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Theory testing (hypothesis testing) in agricultural economics

Sándor Mészáros[1]

Abstract

According to Karl Popper, economics and agricultural economics should be deemed scientific if the theories (hypotheses) are subject to strict tests. The testing of agro-economic theories goes back 50 years in the USA, Canada, Europe, and Japan, and these methods are becoming increasingly part of educational research methodology. In fact, the author of this paper teaches this very subject at Debrecen University, and for this reason has endeavoured to provide an overview on current trends in this field.

The present overview first discusses the role of testing in the research process (cognition), and then analyses the various classification methods (types) of testing. It deals in detail with the application of the (microeconomic) production-theory in agriculture and discusses the potential and limits for measuring scientific progress in this field. Finally it draws conclusions regarding future trends.

Key words

theory testing, hypotheses testing, economics, agricultural economics, production-theory

1. Introduction

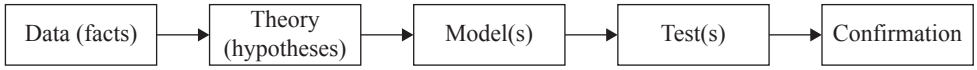
Since 2002 I have been teaching "Agricultural research methodology" at the University of Debrecen to Ph.D. students and consider it important to provide an international overview on the present state of this field. Therefore, this paper is a type of "review paper" presenting the role and the types of testing as well as several application fields. The tests applied in agricultural economics chiefly analyse the microeconomic theories referring to market players' behaviour (producers, consumers, traders). To understand and perform these tests it does not only require traditional agricultural economics, but also knowledge of science philosophy and econometrics.

2. The role of testing in the research process (cognition)

To introduce this section it is appropriate to quote the 19th century science philosopher, Henri Poincaré:

"Science is facts. Just as houses are made of stones, science is made of facts. But a pile of stones is not a house and a collection of facts is not necessarily science." (Poincaré, 1903)

The cognitive process starting from databases to understanding often requires a theory (-ies), model(s) and test(s) (Woodward and Ingram, 2005). These days confirmation is also often added to the list. Therefore, the research process consists of the following main steps:



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This is the general research process, or at least between paradigmatic steps, meaning during periods of "normal" scientific work (see Kuhn, 1962; Mészáros, 2006). However, this process (which is called "scientific method") is not a single process but following feedback will become an iterative (cyclic) process. Wassily Leontief (1971), an American economist of Russian origin, expressed the same as follows: "True advance can be achieved only through an iterative process in which improved theoretical formulation raises new empirical questions and the answers to these questions, in their turn, lead to new theoretical insights."

The process of scientific methods was first developed by the English philosopher Francis Bacon (1620) in his book entitled "Novum Organon". It was Karl Popper (1959), the British science philosopher of Austrian origin, who developed logical hypothesis testing termed "falsification" and required the empirical sciences to test their theories by disaffirmation criteria.

Popper cast doubt on the **justification** of statements (hypotheses) by facts, insisting that the scientific cognition (progress) requires **disaffirmation** of the various hypotheses (Tomcsányi, 2000). Thus it was essential to set up **several hypotheses**, an idea first conceived of by Thomas Chamberlin (1897). American geologist John R. Platt's testing method **"Strong Inference"** is based on this (Platt, 1964). This involves the following:

1. Devising alternative hypotheses
2. Devising a crucial experiment (or several of them), with alternative possible outcomes, each of which will, as nearly as possible, exclude one or more of the hypotheses;
3. Carrying out the experiment so as to get a clean result [and]
4. Recycling the procedure, making sub hypotheses or sequential hypotheses to refine the possibilities that remain..

The role of the experiments in economics is rather limited, but this is not the only reason why hypothesis and theory testing are problematic. Both economics and agricultural economics literature illustrate contradictory opinions on the potential for testing.

3. The question of testing in economics and agricultural economics

In econometrics Hendry (1980) stressed the importance of testing in his article entitled "Econometrics: Alchemy or Science" by creating the "golden rule of econometrics:" testing, testing and more testing. However, the opposition camp lead by the science philospher McCloskey did not waste time in attacking. In her book "Rhetoric of Economics" (1985) she attacked Hendry's ideas, accusing the economists of "testing orgies" but she also tried to illustrate through two surveys that errors were made by the economists during testing; for example, mixing up statistical significance with the magnitude of economic impact. However, two decades later, Hoover and Siegler (2005) succeeded in repelling this attack (I will return to this below).

A comprehensive summary of the topic can be found in the Standford Encyclopaedia of Philosophy (Hausman, 2003). Hausman states that two contemporary scientists, Mark Blaug (1992) and Terence Hutchinson, support the testing requirement. Both men are Popper's disciples. The arguments against testing are summarized by Hausman as follows:

- economic theories can only rarely be falsified in a logical way;
- if they are falsified, Friedman's (1953) methodological principles prevent them from seriously tested;
- if they fail the test the tested theories are not often rejected;
- theories, which have not been adequately tested, can still be applied in economic policy.

Blaug and Hutchison, Popper's two major followers, consider the largest problem as being the requirement that **supplementary hypotheses** are necessary to make theories suitable for testing. Such hypotheses are the following: distribution, indices (indicators), proxies, the hypotheses concerning the absence of (e.g. governmental) intervention. In economics these are called the **Duhem-Quine problem** after the French philosopher Duhem, and the American Willand van Orman Quine. The Duhem-Quine problem's main point is that the individual hypotheses cannot be tested separately from the other hypotheses or the supplementary assumptions. Therefore, economics is not able to apply the empirical data and information to verify the theory, and consequently it is not an exact science. The Duhem-Quine theory's validity is significantly disputed. Sometimes the scepticism comes from the science philosophy side (Boylan and O'Gorman, 2003), and sometimes from others fields of economics. An example of the latter is Soberg (2002) working in experimental economics and McGovern (2006) in financial economics.

The American Journal of Agricultural Economics has also published a discussion on the scientific nature of economics and agricultural economics. The article, written by Leontief (1993), was entitled: "Can Economics be Reconstructed as an Empirical Science?" In this paper he mainly criticizes macroeconomic general equilibrium models and states that partial equilibrium models of agricultural economics are useful. His conclusion was the following: "transformation of economics into a truly empirical science would hardly be possible without substantial additional investment into empirical research and, in particular, systematic data gathering". A biologist and economist named Rosenberg wrote a paper entitled **Powers and Limits of Agricultural Ecnomics** Responding to Leontief's data collection requirement, Rosenberg emphasizes that beforehand one must establish **specific hypotheses** and indicate the coefficients to be measured since otherwise the observations might be sporadic or meaningless. According to him "someone might argue that economic theory has perhaps not developed far enough to inform us as to what sort of data will test it adequately." On the other hand, he discusses agricultural economics' advantages, contrasting it with general economic theory, indicating that the farmers' choice concerning production structure better corresponds to the theory of rational choice. Compared to the other fields of economics, agricultural economics provides opportunities which "make the empirical justification easier, the data more reliable and the theory testing more unambiguous".

It is pertinent to mention that scientific selection from several theories can become a **selection from models**. Another opinion is that in normal conditions the hypotheses take the form of mathematical models (Wikipedia: Scientific method). In the fields of economy and evolution a paper entitled "Model Selection" was published (Johnson and Omland, 2004). In this paper the authors clearly emphasize that "the hypotheses, which are created in verbal or graphical forms have to be transformed into mathematical equations (into models) before adjusting them to the data". In economics, this simply constitutes a natural requirement and an example of this is "Econometrics" by Ramanathan (2003), which discusses model selection within the framework of multiple regression.

4. Types and methods of testing

There are two categories for determining test types. In terms of **volume** there are :

- tests of **individual hypotheses** (statements) and
- tests of **entire theories**

And testing methods can be:

- **logical methods,**
- **mathematical methods (statistical, econometrical)**.

In the relevant literature we find that the classification of testing can also be based on the **purpose** or motivation of testing. Paruolo (2005) lists the following motivations for testing based on econometrics work by Kim, De Marchi and Morgan (1995):

(1) theory falsification
(2a) theory consensus building
(2b) model quality control
(2c) model characteristics in contrast to empirical data.

Keuzenkamp and Magnus (1995) illustrate four different economometrical testing **purposes:**

- theory testing (the authors contend that this is the most far reaching purpose)
- (model) validity testing
- (model) simplification testing
- testing for decision-making

On the basis of the types of testing (in terms of expectations) Nerlove and Bessler (2001) distinguish between **indirect** and **direct** tests. The former are applied for theory testing and the latter are carried out on the basis of observation or data from experiments. It is necessary to point out that the indirect theory testing (and their consequences) is performed on the basis of of Popper's **falsification** logic while the direct tests (on the basis of logical positivists) strive to determine the extent of **confirmation**.

5. Statistical testing of individual hypotheses

According to Liu and Stone (1999) "the ability to conduct and correctly interpret the results of hypothesis tests is one of the most important skills that students can acquire in the introductory statistics course." However, here it it necessary to highlight that this skill is among the **most** difficult to acquire. This could explain why, in agricultural economics, it is not widely applied. However, as Daniel (1998) asserts: "statistical significance testing has existed in some form for approximately 300 years". It is also discussed in detail in Szűcs's textbook for graduate students (Tóthné Lőkös, 2002). However, other scholars' papers on testing have also been published: (Forgács, 2006; Popovics, 2006), and in some books it is also discussed (Fertő, 2006).

A brief review statistical hypothesis' steps of statistical hypothesis tests are the following:

1. The hypothesis has to be expressed in a mathematical or statistical form,
2. A test-statistics has to be selected, in accordance with the hypothesis (e.g. F-test).
3. For the sample the test statistics values are to be determined.
4. The critical range for accepting the hypothesis is to be determined (the alpha value indicates the probability of falling into this range.)
5. A decision is to be made on the acceptance or rejection of the hypothesis depending on whether the test statistical value is within the critical range or not.

Of course, the steps depend on whether the hypothesis testing aims at a parameter, or adjustment, distribution, independence, or homogeneity etc.

Dependent on these are the so-called **null hypothesis** and also, in contrast to it, the alternative hypothesis content. Therefore, the textbooks (e.g. Ramanathan, 2003) discuss hypothesis testing within the framework of various fields' (sections) and also, for example, multiple regression, autocorrelation, and statistical testing of distributed lag models.

Moreover, in the relevant literature statistical testing is sometimes **strongly criticized**. For example, Daniel (1998) prepared a review paper on the erroneous application of the tests and the misinterpretation of the results obtained. On the internet Thompson (2005) published several sources which question the uncritical application of testing statistical hypotheses. The criticisms vary, first of all asserting that modern hypothesis testing is a kind of hybrid of Fisher's "significance testing" and J. Neyman's and E. Pearson's "null hypothesis testing," which focus on the same problem but with differing approaches (Thompson, 2005). Therefore, Spanos (1995) defines this as a textbook paradigm or textbook approach.

McCloskey (publications, 1985 and 2005) criticizes statistical **significance testing** on the basis of three main arguments: 1. For coefficients the "size matters" even if the coefficient is not significant. 2. According to her, economists do not clearly indicate the hypotheses of null hypotheses and neglect type II errors and the power of the tests. 3. She feels that the statistical significance is virtually outside economics (see Hoover and Siegler, 2005). McClosky endeavoured to back her arguments through questionnaire surveys (McClosky and Ziliak, 1996; Ziliak and McClosky, 2004). However, Hoover and Siegler (2005) countered this in a detailed article and proved through examples that this did not offer convincing proof that economists confuse statistical significance with economic significance. Significance tests – if properly applied – are a "valuable tool for assessing signal strength, for assisting in model specification, and for determining causal structure." In order to lessen the problems Daniel (1998) recommended 10 items to editors of educational and social science journals.

6. Scientific progress in agricultural testing of neoclassical production theory

Scientific progress in theory testing over the last 50 years can be illustrated through an overview conducted following the example of agricultural testing of microeconomic production theory. Heady and Shaw's 1954 publication is the major document regarding testing the production side (Paris et al., 1993). The authors calculated Cobb-Douglas-type production functions for crop production and husbandry in four areas of the USA. At that

time, using the microeconomic enterprise theory, farms were considered as profit maximizing and the numerical calculations were made mainly based on the **primal theory** of production functions. Identifying the equilibrium as an important assumption in the neoclassical paradigm, Heady and Shaw (1954) showed through testing the disequilibrium between the factors' marginal productivity and their prices.

In the 1970s the publication of **dual theory** entailed important progress; the main point being that the production function, the cost function, and the profit function can be derived from each other. At the national level one tended to utilise the direct econometric estimation of profit function, and based on this the theory's restrictions were tested.

Noteworthy among early works are Rossi's 1984 analysis of Italian agriculture using the duality theory and Lopez's 1984 analysis of Canadian agriculture. By calculating a generalised Leontief-type profit function and by testing the Hess matrix's curvature characteristics, Lopez found that 75% of its elements were not convex.

Dual theory models are relatively rare and as early as 1994 Fox and Kivanda were able to collect and test 70 agricultural models based on four of the theory's major characteristics: homogeneity, monotony, curvature and symmetry. However, the test did not produce satisfactory results, meaning that in only one model out of 70 were all four theoretical requirements met. Fox and Kivanda's 1994 work was also criticized by several authors. Paris et al. (1993) proved first of all that the theoretical requirements tend be met over the long run rather than over the short run. Reziti and Ozanne (1999) listed several potential reasons for justifying the failure of testing: inappropriate aggregation (among the products, market players); the assumption of non-jointness of products and inputs; inappropriate function types and risk aversion.

Following the introduction of duality there then occurred the **second major theoretical/methodological break-through,** coming in the form of new time series characteristics which were stationary or non-stationary cointegration. The principal architect behind this break-through was Clive W. J. Granger.

Using these new time series characteristics, Reziti and Ozanne (1999) performed tests on Greek agriculture. Based on the 1961-1994 time series, the authors analysed the production side by a macroeconomic (national) approach. In terms of output, they focused on the two main sectors of crop production and husbandry which were aggregated from 66 products. In terms of input, they focused on three variable costs: labour, capital, and current expenses. They also focused on one fixed cost, meaning land. Agricultural production which was described using a Cobb-Douglas function group translog type. Testing was performed from three directions: 1. testing the long-term equilibrium relations (unit root test); 2. in testing the model selection the models applied differed from each other in the way the time factor was evaluated; 3. For testing the theoretical restrictions derived from the production equilibrium, a comparison was made of five different economic models: a statistical equilibrium model (a partial adjustment, an autoregressive and a distributed lag model) and an Error Correction Model (ECM). For the static model the theoretical requirement of both homogeneity and symmetry had to be rejected (with 1% significance) but for the ECM, which proved to be the best, all 3 theoretical requirements were met.

The authors published 11 tables of which 4 presented the parameters of the 4 models while the 7 other tables showed the test data! In comparing the results of the static and ECM

models the authors concluded that in earlier works inadequate specification of the applied models' dynamic properties could have lead to the requirements not being met.

Clark and Grant (2000) were able to monitor the testing results of Fox and Kivanda (1994) on the basis of the time series' non-stationary character. They calculated Canadian agriculture's factor demand functions, and had the foresight to apply the F values instead of the values of the F-test of tables. The F values were calculated by applying **boostrapping techniques** for testing the symmetry and homogeneity. By comparing the two different F-tests, they proved that Fox's and Kivanda's tests (1994) did not reject the neoclassical production theory but rather that the tests were unsuccessful due to inappropriate evaluation of the time series properties.

Finally, we should mention the most recent works by Quirino Paris, in which he tested the technical progress occurring in US agriculture. First, the technical progress's character was tested by calculating Cobb-Douglas type and translog production functions based on the data of 22 Californian cotton processing plants. They concluded that the cotton processing plants do not aim to maximise profit but rather to minimise the costs and that technical progress is not generated by time factor but rather by input price changes (Caputo and Paris, 2004). Later Paris extended the tests to the US agriculture's (Paris, 2005) 80-year time-series extending from 1910 to 1990. By this technique the author tested the theory based on Hicks' assumption (1932) and by analysing the role of input prices. The econometric model to be used for estimation consists of 3 functions (production, input price and input demand functions) and of 3 error-equations. The production function (in three versions) contained 5 different inputs: land, labour, fertiliser, machinery and R+D costs. As for the null hypothesis, the author applied the technical progress model devoid of input prices, which the test rejected outright. Despite the detailed analysis the author does not consider this result as perfect.

7. Discussion and conclusions

When we attempt to evaluate the scientific progress described above several questions arise:

- First, how can scientific progress be **measured** in the fields of theory testing? (and what is the role of theory testing within scientific progress?) Of course, this is above all a science philosophy question, and the methods also exist in other scientific fields (Graham and Dayton, 2002; Ginzburg and Jensen, 2003; Krebs 2006); here we can only attempt to give an answer regarding the production side.
- Regardless of the uncertainty of the measurements, we have to ask whether testing has become **more important** during the last 50 years, and **what kind of phases** can be seen in its development?
- Obviously we are still quite far from the ideal objective of obtaining an inventory-like evaluation. This means being able to determine in the field of agriculture **which parts** of microeconomic production theory were confirmed by tests. However, research has been moving in this direction, and this has been bolstered by the efforts of Fox and Kivanda (1994). Regarding phases, Mundlak (2001) distinguishes between two different types: a phase prior to and then following duality. Since Granger's invention new phases have been detectable and consequently two theoretical-methodological inventions led us to where we are today.

- We have to take also into consideration that testing's success also depends on the **state of the theories**. Hendry (2003) showed that "the economic theory is not complete, correct, and immutable – and never will be". In the theories **ceteris paribus** argumentation has an important role but the factors of variability (e.g. non-stationariness), which are gradually overtaken by econometric testing, are not included. Therefore, in the other scientific fields, theory-maturation is considered important (Loehle, 1987); Paris (2005) provided an example of this. In his work he defined precisely the theorem to be tested.

- However, theory testing's main restrictions are shown in the **data**; or rather the data's observation-type (Spanos, 1995). In the econometric model of agricultural production **inclusion of the technology** is the major problem. Also problematic are the aggregation in terms of products, distinguishing between cutting edge and average technology, and also the interaction between behaviour and economic policy. This problem according to Just and Pope (2001) decreases the usefulness of testing in agricultural production. This explains why currently data acceptable model selection methods and data-mining − which are deemed part of good modelling strategy − are becoming more and more wide-spread (Du Plesis, 2006).

Conclusions can be summarized as follows:

- Currently tests of neoclassical economic models (production, consumption, trade, price transmission, and convergence) mainly occur in US, Canadian, European and Japanese agriculture.

- The tests have confirmed several fundamental principles of the neoclassical economic paradigm. An example is the validity of the Cobb-Douglas and the translog function group in production, cost, and income theory.

- This does not exclude the possible emergence of new paradigms that go beyond the neoclassical economic theory. An example of this phenomenon lies in the fields of institutional economy and most recently in biophysics-based economy (Hall and Klitgaard, 2006).

- Completing the tests is an ambitious task fraught with many difficulties, among them inappropriate aggregation, invalid assumption of lacking non-jointness or jointness among the products and inputs, selection of an inappropriate function type, and a tendency toward risk aversion in an uncertain technological and market environment (Reziti and Ozanne, 1999).

- Therefore, careful analysis is required to decide whether the **theory** itself or any of **its supplementary assumptions** are erroneous (invalid).

- The categories applied by Davis (2004) in the theory reduction (entire theoretical model, partial theoretical model, empirical model, estimating model) can play an important role in recognising the transition between theory and practice.

- The application of computer-intensive methods might help to overcome testing difficulties. An example of this is in cotton processing analysis where 200 thousand repetitions (calculations) were performed for estimating the restriction probability for only one equation (Caputo and Paris 2004).

- There is a strengthening in the agricultural economy's empirical nature and coinciding with this theory testing may become increasingly significant for the future careers of today's Ph.D. students. However, equally important for today's students are statistical and econometric tests for testing individual hypotheses.

References

1. **Bacon,** F. (1620): Novum Organum.
2. **Blaug,** M. (1992): The Methodology of Economics (Second Ed.) Cambridge: Cambridge University Press
3. **Boylan,** T. A. and **O'Gorman,** P. F. (2003): Pragmatism in Economic Methodology: the Duhem-Quine Thesis Revisited. Foundation of Science 8:3-21.
4. **Caputo,** M. R. and **Paris,** Q. (2004): An Atemporal Microeconomic Theory and an Empirical Test of Price-Induced Technical Progress. Giannini foundation for Agricultural Economics, Dept. Agr. And Res. Econ., University of California, Davis, Working Paper No. 04-009. pp. 1-31.
5. **Chamberlin,** T. C. (1897): J. Geol. 837.
6. **Clark,** J. S. and **Grant,** K. G. (2000): Popper and Production: Testing Parametric Restrictions in Systems under Nonstacionarity. Canadian J. Agr. Econ. 48: 15-25.
7. **Daniel,** L. G. (1998): Statistical Significance Testing: A Historical Overview of Misuse and Missinterpretation with Implication for the Editorial Policies of Educational Journals. Research in the Schools 5:23-32.
8. **Davis,** G. C. (2004): The structure of models: understanding theory reduction and testing with a production example. J. Agr. and Resources Econ. 29:65-78.
9. **Du Plessis,** S. (2006): The miracle of the Septuagint and the promise of data mining in economics. Stellenbosch Economic Working Papers: 15/06. Stellenbosch University, South Africa, 31 p.
10. **Fertő,** I. (2006): Agricultural trade in Hungary and in the East-Central European countries (in Hungarian). MTA Közgazdaságtudományi Intézet, Budapest, pp. 160.
11. **Fox,** G. and **Kivanda,** L. (1994): Popper or production? Canadian J. Agr. Econ. 42:1-13.
12. **Friedman,** M. (1953): The Methodology of Positive Economics. Pp. 3-43 In: Essays in positive economics. Chicago: University of Chicago Press.
13. **Ginzburg** L. R. and **Jensen,** C. X. J. (2003): Rules of thumb for judging ecological theories. Trends in Ecology and Evolution. http://tree.trends.com
14. **Graham,** M. H. and **Dayton,** P. K. (2002): On the evolution of ecological ideas: paradigms and scientific progress. Ecology 83: 1481-1489.
15. **Hall,** C. A. S. and **Klitgaard,** K. A. (2006): The Need for a New, Biophysical-Based Paradigm in Economics for the Second Half of the Age of Oil. International J. of Transdisciplinary Research 1:4-22.
16. **Hausman,** D. M. (2003): Philosophy of Economics. In: Stanford Encyclopaedia of Philosophy.
17. **Heady,** E. O. and **Shaw,** R. (1954): Resource Returns and Productivity Coefficients in Selected Farming Areas. Journal of Farm Economics 36:243-257.

18. **Hendry,** D. F. (2003): Bridging the Gap: Linking Economics and Econometrics. Earlier version of book chapter published in: Deibolt C. and Kyrtson, C.: New Trends in Macroeconomics, Springer, Berlin. Heidelberg 2005.

19. **Hendry,** D.F. (1980): Econometrics: Alchemy or Science? Economica 47:387-406.

20. **Hicks,** J. R. (1932): The Theory of Wages. New York: ST Martins.

21. **Hoehn,** J. (1997): Research Methodologies in Agricultural Economics. http://www.msu.edu/couse/aec/991f/jhread.htm

22. **Hoover.** K. D. and **Siegler,** M. V. (2005): Sound and Fury: McClosky and Significance Testing in Economics. Revised Paper (from Internet).

23. **Hutchison,** T. (2000): On the Methodology of Economics and the Formalist Revolution. Cheltenham: Edward Elgar.

24. **Johnson,** J. B. and **Omland,** K. S. (2004): Model selection in ecology and evolution. TRENDS in Ecology and Evolution 19:101-108.

25. **Just,** R. E. and **Pope,** R. D. (2001): The agricultural producer: theory and statistical measurement. Chapter 12 in: Handbook of Agricultural Economics Vol. 1A Eds. Gardner B. L. and Rausser G. C. Elsevier, Amsterdam ▪ London ▪ New York ▪ Oxford ▪ Shannon ▪ Tokyo.

26. **Keuzenkamp,** H. A. and **Magnus,** J. R. (1995): On tests and significance in econometrics. Journal of Econometrics 67: 5-24.

27. **Kim,** J., **De Marchi,** N. and **Morgan,** M. S. (1995): Empirical model particularities and belief in the natural rate hypothesis. Journal of Econometrics 67: 81-102.

28. **Krebs,** C. J. (2006): Ecology after 100 years: Progress and pseudoprogress. New Zeeland J. of Ecology 30: 3-11.

29. **Kuhn,** T. S. (1962): The Structure of Scientific Revolutions. The University of Chicago, Chicago, Illinois, USA

30. **Leontief,** E. (1971): Theoretical Assumptions and Nonobserved Facts. Amer. Econ. Rev. 61:1-7.

31. **Leontief,** E. (1993): Can Economics be Reconstructed as an Empirical Science? Amer. J. Agr. Econ. 75(October):2-5.

32. **Liu,** T. and **Stone,** C. C. (1999): A Critique of One-Tailed Hypothesis Test Procedures in Business and Economics Statistic Textbooks. J. Economic Education Winter 1999:59-63.

33. **Loehle,** C. (1987): Hypothesis testing in ecology: psychological aspects and the importance of theory maturation. The Quarterly Review of Biology 62: 397-409.

34. **Lopez,** R. (1984): Estimating Substitution and Expansion Effects Using a Profit Function Framework. Amer. J. Agr. Econ. 66:358-367.

35. **McClosky,** D. N. and **Ziliak,** S. T. (1996): The Standard Error of Regressions. Journal of Economic Literature 34: 97-114.

36. **McClosky,** D.N. (1985): The rhetoric of economics. Universíty of Wiscosin Press, Madison, WI, USA

37. **McGovern,** S. (2006): Dealing with the Duhem-Quine thesis in financial economics: can causal holism help? Cambridge J. Economics 30:105-122.

38. **Mészáros,** S (2006): Application of the definition of paradigm in agriculture (in Hungarian). Gazdálkodás 50(6):42-50.

39. **Mundlak,** Y. (2001): Production and Supply. Chapter 1 in: Handbook of Agricultural Economics Vol. 1A Eds. Gardner B. L. and Rausser G. C. Elsevier, Amsterdam ▪ London ▪ New York ▪ Oxford ▪ Shannon ▪ Tokyo.

40. **Nerlove,** M. and **Bessler,** D. A. (2001): Expectations, Information and Dynamics. Chapter 3 **in** Handbook of Agricultural Economics Vol. 1A. Eds. Gardner B. L. and Rausser, G. C., Elsevier, Amsterdam ▪ London ▪ New York ▪ Oxford ▪ Paris ▪ Shannon ▪ Tokyo.

41. **Paris,** Q. (2005): Price Induced Technical Progress in 80 years of U. S. Agriculture. Giannini Foundation of Agricultural Economics, Working Paper No. 05-002., Dept. Agr. And Res. Econ., University of California, Davis, pp. 1-49.

42. **Paris,** Q., **Caputo,** M. R. and **Holloway,** G. J. (1993): Keeping the Dream of Rigorous Hypothesis Testing Alive. Amer. J. Agr. Econ. 75(October):24-40.

43. **Paruolo,** P. (2005): Automated Inference and the Future of Econometrics: a Comment. Econometric Theory 21: 78-84.

44. **Platt,** J. R. (1964): Strong Inference. Science 146:No. 3642):347-353.

45. **Poincaré,** H. (1903): La Science et L'hypothése.

46. **Ramanathan,** R. (2003): Introduction to Econometrics by Applications (Hungarian translation). Panem Könyvkiadó, Budapest

47. **Reziti,** J. and **Ozanne,** A. (1999): Testing regularity properties in static and dynamic duality models: the case of Greek agriculture. Eur. Rev. Agr. Econ. 26:461-477.

48. **Rosenberg,** A. (1993): Powers and Limits of Agricultural Economics. Amer. J. Agr. Econ. 75 (October):15-24.

49. **Rossi,** N. (1984): The Estimation of Product Supply and Input Demand by the Differential Approach. Amer. J. Agr. Econ. 66: 369-375.

50. **Søberg,** M. (2002): The Duhem-Quine thesis and experimental economics: A reinterpretation. Statistics Norway, Research Department, Discussion Papers No. 329, pp. 1-22.

51. **Spanos,** A. (1995): On theory testing in econometrics. Modeling with nonexperimental data. Journal of Econometrics 67: 189-226.

52. **Thompson,** W. L. (2005): 326 Articles/Books Questioning the Indiscriminate Use of Statistical Hypothesis Tests in Observational Studies. http://www.cnr.colostate.edu/~anderson/thompson1.html

53. **Tomcsányi,** P (2000): General research methodology (in Hungarian). Szent István University, Gödöllő – National Agricultural Qualifying Institute, Budapest, p. 475

54. **Tóthné Lőkös,** K. (2002): Statistical hypothesis testing (in Hungarian). pp. 211-274 In: Alkalmazott statisztika (Applied statistics, (ed.: I. Szűcs.) Agroinform Kiadó, Budapest.

55. **Woodward,** J. and **Ingram.** J. (2005): Modelling and theory. New Phytologist 165:337-338.

56. **Ziliak,** S. T. and **Mc Closky,** D. N. (2004): Size Matters: The Standard Error of Regressions in the American Economic Review. Journal of Socio-Economics 33:524-546.

Hope and reality: EU accession's impact on Hungarian agri-food trade

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Abstract

The principal aim of this article is to examine how Hungary's agricultural trade has changed since EU accession and whether the country has managed to retain its position as a net exporter. After analysing the Eurostat database's latest statistical data we concluded that Hungary's agri-food trade position has deteriorated regarding both old and new EU member states. The central causes for this are not so much insufficient exports but rather a sharp rise in imports.. Future prospects hinge on further EU enlargement, changes in the EU's Common Agricultural Policy, the outcome of the WTO Doha Round, and trends in world agriculture. To adapt to expected changes and to capitalise on emerging opportunities, Hungary should alter its agricultural export commodity structure in order to increase its competitiveness and diversify its geographical structure.

Key words

EU accession, Hungarian agricultural trade, trade balance, commodity structure, geographical structure

Introduction

When Hungary joined the EU it was the only net agricultural exporter among the ten new member states. At that time its major agri-food trade objective[2] was to retain or perhaps improve this position to help rectify the country's balance of payments problems (Kiss, 2002). However, it has since become apparent that this objective might not be attained. By early 2005 Hungary had an agricultural foreign trade deficit with the new member states (Kiss, 2005a), and by July 2006 this also occurred with the old ones (Szabó, 2006). Fortunately, Hungary's agri-food trade balance with non-EU countries had always been positive, and thus the 674 million euro agricultural export surplus stemming from this (which existed in 2006) was able to counterbalance the 113 million euro deficit with the EU.

Therefore, the central questions and the focus of our study are as follows:

- What caused the undesirable and unexpected deterioration in Hungary's position in agricultural foreign trade?
- Why hasn't there been a major increase in exports in agricultural products in the post-accession period?
- Why were the old and new member states more efficient than Hungary when it came to capitalising on EU accession?
- Where exactly has the decline in Hungary's agri-food position occurred?
- What could and should be done to reverse this trend?
- And finally, what are Hungary's prospects?

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[2] In the coming text *agri-food trade* and *agricultural trade* are used interchangeably.

1. Stagnant exports and increasing imports in agricultural products[3]

Between 2003 and 2006 Hungarian total exports to the EU-24 increased from 30.935 billion euros to 43.924 billion euros, meaning a growth rate of around 42 per cent. However during the same period, Hungarian agricultural exports expanded by only 33 percent, from 1.663 billion euros to 2.210 billion euros (see *Table 1*). Consequently, the share of agricultural products in terms of total exports did not change significantly: between 2003 and 2005 it increased from 5.4 per cent to 5.5 per cent. Moreover, by 2006 the share of agricultural products in terms of total exports decreased to 5.0 per cent, indicating a fall in agricultural export dynamism.

Table 1

Hungarian foreign trade with the EU countries (2003 – 2006)
(million euros)

	2003 (EU-15) +10 candidate countries	2004 (EU-24)	2005 (EU-24)	2006 (EU-24)
Total exports	30,934.70	35,456.70	38,681.00	43,924.00
Agricultural exports	1,663.00	1,972.80	2,130.80	2,210.00
Share of agricultural exports (%)	5.37	5.56	5.50	5.03
Total imports	26,663.20	32,565.20	36,223.40	40,912.00
Agricultural imports	994.30	1,631.30	2,091.70	2,323.00
Share of agricultural imports (%)	3.73	5.00	5.77	5.68

Source*:* author's own calculations based on Eurostat database[4]

When comparing exports and imports, one observes more movement on the import side. Between 2003 and 2006 Hungary's total imports from the EU increased by 53.4 per cent, but Hungary's agricultural imports more than doubled, increasing by **133.6** per cent. Therefore, agricultural goods' share of total imports grew from 3.7 per cent (2003) to 5.7 per cent by 2006, implying a surge in import penetration.

2. The EU as a market and as a source of supply

Given that Hungarian agricultural exports to the EU have increased somewhat more than Hungarian total exports, the EU's significance as a market has grown slightly (see *Table 2*). However, this **5 percentage point market expansion** is rather modest:given that this is the totality (returns) of the unfettered market access enjoyed by post-accession Hungarian agricultural exporters regarding both the old and the new member states. It is necessary to acknowledge that with the old member states significant market expansion was not expected. This was because 92 per cent of their agricultural market had already been liberalised prior to accession (Kiss, 2005b), and very few market access obstacles remained.

[3] By agricultural products we mean the SITC 0+1+29+41 commodity categories, namely: food and live animals, beverages and tobacco, raw animal and vegetable materials, and animal fats and vegetable oils.

[4] A special thank you goes to Gábor Túry, research fellow of the Institute for World Economics for collecting data and compiling a database.

However, with the new member states greater market expansion was expected in the post-accession period. This was because of the high agricultural customs prevalent in the former CEFTA coupled with other trade barriers. One of the major reasons Hungary has not been able to cash in on improved market access is its poor (price) competitiveness.

Table 2

The EU-24's share in Hungarian agricultural trade

million euros

	2003	2004	2005	2006
Total agricultural exports	2,677	2,926	3,167	3,297
Agricultural exports to the EU	1,663	1,973	2,131	2,210
The EU share (%)	62.1	67.4	67.2	67.0
Total agricultural imports	1,461	2,004	2,408	2,624
Agricultural imports from the EU	994	1,631	2,092	2,323
The EU share (%)	68.0	81.4	86.9	88.5

Source*:* author's own calculations based on Eurostat database

As shown in Table 2, more significant changes occurred on the **import side** than on the export side. Between 2003 and 2006 the EU-24's share of Hungarian agricultural imports increased from 68 per cent to 88.5 per cent, a growth of more than 20 percentage points. Presently around **90 per cent** of Hungary's agricultural imports arrive from the enlarged EU.

The above increase can be partly explained by the fact that prior to accession "only" 85 per cent of the Hungarian agricultural market was liberalised regarding the EU-15. Moreover, due to their cost efficiency the new member states managed to make better use of the improved market access opportunities. Furthermore, increased import penetration from the enlarged EU was enhanced by a growing Hungarian agricultural market protection level leading to a diversion of agricultural imports from third countries towards EU countries. Another element stems from a change in the statistical system pertaining to imports. Now the basis for registration is no longer the country of origin, but the country that sent (forwarded) a given product. Consequently, agricultural import items originating from developing countries statistically appear as German or Dutch imports.

Further issues to be covered:

- in which countries (the old or new member states)and in which product categories did they manage to increase their market share?
- what is the impact of this process on Hungary's agricultural trade balance.

3. Hungary's agricultural trade relationship with the EU

As shown in *Table 3*, between 2003 and 2006 Hungarian agricultural exports to the EU-15 increased by 25.7 per cent, but Hungarian agricultural imports more than doubled. Therefore, by 2006 Hungary's agricultural trade surplus with the old member states vanished. As for new member states, Hungarian agricultural exports increased by 59 per cent, thus growing faster than the country's agricultural exports to the old member countries. At the

same time Hungary's agricultural imports from the new member states more than tripled, and by 2005 Hungary's agricultural trade balance became negative and in 2006 deteriorated further. The deficit in Hungary's agricultural trade balance is because **Hungary's agricultural imports increased faster than Hungary's agricultural exports**.

Table 3

Agricultural trade balance

million euros

	2003	2004	2005	2006
Agricultural exports				
EU-15	1,306.6	1,528.8	1,634.0	1,643.0
EU-9*	356.4	444.0	496.8	567.0
Agricultural imports				
EU-15	773.5	1,206.4	1,554.9	1,634.0
EU-9	220.8	414.8	536.8	689.0
Trade balance				
EU-15	533.1	322.4	79.1	9.0
EU-9	135.6	29.2	-40.0	-122.0
EU-24	668.7	351.6	39.1	-113.0
Total agricultural trade balance	1,216.0	+922.0	+759.0	+674.0

* Referring to the new member states we use the term *EU-9* as the term EU-10 also includes Hungary and thus it has no relevance in relation to Hungary's foreign trade with the new member countries.
Source: author's own calculations based on Eurostat database

In order to determine where Hungary's agricultural trade balance has deteriorated the most, it is pertinent to analyse the country's agricultural trade relations.

As is shown in Table 4, among **old member states** Hungary's most important agricultural **export markets** are Germany, Italy and Austria as 62 per cent of Hungary's agricultural exports to the EU-15 went there. The major **import sources** are Germany, the Netherlands and Austria from where 66 per cent of Hungarian agricultural imports derive. As for Hungary's trade balance, the Hungarian agricultural trade deficit chiefly derives from trade with the Netherlands, Germany, Belgium and Denmark. With Denmark the import surplus is due to a Danish agricultural export offensive (in 2005 Danish agricultural exports to Hungary increased by 35 per cent compared to 2004). With Germany and especially with the Netherlands, the significant export surplus is linked to the two nations' geographic location. For example, a significant part of agricultural imports from developing or third countries lands in Rotterdam, Hamburg, or Bremen, and, according to new statistical regulations, these products are registered as EU imports upon arrival in Hungary. This change explains why in 2003 the value of Dutch and German agricultural exports to Hungary equalled 105, and 187 million euros, respectively, but by 2006 shot up to 253 and 557 million euros, meaning a respective increase of 2.4, and 3.0 times the previous figures.

Table 4

Export and import markets in Hungary's agricultural trade EU-15 (2006)

million euros

	Exports	Imports	Balance
Austria	236.3	169.1	67.2
Belgium + Luxemburg	53.9	69.3	-15.4
Denmark	17.7	27.9	-10.2
Finland	10.8	1.2	9.6
France	93.7	95.3	-1.6
Germany	428.8	557.1	-128.3
Great Britain	116.8	50.6	66.2
Greece	96.1	18.6	77.5
Ireland	4.0	7.6	-3.6
Italy	311.6	139.7	171.9
Portugal	2.9	3.1	-0.2
Spain	69.2	77.5	-8.3
Sweden	30.2	7.7	22.5
The Netherlands	96.3	252.5	-156.2

Source*:* author's own calculations based on Eurostat database

Regarding **new member states** Hungary enjoys a positive agricultural trade balance with seven countries (especially with Slovenia), but with Slovakia Hungary has a slight agricultural trade deficit: and a significant deficit with **Poland**. This is mainly due to Hungary's poor export performance (especially in relation to Poland) and the massive imports from new member states.

Table 5

Hungary's agricultural trade with the new member states (2006)

million euros

	Exports	Imports	Balance
Cyprus	7.5	2.6	4.9
Czech Republic	134.4	109.3	25.1
Estonia	9.7	0.5	9.2
Latvia	10.3	0.8	9.5
Lithuania	17.9	3.8	14.1
Malta	2.1	0.1	2.0
Poland	136.4	351.0	-214.6
Slovenia	96.8	38.6	58.2
Slovakia	143.2	153.9	-10.7

Source*:* own calculations based on Eurostat database

4. How the commodity structure changed

After analysing the background behind the Hungarian agricultural market loss and import penetration, the next issue to be discussed is changes in the commodity structure. (*Table 6*)

According to Table 6, the major Hungarian agricultural **exports** were the following: meat products, cereals, fruit and vegetables, plus sugar and food stuffs. Between 2003 and 2006 sugar, wheat, and rape exports increased markedly. The most important **imports** were the following: coffee, tea, cocoa, spices (typical off-shore products entering Hungary as EU import goods), plus food stuff for animals, beverages, tobacco, fruits and vegetables, plus raw animal and vegetable materials. Some of these products are not available in Hungary, and hence their imports play a complementary role. Between 2003 and 2006 the most significant import growth occurred for the following product groups: pork, pigs, tobacco, cheese, milk, sugar, beverages and spirits.

Table 6

The commodity structure of Hungary's agricultural trade with the EU-15 (2006)

million euros

Commodity group (SITC)	Exports	Imports	Balance
0 – food and live animals	1,504	1,263	241
00 – live animals	87	26	61
01 – meat and meat preparations	384	185	199
02 – dairy products and eggs	56	116	-60
03 – fish	4	19	-15
04 – cereals and cereal preparations	349	98	251
05 – vegetables and fruit	288	246	42
06 – sugars, sugar preparations	101	35	66
07 – coffee, tea, cocoa, spices	34	151	-117
08 – feeding stuff for animals	118	186	-68
1 – beverages and tobacco	55	145	-90
11 – beverages	41	106	-65
12 – tobacco	12	28	-16
29 – crude animal and vegetable materials	75	177	-102
4 animal, vegetable oil, fat	9	49	-40
Agricultural goods	1,643	1,634	9

Source*:* author's own calculations based on Eurostat database

Regarding the commodity structure of Hungary's agricultural trade with the **new member states,** the major export items were: meat products, cereals and cereal products, fruit and vegetables, and food stuff for animals. The trade deficit is due to increasing milk and dairy product imports, live animals, meat, and beverages.

Table 7

Commodity breakdown regarding Hungary's agricultural trade with new member states (2006)

million euros

Commodity group (SITC)	Exports	Imports	Balance
0 – food and live animals	494	563	-69
00 – live animals	11	57	-46
01 – meat, meat preparations	48	32	16
02 – dairy products and eggs	27	84	-57
03 – fish	0	11	-11
04 – cereals and cereal preparations	77	65	12
05 – vegetables, fruit	81	55	26
06 – sugars, sugar preparations	67	26	41
07 – coffee, tea, cocoa, spices	93	69	24
08 – food stuff for animals	39	56	-17
1 – beverages and tobacco	60	94	-34
11 – beverages	45	37	8
12 – tobacco	13	53	-40
29 – raw animal and vegetable materials	6	29	-23
4 animal, vegetable oil, fat	4	3	1
Agricultural goods	564	689	-125

Source*:* author's own calculations based on Eurostat database

5. Conclusions and prospects

Prior to accession it was hoped that Hungary would manage to hold and/or improve her position in the field of agricultural trade, but this hope failed to materialise first regarding the new member states and later the old member countries. By 2006 Hungary's agricultural EU-24 trade balance turned negative and this is increasingly difficult to offset with the surplus in other areas. Despite Hungary's 2006 positive agricultural trade balance, its value (674 million euros) still represents a decline[5] from previous years. This decline is noteworthy given that, under optimal conditions, Hungarian agriculture is capable of generating a multi-billion euro surplus and, since EU accession, the sector has enjoyed unparalleled financial support.

The major reasons for the above-mentioned trends are not so much **inadequate export performance**, but rather a **sharp growth in imports**.[6] Luckily, this sharp rise in imports is partially due to reclassification of imports (see the Dutch and German cases), but this does not explain why Hungary's agricultural trade balance with the new member states began to run a deficit. Hungary has to tackle problems in production, competitiveness, quality, food

[5] In November 2004 Hungary's agricultural trade balance equalled 875 million euros. One year before – that is prior to accession – it was 1110 million euros.

[6] Despite the significant import penetration the share of imported goods in the Hungarian domestic market is around 15 per cent.

safety and marketing. Moreover, Hungary has to reckon with expanding competition in the (Hungarian) domestic market. Imports of cheap and poor quality agricultural products should be countered by increasing the bargaining power of domestic producers and by severe quality control measures, meaning Hungary should strengthen its market protection system while still conforming with WTO standards, and thus promote fair competition.

However, there are few grounds for optimism In January 2007 Romania and Bulgaria joined the EU. These two countries have significant agricultural potential and with them Hungarian agricultural trade may show the same tendencies as with the EU-9.[7] In the coming years Hungarian agricultural producers will receive greater financial support, but eventually the **EU's Common Agricultural Policy** is expected to change and not favour either production or export increases,[8] (Kiss, 2006). The extent of these changes highly depends on the outcome of the **Doha WTO Round**. Though the details of the projected agreement are not known, some tendencies are apparent and a preliminary impact analysis can be made:

- because of **decreasing agricultural tariffs** (customs), the EU's market protection level (including in Hungary) will diminish, and thus competition seems destined to become keen(er) in the EU as well as in the Hungarian (domestic) market;
- **market access** might also improve. however, but this will hold true only for 30 per cent of the nation's total agricultural exports as market access conditions will not change regarding the EU-26. The question is whether Hungary will be capable of capitalising on improving market access opportunities outside the EU, and can withstand increasing competition from OECD-countries and especially from developing countries in third markets;
- the above issue is all the more relevant as Hungarian **export subsidies** may decrease and be completely eliminated from 2013;
- moreover, the WTO agriculture agreement will oblige member countries to decrease their **domestic agricultural support**, which in Hungary's case are due to increase until 2013 according to the EU accession agreement.

There is, however, some room for optimism. Various forecasts on **international agriculture** (OECD-FAO, 2006) predict that in the coming decade world agricultural markets will be demand-driven. Overall demand for agricultural products will increase because of population and income growth in developing countries and also because of rapid urbanisation. Thus, demand will especially rise in developing countries. At the same time demand structure will tend toward highly processed and animal products. Though the real prices of agricultural products will not increase significantly, a nominal price increase can be expected.

If oil prices remain high, energy crop production will intensify leading to accelerated demand for land and water. This process might bolster the position of countries with significant agricultural potential. Luckily, Hungary belongs to this "distinguished club".

In order to withstand competition Hungary should change its production and **export commodity structure** toward high value added processed goods, animal products, and fruits and vegetables. It should increase its competitiveness via decreasing production costs, increasing efficiency, improving quality, building up sales infrastructure and an efficient marketing system. Target markets should also be modified as it is predicted that demand for agricultural products will increase mainly in developing countries and emerging markets.

[7] In the first half of 2006 our agricultural trade with Romania had a 90 million euro surplus and with Bulgaria a 9 million euro surplus (Szabó, 2006).

[8] See the reform of the sugar, wine, fruit and vegetable sectors or the change of the intervention system.

References

1. *Enlargement, two years after: an economic evaluation* (2006), European Economy, Occassional Papers No. 24, European Commission, Directorate-General for Economic and Financial Affairs, 111 pp.
2. *Eurostat*, European Community, various issues
3. **Fertő**, I. (2006): *Az agrárkereskedelem átalakulása Magyarországon és a kelet-közép-európai országokban*, MTA Közgazdaságtudományi Intézet, 2006, Budapest, 160 pp.
4. **Kartali**, J. (ed.): A magyar agrártermelés piaci lehetőségeit veszélyeztető versenytársak várható magatartása. *Agrárgazdasági Információk*, 2007. 2. AKI, Budapest
5. **Kartali**, J. and **Wagner**, H.: Az élelmiszergazdasági külkereskedelem hazai és nemzetközi adatforrásainak eltérései és azok okai. *Agrárgazdasági Információk*, 2007. 3. AKI, Budapest
6. **Kiss**, J. (2002): *A magyar mezőgazdaság világgazdasági mozgástere (The world economic environment of the Hungarian agriculture),* Budapest, Akadémiai Kiadó, 406 p.
7. **Kiss**, J. (2005a): Ki mint vet …, avagy az új EU-tagok mezőgazdasága (The agriculture of the new member states in the EU), *Falu*, Vol. XX, No. 2, 2005. Summer, pp. 73–89.
8. **Kiss**, J. (2005b): A magyar élelmiszergazdaság világgazdasági mozgástere (The manoeuvring room of the Hungarian agriculture), *Kihívások,* No. 184. szám, MTA VKI, 16 p.
9. **Kiss**, J. (2006): Az EU agrárpolitikájának főbb kérdőjelei és a várható megoldási módozatok (The main questions and answers of the EU's Common Agricultural Policy), *EU-tanulmányok VI,* Budapest, Nemzeti Fejlesztési Hivatal, pp. 201–223.
10. **Kiss**, J. (2007): *A világ mezőgazdasága a XXI. század első évtizedeiben*, Budapest, 2007, MTA Világgazdasági Kutatóintézet, kézirat, 15 pp.
11. **Kürti**, A,; **Stauder**, M.; **Wagner**, H. and **Kürthy**, Gy. (2007): *A magyar élelmiszergazdasági import dinamikus növekedésének okai*, Agrárgazdasági Kutató Intézet, kézirat pp. 100
12. **Lukas**, Z. and **Mládek**, J. (2006): *Central and Eastern European Agriculture in Integrating Europe,* WIIW Research Reports No. 329, Vienna Institute for International Economic Studies, 40 pp.
13. *Mezőgazdasági Statisztikai Évkönyv 2005*, KSH, Budapest, 2006.
14. *Monitoring jelentés 2005, A nyolc új közép- és kelet-európai tagország első uniós évéről*, 2004. május 1. – 2005. május 1., (szerk.: Vida Krisztina), MTA Világgazdasági Kutató Intézet), Budapest, 112 pp.
15. *Monitoring jelentés 2006, A nyolc közép- és kelet-európai tagország második uniós évéről*, 2005. május 1. – 2006. május 1., (szerk.: Vida Krisztina), MTA Világgazdasági Kutató Intézet), Budapest, 153 pp.
16. *OECD-FAO Agricultural Outlook 2006-2015*, Paris-Rome, OECD/FAO, 2006.

17. *Prospects for agricultural markets and income in the European Union*, *2006-2013*, European Commission, Directorate-General for Agriculture, July 2006, 36 pp.

18. **Szabó**, J. (2006): Agrár-külkereskedelmünk 2006 januárja és júniusa között (Hungary' agricultural trade between January and June 2006), *Az Európai Unió Agrárgazdasága*, Vol. 11, Nos. 11-12, pp. 15–16.

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Sigma convergence in Hungarian agriculture

Ibolya Lámfalusi[1]

Abstract

The present paper provides an analysis of agricultural sigma convergence in four old Member States and in Hungary. The analysis was derived from the output and input data from the Economic Accounts for Agriculture between 1990-2005. The results obtained indicate significant convergence in the old Member States and Hungary. First of all this held true for incomes but the inputs do not reveal a perceptible pattern. However, in terms of outputs Hungary lags well behind the Old Member States, but the difference is not nearly as great for inputs. This can probably be explained by the fact that the rate of increase for inputs is higher than for producer prices, meaning the relative prices of agricultural output and input products (agricultural terms of trade) are increasing, which decelerates the convergence process. Even the improvement in efficiency can only partly compensate for these negative effects. The results of the analysis underline the importance of the number of employees of which the continual and significant decrease largely determines convergence itself and also its rate.

Key words

sigma convergence, EU, agriculture, income, indicators

Introduction

Economic growth and convergence are stimulating macroeconomic research fields. By analysing economic development the experts would like to answer fundamental questions such as the source of growth, what determines a country's growth rate and its pattern, and whether or not equalization among developed and less developed countries can be expected. The latter is a relevant question for interdependent countries or groups such as the EU Member States. Due to their common economic policy the Member States should become more interdependent. However, a result of constant EU enlargement is that differences among Member States regarding levels of development are increasing and it is becoming increasingly difficult to create a unique economic level. Initially the six founding ECC members had almost the same economic level but today the EU includes 27 Member States, having various levels of economic development. Therefore, it is an important question whether in such a heterogeneous community one can eventually expect differences in levels of development to disappear.

And all the factors mentioned above are even more relevant to agriculture. The Common Agricultural Policy is the most complicated and detailed EU regulatory system, and agriculture is also the main user of EU financial resources. Will the common regulation of agriculture facilitate more rapid convergence by new members, which includes Hungary?; and will this serve to eliminate differences among Member States, i.e., to convergence? Before analysing the question in more detail it is pertinent to overview convergence theories' chief characteristics and describe the definitions regarding the field's main elements.

Among convergence theories first came the **absolute convergence hypothesis** which was based on the neoclassical growth model, meaning the Solow model. In accordance with this hypothesis, poor developing countries are able to converge into the group of economi-

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cally developed countries. Due to decreasing marginal products, the growth rate in the less developed countries is larger than that of the more developed ones, which means that the poor countries are automatically lifted up, and that income differences are gradually erased.

However, the hypothesis of absolute convergence has not proven true in practice. The methods applied for empirically testing the model have been criticized. Friedman (Friedman, 1992) and Quah (Quah, 1993) emphasized that the convergence results obtained are statistically incorrect. (Major, 2001).

Following this came the **conditional convergence theory.** The theory's key idea is that the poor countries will not approach rich countries' development level (that is, to a certain level of development) but will grow at various equilibrium pathways. Each country has a characteristic long-term growth stage and trend, determined by the country**'**s natural, economic and social conditions. The long-term equilibrium (i.e., the steady-state) of two or more countries is only uniform if all their parameters are identical (Ligeti, 2002.).

As mentioned above, the neoclassical model stipulates that the growth rate gradually decreases. As a country approaches a state of long-term equilibrium, the growth rate declines. However, this assumption seemed to contradict the observed facts so in the eighties a new development model was created. In contrast to the neoclassical theory's conclusions, the so-called endogenous growth theory predicted the continuation of the national income growth rate per capita in the various countries, meaning that the existing income differences will either increase or at least remain.

However, despite the new developments the most recent empirical work regarding the various countries' and regions' relative growth was not inspired by the new theories. Parallel to the endogenous trend a more sophisticated and precise analysis has also been published of which the empirical analyses are based on the old neoclassical model. The data support the conditional convergence, which relates particularly to the neoclassical model (Barro, 1997).

The literature of the last decade replaced the definition of absolute convergence with the designation of **σ convergence.** The main reason for this is that σ convergence is a more far-reaching definition than the absolute convergence hypothesis, and therefore includes it as a base case. This definition is more far-reaching than the absolute convergence hypothesis since in σ convergence the subject of the analysis is not all the countries in the world but can be any group of countries or any regions within a country. In accordance with this concept convergence means that the dispersion of the indicator analysed shows a declining tendency over time (Barro, 1992).

Both absolute and σ convergence analyse the convergence itself and its extent and do not deal with its rate. The definition indicating the speed of convergence is the **β convergence.** β convergence means that poor countries' growth rate is higher than that of the rich ones and thus the poor ones are able to converge. The number of β indicates the estimated speed or rate of convergence (Barro, 1992).

The two different convergence definitions are related to each other; meaning β convergence derives from σ convergence but the contrary does not hold true. For the "condensation" of the countries' cross-sectional data more rapid growth in the poor countries is indispensable. Thus β convergence is a prerequisite for σ convergence but it is not a sufficient condition.

In accordance with the hypothesis of conditional convergence, β convergence applies to some countries in the sense that each country converges to its own long-term equilibrium and the convergence rate is in inverse ratio to the distance to the end state. However, conditional convergence does not state whether the long-term equilibriums of the various countries approach each other or not, meaning it does not say anything about σ convergence.

The international literature contains a wide range of papers on convergence. Among a few works referred to in this paper is Barro és Sala-i-Martin (1991, 1992) who analysed conditional convergence in 48 US states. Also mentioned is Bernard és Durlauf (1996) who dealt with the differences between cross sectional and time series convergence testing. Guetat és Serranito (2007) investigated both absolute and conditional convergence in southern African countries. Convergence in the 140 NUTS2 regions of the Community was analysed by Brasili és Gutierez (2004). Among the Hungarian authors we refer to papers by Major (2001) and Ligeti (2002) on convergence theory and dynamics as well as the paper by Dedák (2000) which discusses growth theoretical relationships in economic catching up.

Both the international and Hungarian literature focus on convergence at the national level rather than the various sectors, such as agriculture. Also mentioned in this paper is an analysis by Mukhereje and Kuroda (2003), on agricultural convergence in 14 states of India while McCunn and Huffman (2000) tested the effects of convergence research on the agricultural sector. Soares and Ronco (2000) investigated trends in agricultural income differences and profitability in terms of time in EU Member States while Ludena and his co-authors (2007) analysed convergence at sub-sector levels (crop, ruminants and non-ruminants production) and they also prepared forecasts.

Hungarian authors Borbély and Vanicsek (2001) dealt with the above mentioned research field and compared Hungary and the EU at the national and sectoral level regarding agriculture, industry, and services.

The above-mentioned papers and those listed in the References section sharply differ from each other regarding the type of analysis and the conclusions drawn. These differences can be identified as follows:

- On the basis of the convergence type, meaning from the definitions discussed above which are the focus of the analysis;
- By determining whether the analysis covers only the outputs or also the inputs.
- On the basis of the analysis is the total factor productivity, meaning any of the partial productivity indicators;
- By determining whether it refers to the whole agricultural sector or to some subsectors or to some groups of a sub-sector.

The present paper analyses σ convergence. On the basis of partial productivity indicators we endeavour to learn whether Hungarian agriculture (its total) is approaching the EU level and whether convergence is occurring more on the input side or on the output side?

Databases and methodology

The goal of this paper is to analyse Hungarian agricultural convergence and that of four Member States from the EU-15 (Austria, Denmark, France and Portugal).

In selecting the mentioned Member States agriculture's weight in the national economy was the determining factor as in each of the four countries agriculture accounts for 2-4%[2] of GDP. Moreover, agricultural activity or any of the production conditions are similar to those in Hungary. Among the determining factors for studying these countries were the product structure of Danish agricultural production, Austria's Accession date, Portugal's development level, and the diverse nature of French agriculture.

The convergence analysis is based on EUROSTAT data and included in the Economic Accounts for Agriculture (EAA)[3] which provides an overview of agricultural performance in the Member States. Since 1964 the Statistical Office of the European Union has regularly collected EAA data. The Hungarian EAA started in 1996 and was first published in 1998[4].

Starting with the *agricultural industry's output by deducting the various items of inputs*[5], the EAA arrives at the entrepreneurial income indicating the income of the non-paid labour, the income originating from land and from capital (Table 1).

Sigma convergence is the relationship between the output and input data from the countries studied provided the cross-sectional dispersion of the countries is declining over time. Testing the sigma convergence can be performed by estimating the following regression equation applied by McCunn and Huffman (2000):

$$\text{var (ln GDP/capita)} = \Phi_1 + \Phi_2 * t + \varepsilon_t$$

where, var (ln GDP/capita) is the GDP per capita variance; Φ_1 constant; Φ_2 regression coefficient; t time factor; ε_t white noise with zero expected value.

The sufficient condition for sigma convergence is that the regression coefficient (Φ_2) is negative and significantly different from zero, the latter tested by a t-test. The null and alternate hypotheses are the following:

H_0: $\Phi_2=0$

H_1: $\Phi_2\neq0$

The test statistic of hypothesis testing is: $t_t = \Phi_2 / S_{(\Phi 2)}$. The significance level of the hypothesis testing is: α=5%.

[2] By considering the share of agriculture - in the narrowest sense, that is, ignoring the upward and downward processing, in GDP.

[3] EAA does not include the non-agricultural activity of agricultural organisations but it contains the agricultural activity of non-agricultural organisations.

[4] A detailed description of the database is provided in the publication of KSH entitled „Economic Accounts for Agriculture, 2006".

[5] From among the items to be deducted from the gross output neither the balance of taxes and subsidies on production nor the rents and the interests paid and received can be classified into the group of the inputs but in order to make it simple in the following the items to be deducted from the gross output are called inputs.

Table 1

Output and input categories in the Economic Accounts of Agriculture

Output of the agricultural industry					
Total intermediate consumption	Gross value added				
	Fixed capital consumption	Net value added			
		Balance of other taxes and subsidies on production	Factor income		
			Compensation of employees	Operating surplus/mixed income	
				Balance of rents paid*, interest paid and received	Net entrepreneurial income

* rents and other real estate rental charges to be paid
Source: author's own figures prepared on the basis of the publication entitled "Economic Accounts for Agriculture, 2006"

One of the indicators most often applied in the convergence analysis is GDP per capita. Using available opportunities, in my research I performed not only the analysis of the agricultural outputs and inputs but also all the others on the basis of the Annual Work Units and Utilised Agricultural Area.

The analysis of the four selected countries covers the period from 1990 to 2005. For Hungary the data are only available from 1998 when the database started, meaning the applied time series are very short, and the results obtained should be taken with a measure of scepticism. For this reason the calculations are based on a twofold time frame: a long period for the four countries (1990-2005), and a shorter period when including Hungary, constituting five countries in all. By comparing the results obtained in the two versions conclusions can be drawn regarding Hungarian agricultural tendencies

In the next section the countries' performance will be presented briefly for output and input categories, with special emphasis on agricultural output per hectare and per capita, which partly determine the development of the other types of outputs. In the following we present the results of the convergence analyses.

Results and discussion

Between 1998 and 2005 Hungarian agricultural industry's output continued to increase, but nonetheless suffered some set-backs. The nominal value growth rate was 4.4%, but at the same time agricultural area continually decreased, in fact declining by 7 percent in seven years. Stemming from this the **output per hectare increased** from EUR 774 to EUR 1,045, meaning **by 35.1%** (Annex 1). The change was even more impressive if one considers **the agricultural output per capita, which increased from EUR 6,839 in 1998 to EUR 11,772 by 2005, totalling 72.1%** (Annex 2).

This can be explained by the 25% decrease in the number of agricultural employees. In terms of productivity, 2004 was an outstanding year with agricultural output per area increasing by 17.9% and the same per capita increasing by 23.8%. This sharp improvement was due to favourable weather conditions and to the transition to EU subsidy schemes, the latter's effect seen during the subsequent years.

Thanks to a bountiful supply of land, high livestock numbers, and sophisticated technology, **Danish** agriculture's output is impressive. Two thirds of agricultural products are sold abroad. Despite some market volatility, between 1990-2005 Danish agriculture was able to continually maintain its high output level which, in terms of efficiency, compared favourably with other European nations. Even in the worst year of 1999, the output reached **EUR 2,600, and in 2001 it almost reached EUR 3,400.** During the same 15-year period agricultural area decreased by less than 3%. Coupled with high productivity in terms of area, labour efficiency is also outstanding. The **output per capita, also remarkable by international standards, increased 1.5 fold, to EUR 11,9551**. These positive results are foremost due to a 40% decrease in agricultural employees.

Albeit at a moderate rate, French agriculture**'**s output continually increased between 1990 and 2005 (yearly by 0.8% on average). However, the 1992 agricultural reform temporarily hampered sectoral performance, but later the sector was able to adapt to the new policy. **During this period French agriculture's area productivity increased by 15.6 , from EUR 1,847 in 1990 to EUR 2,136 by 2005.** However, in this growth the 3% increase in area played little role. The increase in labour productivity was stronger than that of area productivity. Between 1990 and 2005 the number of employees decreased by 32.8% and **thus the output per hectare increased by 67.1% to EUR 67,052.**

During the last decade EU Accession had a decisive impact on **Austrian agriculture.** In the post-Accession era the most critical measures taken were those cancelling protection for producers and reducing agricultural prices to EU level, which was lower than the Austrian ones, which led to a significant decrease in gross incomes.

Despite significant direct payments, by 1999 Austrian agriculture's 1994 EUR 6,659 output decreased by more than 17% and it only started to grow slowly from 2000. If one looks at the whole period from 1990-2005, one sees that the output decrease was such (13.4%) that it exceeded the 5.6% area decrease. EU Accession led to more market-oriented regulation and resulted in a **decrease in area productivity, dropping from EUR 1,828 in 1990 to EUR 1,679 by 2005**. However, in terms of **output per capital** the situation is better because, thanks to a 30% decrease in employees, **productivity increased by almost 22% during the whole period analysed**.

Portugal joined the EU in 1986, and between 1990 and 2005 the impact of EU Accession was pronounced as Accession meant generous subsidies for the backward agricultural sector, and prompted significant technical improvement plus increasing investment. Between 1990 and 2005 agricultural output continually increased. This, coupled with a a drastic drop in the number of employees, meant **output per capita grew two fold (by 136.8).** Portuguese agriculture was thus able to maintain or even increase the level of production by halving the amount of labour used. This was mainly due to the above-mentioned technical improvement **Area productivity also increased too,** albeit at a more moderate extent. **During the 15 years in question area productivity grew from EUR 1,521 to 1,693.**

When one surveys agricultural output traits in the four old Member States and Hungary, one observes a few common and general tendencies. Between 1990 and 2005 the output of agricultural products increased in all the countries apart from Austria. At the same time the agricultural area slightly decreased in each country and so, other than in Austria, the agricultural output per hectare increased. As for area productivity among the five countries, Denmark is in the best position, followed by France and then Austria and Portugal and finally by Hungary.

In each country the number of employees decreased more significantly than the agricultural area, meaning the output per capita increased more rapidly in all Member States, even including Austria. On the basis of output per capita the Members States' order of ranking mirrors area productivity. It is also worthwhile to compare the average annual growth rate of the above indicator. On the basis of the output per capita the Member States**'** ranking in terms of productivity level already attained is just the opposite. At 7.0% annually, Hungary's growth rate places firsts, followed by Portugal at 5.9%, France at 3.4%, and Denmark at 2.9%. As mentioned in the Introduction, this is also supported by the absolute convergence hypothesis, meaning the growth rate of the less developed countries is higher than that of the developed ones, thus enabling them to converge.

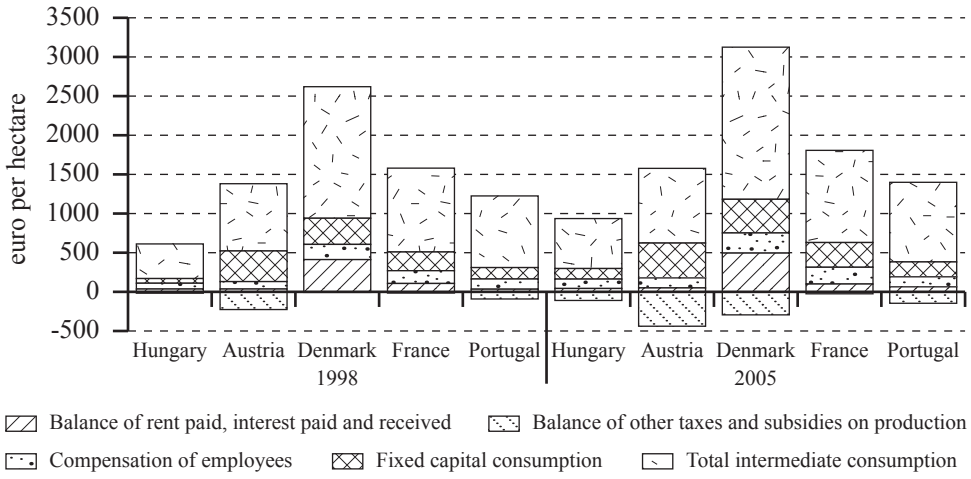


Figure 1: **Inputs per hectare in the investigated countries (1998, 2005)**

Source: author's own calculations based on EUROSTAT database.

At first in EAA the total intermediate consumption, accounting for the largest part in the inputs, is deducted from the output. This element of the input per hectare varies significantly from country to country (Figures 1-2); in France it is double and in Denmark more than triple the typical value for Hungarian agriculture. Its ratio to the output is the largest in Denmark, meaning 67.0 % while in the other four countries it is between 56-61%. Other than in Portugal, where it is stagnating, the ratio of the total intermediate consumption increased in each of the countries, meaning it accounts for a larger and larger part in the output and the share of the remaining part, indicating that the gross value added is gradually decreasing.

Due to the high and increasing rate of total intermediate consumption, the gross value added per hectare decreased during the period investigated in Denmark, France and Austria while in Portugal and Hungary it increased, but at a lower rate than the output. Apart from Austria, the gross value added per capita increased in each of the Member States.

The fix capital consumption is deducted from the gross value added and then the net value added is obtained. The value of fixed capital consumption is larger in the countries having a high technical level in agriculture, such as Denmark, France and Austria, while in Portugal and Hungary it is characteristically low.

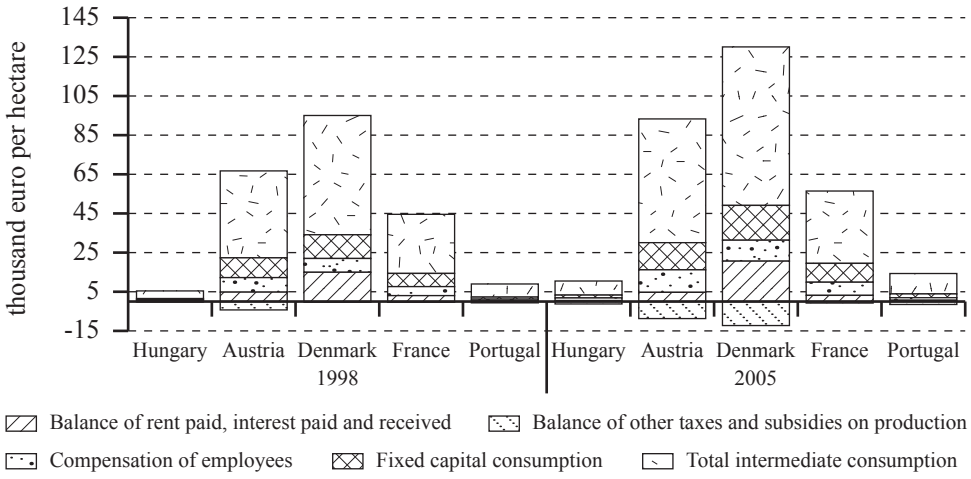


Figure 2: **Inputs per capita in the investigated countries (1998, 2005)**
Source: author's own calculations based on EUROSTAT database.

Only in Hungary did the **net value added** remaining after the deduction of the fixed capital consumption per hectare increase while in Portugal it stagnated and in the other Member States it was in decline. The net value added per capita was in decline in Denmark and Austria; in France, Portugal and Hungary it grew.

The net value added is modified by the **balance of other production taxes and subsidies.** In each of the the countries studied the balance of other production taxes and subsidies is positive (the amount of the subsidies exceeded that of taxes on production), and thus increased the income[6]. Therefore, in each case the net value added exceeded the factor

[6] In the figure the balance of the taxes and subsidies is a negative value, contrasting with the several modifying items – if the amount of the subsidies exceeds that of the taxes – increases the output and does not decrease it.

income. For subsidies the amount and rate of increase were remarkable in Austria, but it also rose sharply in Denmark and Hungary during the observed period (1998–2005).

Thanks to the positive balance of production taxes and subsidies the rate of increase for **factor income** per hectare was higher in Hungary and Portugal than that of net value added, while in Austria and Denmark it was stable. In France no significant effect could be identified. In every country the net value added was positive.

In Hungary and France **compensation for employees** accounted for 10-11% and in Austria, Denmark and Portugal for 7-9% of the output. These slight differences can be explained by higher wages and lower labour input in the developed countries and by the large number of employees and lower wages in the less developed countries. Other than Portugal, the ratio of labour input to output increased in every country.

The **operating surplus/mixed income** per area, obtained by deducting compensation for employees, was on the increase in Hungary and Portugal while in the other three countries it continually decreased. Due to fewer employees, the operating surplus/mixed income per capita increased in each of the studied Member States.

The values of the balance of rents paid, interest paid and received vary significantly for each country. In Austria it surpassed Hungary's by 20%, while in Denmark it was eleven times higher.

The final element for EAA output is the **net entrepreneurial income**. Due to various setbacks, in Denmark the net entrepreneurial income continually and sharply declined. In the other three old Member States the income differences continually grew more equal, due to slowly decreasing French and Austrian agricultural output as well as to increasing Portuguese income. In Hungary the net entrepreneurial income per hectare decreased between 1998 and 2003 and then in 2004 started to increase, and in 2005 continued to do so. Except for Denmark, the net entrepreneurial income per capita grew in all Member States.

The next section focuses on methodology and there the convergence analysis results will be presented. In the four countries the 1990-2005 calculations indicate convergence across agricultural outputs, gross value added and factor income and **operating surplus/mixed income**. In the four cases, the signs of Φ_2 coefficient (Table 2, column 1) were negative and significant, meaning that the **cross sectional dispersion decreased over time in the above outputs**, and the differences of the Member States decreased over time. The coefficient's absolute value t starting from the output to the net entrepreneurial income had an increasing trend, meaning the dispersion extent was declining at a larger and larger rate.

When Hungary was included in the studied period from 1998-2005, convergence was less apparent. Apart from entrepreneurial income, the value of coefficient Φ_2 was always negative and convergence significant only in agricultural output. The reason for this is that during the entire investigative period Hungarian agriculture's output per hectare increased but this increase was not consequent. Other than for output, the 2005 annual data in the various income categories exceeded that of 1998 but up to 2003 a decreasing or stagnating tendency was observed and only in 2004 was a positive change apparent in the time series. From this date it started to increase (Figure 3). However, if one considers the entire period, one observes that the dispersion declined more sharply, and during the seven-year period the absolute values of Φ_2 coefficient surpassed those of the values calculated for the period 1990-2005.

Table 2

Convergence across countries based on output per hectare

Output per hectare	1990-2005			1998-2005		
	Φ_2 (1)	Significance of Φ_2 (2)	Φ_1 (3)	Φ_2 (4)	Significance of Φ_2 (5)	Φ_1 (6)
Output of the agricultural industry	-0.00293	significant	0.10738	-0.01305	significant	0.25166
Gross value added	-0.00326	significant	0.09647	-0.01517	insignificant	0.28785
Net value added	0.00260	insignificant	0.07871	-0.01124	insignificant	0.27903
Factor income	-0.00382	significant	0.06663	-0.01647	insignificant	0.26775
Operating surplus/ mixed income	-0.00768	significant	0.11847	-0.01689	insignificant	0.35518
Net entrepreneurial income	0.39238	significant	-1.39022	0.33440	insignificant	1.38671

Source: author's own calculations based on EUROSTAT database.

In the EU-15 Member States and in Hungary, the net entrepreneurial income analysed tended to diverge, but in the latter case the coefficient was not significant.

The convergence process is indicated by the fact that Hungarian area productivity is approaching that of the other countries investigated. In 1998 Hungarian output data accounted for only 34-38% of the average of the four old Member States studied but in 2005 they accounted for 45-66% (Annex 3).

The analyses carried out on the basis of income per capita further proved the presence of convergence. In the old Member States and in the group including Hungary, coefficient Φ_2 was negative for all income types with the exception of net entrepreneurial income. In almost every case this proved significant, except for the operating surplus calculated for the period of 1998-2005 (Table 3). Moreover, the absolute value of Φ_2 was always higher than the per hectare data. There was also insignificant divergence for net entrepreneurial income.

In 1998 the Hungarian agricultural sector's output per capita accounted for only 14-16% on average in the investigated countries, while in 2005 it reached 20-27%. Due to Hungarian agriculture's low labour productivity these ratios lagged behind the per area data.

The output data (except for agricultural output) depend on the "earlier" output data and on the modifying items. The output data influence each other while the inputs do not. It is pertinent to overview the outputs regarding the input elements' convergence during the investigated period.

For the 1990-2005 period calculations were performed based on the four countries' data and the per hectare data showed showed convergence for fixed capital consumption, compensation for employees, interests and rents, but also divergence for total intermediate consumption, and taxes and subsidies balance, but the coefficient's value was insignificant. However, the sigma convergence analysis for the shorter period indicated significant convergence for fixed capital consumption and for compensation for employees.

Table 3

Convergence across countries based on output per capita

Output per capita	1990-2005			1998-2005		
	Φ_2 (1)	Significance of Φ_2 (2)	Φ_1 (3)	Φ_2 (4)	Significance of Φ_2 (5)	Φ_1 (6)
Output of the agricultural industry	-0.01211	significant	0.94928	-0.05486	significant	1.34976
Gross value added	-0.02289	significant	1.06474	-0.06391	significant	1.45309
Net value added	-0.02087	significant	1.04272	-0.06087	significant	1.37862
Factor income	-0.03106	significant	0.97827	-0.06640	significant	1.31793
Operating surplus/ mixed income	-0.05187	significant	1.17892	-0.07746	insignificant	1.46095
Net entrepreneurial income	0.62477	insignificant	-1.90512	0.64632	insignificant	1.99623

Source: author's own calculations based on EUROSTAT database.

Compared to 1998-2005, the coefficient's absolute value indicating dispersion decrease was lagging behind in the longer period. This shows that **the inputs' equalization was not as typical in the four countries as** for the group of studied countries that included Hungary.

Table 4

Convergence across countries based on input per hectare

Input per hectare	1990-2005			1998-2005		
	Φ_2 (1)	Significance of Φ_2 (2)	Φ_1 (3)	Φ_2 (4)	Significance of Φ_2 (5)	Φ_1 (6)
Total intermediate consumption	0.00063	insignificant	0.09460	-0.01221	significant	0.24494
Fixed capital consumption	-0.00013	insignificant	0.18028	-0.03282	significant	0.52001
Compensation of employees	-0.00284	insignificant	0.14448	-0.00295	significant	0.14638
Balance of other taxes and subsidies on production	0.16547	insignificant	2.02917	0.18871	insignificant	2.57868
Balance of rents paid, interest paid and received	-0.00913	insignificant	1.48200	-0.02608	insignificant	1.32201

Source: author's own calculations based on EUROSTAT database.

In 1998 Hungary reached 24-48% of the average for the four countries investigated, while in 2005 it reached 36-123% (Annex 3). The 123% high value is due to the adaptation of EU subsidy schemes causing the tax and subsidy balance to grow sharply. Apart from this Hungarian agricultural input attained 36-60% of that of the EU. In both years the ratios for inputs per hectare exceeded the output data.

As for data per capita, the 1998-2005 values correspond with those calculated for area productivity; meaning these are observable regarding total intermediate consumption, fixed capital consumption and compensation for employees (Table 5). In all three cases the absolute values of coefficient Φ_2 exceeded the Table 4 values. In the research that didn't include Hungary divergence generally occurred, and there was a clear decrease in dispersion regarding total intermediate consumption.

Table 5

Convergence across countries based on input per capita

Input per capita	1990-2005			1998-2005		
	Φ_2 (1)	Significance of Φ_2 (2)	Φ_1 (3)	Φ_2 (4)	Significance of Φ_2 (5)	Φ_1 (6)
Total intermediate consumption	-0.00590	significant	0.89551	-0.04814	significant	1.28782
Fixed capital consumption	0.00799	insignificant	1.58317	-0.09439	significant	2.10808
Compensation of employees	0.01859	significant	0.62745	-0.01995	significant	1.04820
Balance of other taxes and subsidies on production	0.31235	insignificant	3.63619	0.86530	insignificant	2.52989
Balance of rents paid, interest paid and received	-0.00427	insignificant	3.09063	-0.08960	insignificant	3.27025

Source: own calculations based on EUROSTAT database

For one item coefficient Φ_2 revealed an output modification, and this occurred with the subsidy and tax balance for production, which was consequently positive, thus indicating convergence. The reason for this was that in several countries the amount of subsidies for production was greatly modified.

In terms of input per capita Hungarian agriculture also made rapid progress. In the first year of the period the ratio of 5-20% increased to 16-26%, which was still significantly below both the EU averages for input per hectare and input per capita. Regarding this indicator it is necessary to mention that the input level in the four investigated countries was higher than that in other EU countries, while the number of employees is relatively low and, therefore, the input per capita is extremely high. But in Hungary there is a high number of employees and thus the input per capita is relatively low and Hungary's ratio lags behind the inputs of the other countries studied. By comparing this ratio to the EU-25 average a more accurate picture is obtained; meaning the outputs per capita descend to the inputs; and all of these are lower than the values of area productivity.

Conclusions

Based on the research conducted we can first of all state that the output data converged not in the four country group, but also in the group including Hungary. This is particularly true for output per capita where the output per capita was more accentuated than per hectare. This indicates that in Hungarian agriculture **the driving force behind convergence tends to be fewer agricultural employees resulting in efficiency improvement rather than an increase in output level**. The sharp decline in the number of employees possibly contributes toward the equalization of performance differences For example, Austria experienced a decline in output but also a decline in the number of employees, but the latter occurred at a greater rate than with output. In this respect efficiency increased, reflecting tendencies in the other Member States, which were influenced by output increase and a lower decrease in the number of employees (at a lower rate than for output). **Owing to its high number of employees, Hungarian agriculture lags well behind, meaning the future holds major potential for improvement.**

For output data only the net entrepreneurial income differs from the trend. Because they differ according to Member States, rents plus interests paid and received meant net entrepreneurial income diverged in each case and in both periods.

The last two years of the period, meaning 2004 and 2005, are noteworthy when it comes to assessing the Hungarian sector**'**s output. In these two years performance was much higher than before and this was due to favourable production conditions and to the adaptation of EU subsidy schemes.

Convergence for the inputs is less typical. The four countries studied attained greater convergence in output data through various inputs and structures, meaning that the **output data convergence cannot be attributed to a tendency similar for inputs**. When Hungary is included in the studied countries, sigma convergence is observable in fixed capital consumption and in compensation for employees. The reason for this is linked to the inputs as between 1998 and 2005 convergence in Hungarian agriculture was so pronounced that it drove down dispersion for the five countries in the observed group. **In terms of inputs Hungary is closer to the EU level than with outputs, which meshes with the above information. This hinders output data convergence,** and is why income convergence was less significant among the group of nations that included Hungary.

The input rate increase is greater than that for outputs, which is partially due to production factors and input prices and levels, all of which is connected to the terms of trade. In the Member States, and particularly so in Hungary, the relative prices of agricultural output and input products (agricultural terms of trade) is on the increase, which means the increase rate for the input prices exceeds the producer prices. All these contribute to rapid convergence for the inputs which **decelerates income equalization.**

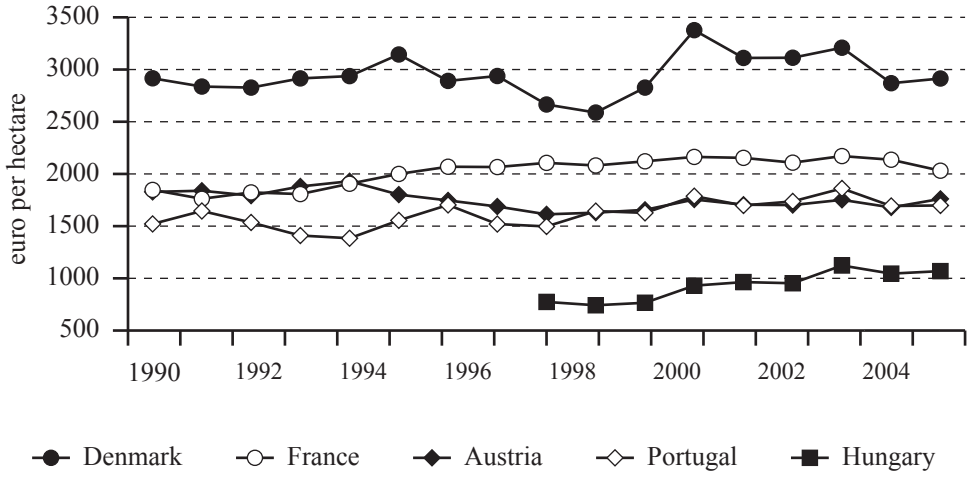
Not only prices influence convergence but also by the relationship between output and the input volume, meaning by efficiency. Apart from Austria, the volume increase for outputs exceeded that of inputs in each country, which means that efficiency generally increased. Improvement in efficiency was greater in the less developed countries such as Portugal and Hungary than in France and Denmark. This shows that **efficiency improvement bolstered convergence in the less developed countries.** However, price effects were more influential

than the advantage derived from improved efficiency with the exception of Portugal where the efficiency improvement was larger.

In the Introduction it was mentioned that previously non-Hungarian authors had already carried out convergence analyses on EU agriculture, but here I will certainly not attempt to compare my results with theirs. On the one hand, the earlier research covered only the EU-15 and did not contain any information on Hungary. On the other hand, their methodology only permitted conclusions for the countries and not for specific groups of countries.

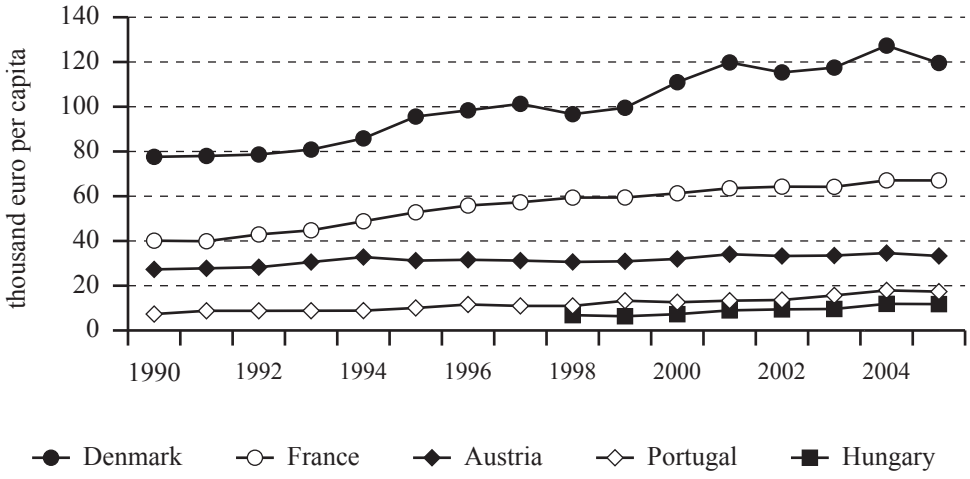
Regarding this paper it is important to emphasize that the advantage stemming from aggregated investigation directed toward the entire agricultural level is that the results allow overall conclusions for convergence across countries. However, the disadvantage is that **it does not reflect national differences emerging from various production structures**.

However, as shown by Ludena (2007), the above point is potentially important since in the various agricultural sub-sectors (e.g. crop, ruminant and non-ruminant production) efficiency improvement and convergence trends differ. For example, this paper definitely shows that in sub-sectors such as crop production and non-ruminants convergence is greater than with ruminants where divergence is more prevalent. As with this paper, a lack of input and output data chiefly explains why little research is done at sub-sector levels.



Annex 1: **Output per hectare in the investigated countries (1990-2005)**

Source: author's own construction based on EUROSTAT database.



Annex 2: **Output per capita in the investigated countries (1990-2005)**

Source: own construction based on EUROSTAT database.

Annex 3

Outputs and inputs of Hungarian agriculture in the percentage of the average of the four EU countries (%)

Description	1998	2005	1998	2005
	Per hectare		Per capita	
Outputs				
Output of the agricultural industry	37.8	49.6	15.3	21.9
Gross value added	34.4	44.7	13.9	19.7
Net value added	38.0	46.7	15.4	20.6
Factor income	38.3	56.7	15.6	25.0
Operating surplus/mixed income	35.9	55.6	14.6	24.5
Net entrepreneurial income	37.1	61.9	15.0	27.3
Inputs				
Total intermediate consumption	40.8	53.4	16.6	23.5
Fixed capital consumption	24.0	41.0	9.5	17.7
Compensation of employees	47.6	59.4	19.3	26.2
Balance of other taxes and subsidies on production	44.2	123.3	4.5	24.1
Balance of rents paid, interest paid and received	31.2	36.2	12.7	16.0

Source: author's own calculations based on EUROSTAT database.

References

1. **Alvincz**, J. *et al*. (2001): The Situation of the Agricultural Income and the Factors Affecting it. (in Hungarian). *Agrárgazdasági Tanulmányok*, AKI, Budapest 2001./7.
2. **Barro**, J. R. (1997): Factor Determining the Economic Growth (in Hungarian). *Közgazdasági Kiskönyvtár*, Budapest, 2005. p.126.
3. **Barro**, J. R. and **Sala-I-Martin**, X. (1991): Convergence across States and Regions, Brooking Papers on Economic Activity, 1(1991), pp.107-158.
4. **Barro**, J. R. and **Sala-I-Martin**, X. (1992): Convergence. *Journal of Political Economy*, 2 (1992), pp.223-251.
5. Bernard, A. B. and **Durlauf**, S. N. (1996): Interpreting Tests of the Convergence Hypothesis, *Journal of Economics*, 71(1996), pp.161-173.
6. **Borbély**, Sz. and **Vanicsek**, M. (2001): Hungary' Position in the European Economy (in Hungarian). *Közgazdasági Szemle*, Vol. XLVIII (Jan. 2001.) pp. 63-90.
7. **Brazili**, C. and **Gutierrez**, L. (2004): Regional Convergence across European Union, 2004 February,
8. http://econwpa.wustl.edu/eps/dev/papers/0402/0402002.pdf
9. **Dedák**, I. (2000): Relationships of Growth Theory of the Economic Convergence (in Hungarian). *Közgazdasági Szemle*, Vol. XLVII. (June 2000) pp.411-430.
10. **Friedman**, Milton (1992): Do Old Fallacies Die? *Journal of Economics Literature*, 30 (December 1992), pp.2129-2132.
11. **Guetat**, I. and **Serranito**, F. (2007): Income Convergence within the MENA Countries, *The Quarterly Review of Economics and Finance,* 46(2007), pp.685-706.
12. **Ligeti**, Zs. (2002): Economic Growth and Convergence (in Hungarian). BKÁÉ Ph.D. Thesis, p.167.
13. **Ludena**, C. E.; **Hertel**, Th. W.; **Preckel**, P. W.; **Foster**, K. and **Nin**, A. (2007): Productivity Growth and Convergence In Crop, Ruminant, and Non-ruminant Production: Measurement and Forecasts, *Agricultural Economics*, 37 (2007), p. 1-17.
14. **Major**, K. (2001): Dynamics of International Income Inequality. (in Hungarian). BKÁE, Ph.D. Thesis, p.123.
15. **McCunn**, A. and **Huffman**, W. E. (2000): Convergence in U.S. Productivity Growth for Agriculture: Implication of Interstate Research Spillovers for Funding Agricultural Research. *American Journal of Agricultural Economics*, 82 (May 2000): pp. 370-388
16. **Mukhereje**, A. N. and **Kuroda**, Y. (2003): Productivity Growth in Indian Agriculture: is there Evidence of Convergence across States? *Agricultural Economics*, 29 (2003), pp. 43-53
17. **Quah**, Danny (1993): Galton's Fallacy and Tests of Convergence Hypothesis, Scandinavian. *Journal of Economics*, 95 (December 1993), pp. 427-443
18. **Soares**, F. B. and **Ronco**, R. (2000) Agricultural Income and Productivity in the European Union: Convergence or Divergence among Members? Working Paper 20/2000., ICER, Turin, December, 2000.

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Supporting rural development from structural funds in new EU member states

Gabriella Iglói[1]

Abstract

EU Accession has had the most impact on the agricultural sector and rural dwellers' living conditions. Currently the first phase of EU Structural Funds benefits is coming to an end. The objective of this study is to provide an international overview on how to make use of rural development support within the new EU Member States. It also seeks to determine the importance of rural development in national development programmes, and the nature of measures intended to improve the quality of rural life, and whether these can possibly mesh with the objective indicators of agriculture.

Keywords

rural development, structural funds, EAGGF

Introduction

Hungary became an EU Member State on 1st May 2004. As in most new Member States, the economically and politically important event of EU Accession has affected most the agricultural sector and rural dwellers' living conditions. In the next decade the EU's financing mechanism will be crucially important for agriculture and rural development in terms of development policy, which accentuates this topic's timeliness and importance.

The increasing presence of EU financial assistance programmes has placed development policy and policy evaluation in the forefront. Upon entering the EU, Hungary began to receive EU Structural Funds, but in fact the funds were available half a year earlier, bringing about a new era in Hungarian rural policy.

When establishing regulations for Structural Funds, the European Union set criteria for funding eligibility. Member States are not obliged to apply all the criteria, but they can choose based on the situation analysis and needs assessment.

After studying planning and programming documents for Structural Funds regarding new Member States, attention was turned to analysing these countries' rural development programmes. Pertinent research documents were studied and the following questions raised.

- What is the role and position of rural development within the framework of development policy stated in the respective national development plan of a given country? How much of the total Structural Funds allocated go toward rural development?
- What type of measures were chosen and applied for rural development within each of the national development plans? How do these relate to analysing the situation?
- Furthermore, to what extent were the objective indicators of agriculture taken into account when planning the use of these funds? Do the given countries differ in this regard, and what differences can be observed?

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On May 1, 2004 Hungary was not alone in joining the EU. Among the new entrants were also the Czech Republic, Estonia, Poland, Latvia, Lithuania, Slovakia, and Slovenia. Fact-finding was carried out based on documents from these seven countries[2] By reason of their history, geographical fundamentals, and economic structure these seven countries provide an appropriate comparison with Hungary. Though New Member states, Cyprus and Malta are not appropriate comparison models as they are small island-countries with substantially different fundamentals.

An international overview allows a more comprehensive study of the Hungarian Operational Programme for Agriculture and Rural Development. It also permits a comparative analysis regarding the different measures taken, as well as locating and pinpointing the best practices in this field.

Data and method

In assessing Hungarian agriculture and rural development measures it is worth presenting an overview of the development plans in other new Member States.

According to Council Regulation 1260/1999 which establishes provisions for the Structural Funds, a basic assistance document can be a National Development Plan or a Single Programming Document, but it should contain a description/summary of measures to be implemented. These documents have been used as a basis in the comparative analysis. However, only those new Member States are included whose experience is relevant and useful to Hungary, meaning continental countries. Therefore for climatic, geographical, and economic reasons Malta and Cyprus are excluded.

Czech Republic

In terms of Czech agriculture's significance and needs, the Rural Development and Multi-Functional Agriculture operational programme's allocation accounts for 12% of total EU-expenditures.

The OP Rural Development and Multi-Functional Agriculture's strategic objectives are as follows:

1. Rural areas, improving agricultural technical equipment and processing businesses;
2. Improving the marketing of agricultural produce with higher added value and exporting to foreign markets;
3. Consolidating the forest and agricultural ownership structure and promoting multi-sector development in rural areas;
4. Solving rural development social issues by increasing employment, improving the age and education structure, and accessibility of information.

(However it should be noted that 'Revitalization of Rural Areas' priorities are included in the Joint Regional Operational Programme and is co-financed from the European Regional Development Fund.)

[2] Under 'continental countries' – similarly to the Anglo-Saxon terminology – countries on the European peninsula of the Euro-Asian continent are meant with the exception of the island-countries.

Estonia

Agriculture, Fisheries and Rural Development priorities will be implemented through the following measures:

1. Investment in Agricultural Holdings
2. Investment Support for Improving the Processing and Marketing of Agricultural Products
3. Diversification of Economic Activities in Rural Areas
4. Integrated Land Improvement
5. Renovation and Development of Villages
6. Local initiative based Development Projects – LEADER
7. Forestry
8. Support for Setting up and Provision of Farm Advisory and Extension Services
9. Regulating the Fishing Capacity of the Fishing Fleet
10. Modernization and Renewal of the Fishing Fleet
11. Investment support Measures for Fisheries Production Chain
12. Other Fisheries Related Measures

Hungary

Agricultural policy objectives are designed to increase agricultural production efficiency and to make producers competitive and their market positions more attractive and more secure. The Hungarian Agricultural and Rural Development policy objectives:

- to improve the competitiveness of agricultural production and food processing;
- environmentally friendly agricultural development, and rationalization of land use;
- to promote the realignment of rural areas.

Of the above objectives, the Agriculture and Rural Development Operation Programme (OPARD) only serves to attain the first and third objectives, while environmentally friendly agricultural development and rationalization of land use are included in the National Rural Development Programme containing the accompanying measures financed by the EAGGF Guarantee Section.

On the basis of the strategy, the OPARD objectives are implemented through the following three priorities:

1. Establishment of competitive basic material agricultural production
   a) Investment in agricultural holdings;
   b) Modernization of fisheries;
   c) Support for young farmers;
   d) Improving conditions for personnel involved in production.
2. Modernization of food processing
3. Development of rural areas
   a) Enhancement of the range and quality of products and services produced in the countryside;
   b) Development of infrastructure that creates the basis for sustainable agricultural production and local processing;
   c) Creation of attractive village conditions, preserving rural heritage;
   d) LEADER+ programme.

Latvia

Latvia has a number problems to overcome. Some of these include structural problems in agriculture and product processing, a low level of entrepreneurship in rural areas and insufficient initiative among rural inhabitants. Latvia needs to ensure sustainable rural, agricultural and forestry development and to do this a complex approach towards solving rural problems is necessary. Other rural issues include modernization of agricultural production, soil improvement, competitive processing of agricultural products, creating employment, effective use of natural resources, motivating rural inhabitants and the inclusion of young persons in agricultural production. Another priority is the sustainable utilization of available fish resources to harvest sea and inland fish resources to produce high value added fish products. The hope is for Latvian seafood to be competitive on local and international markets as well as to create opportunities for the acquisition of new market outlets.

In order to achieve the above objectives the priority of the Promotion of Development of Rural Areas and Fisheries has several sub-priorities which are listed below:

1. Promoting Agricultural Development and Rural Areas:
   a) Investments in Agricultural Holdings;
   b) Getting Young Farmers Started;
   c) Improvement in the Processing and Marketing of Agricultural Products;
   d) Promoting Adaptation and the Development of Rural Areas;
   e) Forestry Development;
   f) Developing Local Action (LEADER+ Type Measure);
   g) Training.
2. Promotion of Sustainable Fisheries Development:
   a) Adjustment of Fishing Initiatives;
   b) Fleet Renewal and Modernization of Fishing Vessels;
   c) Development of Processing and Marketing Fishery and Aquaculture Products, Fishing Port Facilities and Aquaculture;
   d) Development of the Coastal Fishery, Socio-Economic Measures, Promoting New Market Outlets and Supporting Producer Organizations.

Lithuania

The Rural and Fisheries Development goals and priorities were based on numerous criteria and objectives. Among these were existing natural resources and residents' traditions, modernizing the agriculture, forestry and fisheries sector. These were to be coupled with investment in alternative activities to traditional farming and in economic diversification to help mitigate modernization's negative social and economic consequences in rural and coastal areas.

Seeking to achieve this goal, the following objectives have been set:

1. Creation of competitive EU market-oriented agriculture, encouragement of food safety and development of marketing allowing the more effective use of existing opportunities and to ensure employment in rural areas:
   a) Investment in Agricultural Holdings;
   b) Support for Young Farmers;
   c) Promoting the Adaptation and Development of Rural Areas (Re-parceling activity);
   d) Improving the Processing and Marketing of Agricultural Products.

2. Diversification of economic activities in rural areas; to help agricultural producers through participation in additional economic activities brought about by fostering biological diversity within the landscape and environment:
   a) Forestry;
   b) Promoting the Adaptation and Development of Rural Areas;
   c) LEADER+ type measure and Training.

3. Creation of a resource-based and market-oriented modern and competitive fisheries sector that complies with EU requirements and lessens the social consequences of restructuring:
   a) Fishing fleet related actions;
   b) Protection and development of aquatic resources, fishing port facilities, processing and marketing, and inland fishing;
   c) Other fisheries related actions.

Poland

Poland differs from other new Member States in that agriculture and rural development actions are separated into two operational programmes:

1. Operational programme – Restructuring and modernizing the food sector and rural development:

   a) Support for agricultural changes and adjustments
      - Investments in agricultural holdings;
      - Helping young farmers start new farms;
      - Training;
      - Support for agriculture advisory services;
      - Re-parceling;
      - Agricultural water resources management;

   b) Sustainable development in rural areas
      - Restoration of rural areas, cultural heritage protection, and preservation;
      - Diversification of agricultural activities and activities related to agriculture to provide multiple activities or alternative incomes
      - Development and improvement of agriculture-related technical infrastructure;
      - Restoring forestry production potential which has been damaged by natural disaster and fire and introducing appropriate preventive measures;

   c) Development and adjustment to EC standards regarding agricultural products processing
      - Improving processing and marketing of agricultural products.

2. Operational programme – Fisheries and fish processing:

   a) Adapting fishing investments to resources
      - Scrapping of vessels;
      - Transferring to third countries or re-locating to other types of operations;
      - Joint ventures;

b) The renovation and modernization of the fishing fleet
   - Construction of new vessels;
   - Modernization of the existing vessels;
   - Withdrawal from service (without public aid) for renovation purposes;

c) The protection and development of water resources, fish breeding, equipment for fishing harbors, fish processing and marketing, the inland fishery
   - Protection and development of water resources;
   - Fish breeding;
   - Fishing harbor infrastructure;
   - Fish processing and marketing;
   - Inland fishing;

d) Other activities
   - Coastal fishing;
   - Social and economic activities;
   - Promotion;
   - Organization of market turnover;
   - Temporarily shutting down activity and other financial compensation;
   - Innovation and other initiatives.

Slovakia

The Slovak National Development Plan's specific objective for increasing the efficiency of agricultural production and the rural population's quality of life directly contributes to all three development axis of their development strategy: economic growth and competitiveness, employment, and well-balanced regional development.

Objectives of the Rural Development and Development of Multi-Functional Agriculture operational programmes are concentrated in 3 priority areas to further investment in agriculture and rural development:

1. Support for productive agriculture
   - investment in agricultural holdings,
   - improving processing and marketing of agricultural products.

2. Support for sustainable rural development
   - Sustainable forest management and forestry development,
   - Fishery,
   - Promoting the adaptation and development of rural areas,
   - Training.

3. Technical assistance

Slovenia

Priorities in terms of restructuring agriculture and rural development are ensuring competitiveness, sustainable use of natural resources, preservation of rural population density and harmonization with community legislation. Strategic objectives will be implemented within the following programmes:

1. Restructuring agriculture
   a) Improving agricultural structures;
   b) Modernization of farms;
   c) Improving organization of agricultural producers.

2. Restructuring of the food processing industry
   a) Support for the food-processing industry so to promote investment in tangible assets;
   b) Support for development and organizational activities to improve food-processing industry competitiveness.

3. Rural development
   a) Developing ancillary activities and related jobs in rural areas;
   b) Bringing together farmers to further setting up new economic infrastructure for more efficient product marketing;
   c) Improving rural infrastructure, village renovation, and the protection and preservation of rural heritage;
   d) Comprehensive preservation of the environment concerning agriculture and forestry, protection of the cultural landscape, and environmentally-friendly animal breeding as well as the interconnected preservation of water resources;
   e) Diversification of agricultural and non-agricultural activities in order to ensure alternative income in rural areas.

4. Forestry development
   a) Strengthening the multipurpose role of forests;
   b) Comprehensive monitoring of the state of forests, sustainable forest management and multiple exploitation;
   c) Bringing together forest owners to improve management of privately-owned forests;
   d) Raising public awareness of the importance of forests and forestry.

5. Fisheries development
   a) Sustainable resource management – fishing grounds;
   b) Increasing production capacities for freshwater fish farming;

6. Knowledge
   a) Increasing the education level and vocational qualifications of persons employed on farms;
   b) Increasing the share of people involved in life-long learning, honing skills, and permanent education and training in rural areas;
   c) Putting modern scientific findings and new technology into practice in agriculture and food-processing.

Results and Conclusions

A comparative analysis of EU assistance for agriculture and rural development under the umbrella of Structural Funds explains the similarities and differences from three main viewpoints:

1. Financial representation within the total national allocation (Budgeting)

Agriculture and fisheries related investments are financed from both the European Agricultural Guidance and Guarantee Fund (EAGGF) and from the Financial Instrument for Fisheries Guidance (FIFG).

Rural development is also mainly financed from the EAAGF Guidance Section. However, some countries (such as the Czech Republic and Hungary) have similar initiatives, but with well-separated specifications, and they can be financed from the European Regional Development Fund.

The following chart demonstrates the Structural Funds proportion within the total national allocation for each of the newly acceded beneficiary countries:

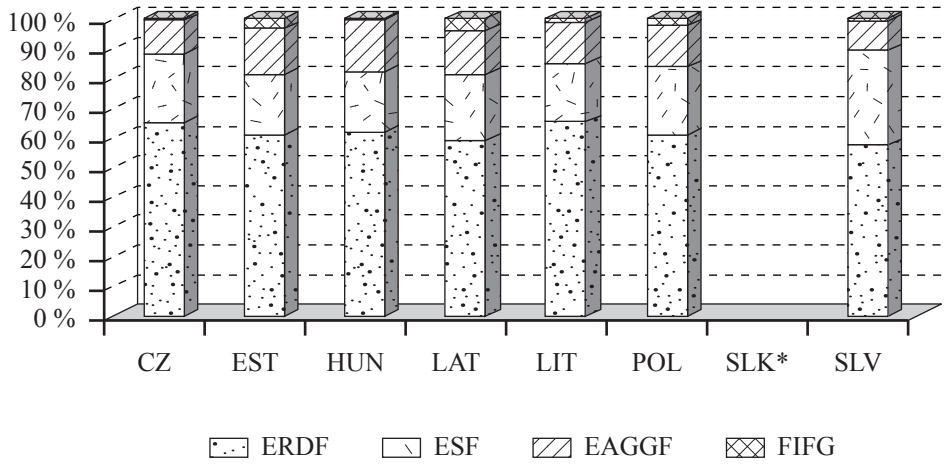


Figure 1: **Proportion of Structural Funds in total allocation 2004-2006**

* The financial tables of the National Development Plan of the Slovak Republic were not elaborated in the standard format given by the European Commission, therefore they do not contain data according to the breakdown above.
Source: author's own creation

According to the chart no major differences are discernible among the national strategies for distribution of funds. The ratio of EAGGF and FIFG resources varies between 10 and 19 percent, and thus can be considered stable and balanced.

This budgetary balance among countries does not necessarily mean that the proportional use of EAGGF and FIFG funds correlates with agriculture's economic role within each of the countries. The following table illustrates the principal agricultural objective indicators within national economies.

Table 1

Agriculture indicators and rural development support in the new Member States 2004-2006

	Agriculture in GDP (%)	Employment in agriculture (%)	Agricultural land (%)	EAGGF Guidance Section* + FIFG ratio (%)
Czech Republic	3.40	5.20	54.30	12.00
Estonia	3.70	28.40	19.70	18.66
Hungary	**3.70**	**6.50**	**66.50**	**18.00**
Latvia	4.70	15.50	38.30	18.81
Lithuania	7.00	19.90	51.60	15.08
Poland	2.90	27.50	59.00	16.20
Slovenia	3.30	n/a	40.00	10.00
EU-15 average	1.70	4.30	42.00	not relevant

* Since the scope of the study only extends to the Structural Funds the Guidance Section of EAGGF has been taken into account.
Source: author's own creation, on the basis of the national development plans of each of the countries; furthermore the data concerning the EU-15 average are from "Agricultural Situation in the Candidate Countries, Country Report on Hungary (July 2002)" issued by the European Commission.

According to the table the following conclusions can be drawn:

a) Agriculture's role within annual GDP does not differ significantly, with the exception of Lithuania where its proportion is almost double that of the other countries. However these figures are substantially higher than the EU-15 average At the same time the Lithuanian ratio of EAGGF and FIFG funds is among the lowest, apparently upsetting the balance. Also in Slovenia the ratio of financial assistance for agriculture and rural development can be considered as lower than justified compared to Estonia or Hungary where the proportion of agriculture in terms of GDP is almost the same.

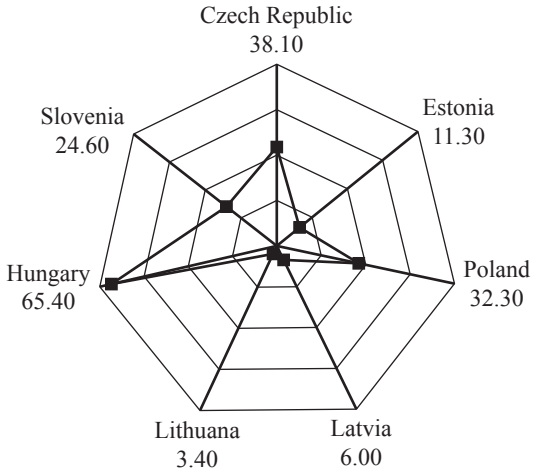
b) As for the amount of labour employed in the agricultural sector, the picture is rather comprehensive as the indicator varies between 5 and 30 percent. No correlation can be found for the allocation of agriculturally related financial support. If one compares the countries' indicators, in the Czech Republic and in Hungary one sees that the financial assistance is far greater than justified by their employment indicator, but in other countries the financial assistance given rural development is under-represented.

c) If one takes the proportion of agricultural land within each country's total territory and relates it to the amount of EU assistance devoted to agriculture, one sees that in Latvia and Estonia the proportion of EU assistance devoted to agriculture seems excessive but this can be explained by their similar geographical situation and poor quality acidic soil which requires more work and attention.

Though no major difference can be discerned regarding the nations' Structural Funds allocation strategy, this fact does not pertain to the OPARD internal financing structure and equivalent operational programmes. According to rules and regulations governing Structural Funds these operational programmes are financed from 3 different sources:

- the Structural Funds themselves, in this case from the EAGGF Guidance Section;
- co-financing ensured by central budgetary resources;
- contributions by those benefiting from the individual projects.

Those benefiting from the individual projects are also called upon to contribute to the projects, and the following chart indicates which beneficiaries are required to assume the heaviest burden in terms of the countries' operational programmes for agriculture and rural



development respectively.

Figure 2: **Average level of beneficiaries' contribution to OPARD-equivalent programmes in new Member States**

Source: author's own creation

Several countries (e.g. Lithuania and Latvia) during the planning procedure opted to cover the additional Structural Funds' finances entirely from budgetary resources. Nevertheless, even in these countries, support for the agriculture and rural development sector cannot be considered complete as beneficiaries also have to provide a modest amount from their own pockets.

The average contribution from programme beneficiaries in the above countries varies between 3 and 65%. The lowest is in Latvia and Lithuania where all the other operational programmes are fully financed from state resources while in Hungary beneficiaries have the heaviest burden when it comes to contributing from their own pockets.

Requiring programme beneficiaries to contribute heavily may produce a dual effect regarding OPARD implementation. On the one hand, it may improve the sector's financing structure by encouraging increased involvement by more private (market) resources, in turn

increasing initiatives and thus the number of projects to be implemented. This means that other than the beneficiaries own resources additional capital becomes part of programme implementation.

On the other hand, a clearly negative effect of this requirement is that it discriminates in favour of wealthier producers with greater access to financing, and of course excludes poorer producers. For example, beneficiaries can be required to co-finance 65% of the programme and there are also subsequent payments.

2. Measures and activities intended to be implemented under the agriculture and rural development chapter of planning documents (Substance)

Objectives, measures and activities are identified by each country's SWOT-analysis and therefore can widely vary. However, they can be termed unimaginative as the same measures, only with different emphasis, are repeated and even at the level of eligible activities only slight differences can be observed. This repetition could be explained by a shared historic perspective meaning the countries are seeking solutions to similar problems, especially among those with a smaller amount of assistance spread among a high number of measures and activities, meaning financial resources seem to be thinly spread among the large number of measures.

Two important factors define the measures applied by the countries: (i) how soon after implementation can a measure's results be achieved and observed.; and (ii) whether and how long these results are sustainable. Based on these factors, measures can be classified into the following groups:

- *quick result – short sustainability:* these measures are relatively easy to implement, and the results can be demonstrated almost immediately, but the impact is short-term. New equipment tends to be part of this group so the typical measures taken are investments in agricultural holdings, and modernization of the processing of agricultural, fishing and forestry products. It is noteworthy that every country studied has applied this group of measures, but for some countries – like Hungary – these measures represent the overwhelming majority of the measures taken.
- *quick result – long sustainability:* here implementation is easy and the results short-term, but the actual impact only occurs over time. An example of this class is support given to young farmers, or training programmes, vocational training, education providing a solid knowledge base.
- *slow result – short sustainability:* here implementation of measures is more complicated, difficult and hence time-consuming, but the impact is only short-term. Typically these entail (re)construction work and investments for applying modern technology or serving to comply with animal health and hygiene requirements.
- *slow result – long sustainability:* these measures are the most difficult to justify and verify as implementing them is time-consuming and the impact is only detectable in the long term. However, these measures can actually contribute to structural changes and sustainable development, a trait which the sometimes financially questionable above measures lack. These measures sometimes entail land consolidation and innovation, and only a small number of countries-Poland and Slovenia-backed and applied them, and this was likely due to time and financial constraints.

Ultimately beneficiary countries can be divided into the following groups:

a) *Czech Republic, Slovakia, Slovenia and Hungary - only* 'traditional' agricultural, forestry and rural development activities are initiated. Emphasis tends to be on investment projects: infrastructure development, and equipment modernization; and even when it comes to preserving rural heritage reconstruction activities are primarily financed. In these three countries economic diversification regarding employment and income is commonplace. Soft measures such as job training and networking linked to the above are less frequent.

b) *Estonia, Latvia, Lithuania, Poland* - these countries have long Baltic Sea coastlines and fishing is the key element in their development programme. A major priority is modernizing the fishery fleet, a goal related to EU fishing quotas. They also hope to help alleviate the social and economic impact of fishing fleet restructuring and downsizing through compensation. Furthermore, substantial resources are being allocated to increase fish processing facilities and enhance safety measures. Poland has the most ambitious programme as there a separate operational programme has been established to support the Polish fishery. As for the other measures, these three countries follow the same practices and tendencies as the countries in the above group.

Slovenia is the only country that cannot be classified in these terms. The country does have an Adriatic coastline, but it is much smaller in comparison to the Baltic countries and Poland. Although its fishery is part of the Slovenian development programme, the focus is on freshwater fish farming and there are no measures regarding its fishing fleet. Slovenia is noteworthy through its emphasis on education, training, R+D, plus networking activities and measures.

Slovenia's particular situation is due to Structural Funds' regulations and the nation's economic development indicators Slovenia elaborated a 2004-2006 National Development Plan and benefited under Objective 1 for regional support. However, as of 2007, Slovenia's GDP exceeded 75% of the EU average and therefore the country will no longer be eligible for Objective 1 support. In the 2007-13 budgetary period Slovenia will only be eligible for structural support under the 'regional competitiveness and employment' and 'European territorial co-operation' priorities. These priorities are basically the counterparts of Objective 2 and 3 and the relevant community initiatives under the current support umbrella. If Slovenia's intent was to ensure the continuity and sustainability of the current support umbrella in the next budgetary period, a logical decision would be to pursue these types of measures.

3. Impact on the sustainability of rural areas

Structural Funds are the EU's major financial cohesive tool, and are supposed to decrease regional economic and social disparities. Simultaneously, cohesion policy is closely linked to the Gothenburg and Lisbon processes and aims at improving employment capacities.

However, it is difficult to measure each development programme's impact since the programmes' indicators are not uniform. The majority of the countries do not even include them, and those who do have varied practices.

- *Poland* introduced its unemployment rate as an impact indicator for the Sectoral Operational Programme for Restructuring and Modernisation of the Food Sector and Rural Development, and the expected change is -2%;

- As an impact indicator *Lithuania* placed the net jobs created and/or maintained in terms of the programme with a target value of 4000 jobs;
- *Estonia* did not use indicators but presented the HERMIN model to simulate the development programme's impact.. However, this model has only two sectoral categories and lacks an indicator for agriculture and rural development. Nevertheless, the total number of jobs created due to the entire programme's implementation is predicted to be 24,820 by the year 2008;
- For the programme level and the OP level, *The Czech Republic* introduced the unemployment rate as an indicator. However, for the OP the proposed impact indicator is the unemployment rate change in less favoured areas (LFAs). Furthermore, for this indicator no baseline and no target value have been estimated.

The number of maintained and created jobs is a major and compulsory indicator regarding the contracts governing supported projects. However, if one examines the Hungarian OPARD context, one sees that at the programme level this is not even highlighted.

By the end of the year of 2006 these indicators were as follows:

Table 2

Employment indicators in rural development projects

Number of projects	Total amount of support (HUF)	Maintained working places (p)	Established working places (p)
4,211	113,460,452,902	55,809	7,736

Source: EMIR (Unified Monitoring Information System for the Structural Funds)

The above numbers indicate project objectives, but at the time the present study was conducted there was no available information regarding whether the objectives were actually fulfilled.

References

1. Agricultural Situation in the Candidate Countries, Country Report on Hungary (European Commission, July 2002)
2. National Development Plans of new Member States
3. Estonian National Development Plan for the Implementation of the EU Structural Funds – Single Programming Document 2004-2006, (http://www.struktuurifondid.ee/)
4. Latvia Single Programming Document Objective 1 Programme 2004 – 2006, (http://www.esfondi.lv/upload/05-saitosie_dokumenti/spd_en_01062006.pdf)
5. National Development Plan of Slovenia 2001-2006, (http://www.svlr.gov.si/fileadmin/svlsrp.gov.si/pageuploads/enotni_programski_dokument_rs_2004-2006.pdf)
6. National Plan of Regional Development of the Slovak Republic, (http://www.strukturalnefondy.sk/Documents/Programove_dokumetny/Amendment%20to%20NDP%final.pdf)
7. National Development Plan of Poland 2004-2006, (http://www.funduszestrukturalne.gov.pl/English/Community+Support+Franework/)
8. National Development Plan of the Czech Republic 2004-2006, (http://www.strukturalni-fondy.cz/fondy-eu-2004-2006)
9. National Development Plan of Hungary 2004-2006, (www.nfu.gov.hu)
10. Single Programming Document of Lithuania, (http://www.www.esparama.lt/en/bpd/about_spd)

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The Hungarian land market after EU Accession

Szabolcs Biró[1]

Abstract

Besides its natural potential, Hungarian agriculture's **major current advantage is low land prices and rental fees**. Economic theory suggests that as Hungarian economic performance approaches the EU average, production costs will also become equal. Increasing land prices, generated by higher rentals fees, will mean landowners continually remove more agricultural income and Hungary's competitive advantage will dwindle. Moreover, subsequent capital withdrawal will lead to weaker agricultural investments. The aim of **land policy** is to **assist the land use of those farmers who make a living from agricultural production**. To increase competitiveness one needs income security and policy efficiency **meshing land ownership with land use for those farms wishing to acquire more land** This is particularly true for full-time farmers and for farms that can become commercially viable. Presently the **land market is** unstable. This instability, coupled with rigid legislative controls on a rising desire for land acquisition, could lead to escalating land prices. A sudden surge in prices would hurt *hands-on* farmers, and strengthen the bargaining power of those landowners who are not actually engaged in farming.

Keywords

agricultural land, volume of land market transactions, land prices, land rents

Introduction

When Hungary was joining the EU, the country endeavoured to facilitate land purchase for those individual Hungarian farmers[2] who were not yet fully competitive. Hungary therefore asked the Commission to extend the prohibition on foreigners' buying land, justifying its request by citing **low land prices** and the accompanying risk of **speculative purchases by foreign capital**. Total restriction was not possible since it contradicts one of the Union's key principles, meaning the free movement of capital. The Hungarian restriction is thus only partial as under certain conditions EU citizens can purchase Hungarian property. The restriction is also provisional as the derogation is only valid for seven years and in fact refers only to land purchase by legal persons (collective organisations considered as having a legal identity) and non-resident EU citizens. On the basis of the Commission's report, the **Council** may **unanimously opt** (Hungarian support being mandatory for this to happen) to reduce or cancel the provisional period. To assess **Hungary's position** it is necessary to analyse those arguments which were put forward when Hungary was joining the EU so to determine whether they are still valid or if new **arguments** should also be considered as a result of **changes stemming from Accession**.

Without exception the pertinent literature recognises the factor of low land prices, which was used to justify the derogation. The derogation period enabled **Hungarian farmers and agriculture to consolidate, become more market oriented, and permitted, in the long run, Hungarian land prices to gradually reach the price level of other Member States, while rendering impossible speculative land purchases by foreigners.** During the derogation period, Hungary could retain national legislation that **restricts purchasing Hungarian agricultural land by non-resident foreign citizens and legal persons** (with or

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[2] individual farms (or "household" or "family" farms)

without legal entity, meaning legal persons and unincorporated entities). As for **leasehold,** the derogation period is not applicable since from the outset Accession regulations extended lease rights to both private individuals and legal persons (with or without legal entity) from the Member States and for Hungarian natural and legal entities.

Some major documents on the Hungarian land market have been produced. Among these are Szűcs' (1998) analysis of Hungarian land prices and lease payments, and Csendes/Szűc's (2002) research on the factors influencing land market supply and demand, plus an analysis of Hungarian agricultural land ownership and land use structure (Swinnen, – Vranken, 2003) (Sadowski – Takács – György, 2005). Also significant are conclusions from Frandsen and Jensen's 2000 model analyses regarding CAP subsidies in the new Member States. Last but not least are Ciaian/Swinnen's 2005 research results on how subsidies affect the land market, and the impact of CAP reform, plus Kovács' 2006 study on transition to the Single Payment Scheme (SPS)

Further examination of the Hungarian Land Market rests on a review of those arguments Hungary presented in favour of derogations concerning the transitional measures prohibiting the purchase of agricultural land by foreigners and legal persons (with or without legal entity).

1. Data and methodology

An examination of post-Accession **changes** (land use, land ownership, land market) has been conducted using **the pertinent literature, statistics, complementary data gathered and empirical** analyses. A comparative analysis allows one to assess **the validity of the arguments** presented at the time of Accession, plus whether **maintaining current measures is justified as well as the the viability of new arguments as to** whether to lift or extend the land acquisition prohibition.

Such an **assessment is difficult** since the relevant statistics really only cover 1-2 years of the brief post-Accession period and thus cannot reflect actual tendencies. Official Hungarian statistics do not provide any data on agricultural land's market price, rendering impossible the calculation of average land prices. Moreover, the official data collection system for lease payments gives merely representative data at the national level. Even in the EU there is **no unified methodology for collecting land prices**. The most recent available EU land market statistics (Eurostat, 2006) provide no data on 13 Member States. In 2004 only 10 Member States presented land price data and only six Member States provided any information on lease payments.

2. Regulations on EU agricultural land acquisition

In rural areas farmland is not only related to production, but also to a specific way of life. Land utilisation's economic role is to ensure the long-term development of agricultural production. The Treaty of Rome deals with agricultural land in relation to agricultural products, while the Common Agricultural Policy does not directly apprise it. When the European Economic Community was first being founded agricultural land did not play a major role in foreign capital investments, and the focus was on the free movement of goods, services, and factors of production. However, since then agricultural land prices have shot up and

agricultural land has captured more attention, leading Member States to come to **mutual agreements on land purchase.**

Article 67 of the Treaty of Rome, and in particular the first Article and the second paragraph of the Annex of Council Directive No. 88/361/EEC (on the implementation aiming to assist the free movement of capital), includes the gradual **cancellation of prohibition** and discrimination of "persons native and native in foreign countries" – meaning EU citizens – in **property purchase**. The Single European Act stipulated that from 1 January 1994 the movement of capital became unlimited. The paragraph in the EU's Maastricht Treaty replacing Article 67 only permits restriction on movement of capital between Member States and Third countries. Other than this, the Union does not regulate land markets and allows for **different land policies within Member States** (Marton et al., 2003).

When it comes to land acquisition, European Union legislation contains nothing more precise or restrictive than this regulation. The Directive on the prohibition of **discrimination** by Member States affects national legislation. The prohibitions effective from 31 December 1993 can be maintained regarding Third countries[3]. By aiming to implement as fully as possible the free movement of capital among Member States and Third countries the Council – based on the Commission proposal – may by qualified majority also enact further measures on the land market. It may also enact total and obligatory cancellation of any of the prohibitions regarding land acquisition and leasehold.

3. Land rental market

Privatization measures led to private land ownership and farming based primarily on land lease. Recently **permanent land lease has** replaced ownership as the dominant trend in agricultural land. Here the land rental market is not viewed as a part of the land market; but land market factors impact on it[4]. Therefore, **before discussing land ownership and the land market it is necessary to analyse actual land use and its recent changes.**

Land use

General trends in **land use** were already apparent prior to Accession. Counting the number of farms coupled with statistical[5] analysis of how farms use their land provides useful information. For example, in 2005 there were 13.2 thousand farms with an area above 50 hectares, and this amounted to 1.98% of all farms. Farms in this greater than fifty hectares category used 76.8% of their total area. There were 49.2 thousand farms with more than ten hectares and this entailed 7.4% of total farms. These farms used 89.9% of their total area. Compared to 2000, the average productive area of farms above 50 hectares (332.4 ha) decreased by a quarter, and compared to 2003 fell by 6.1%. On the other hand, **the average** (productive) **area of farms above 100 hectares** (104.3 ha) **increased slightly** (by 4% to 2000 and by 3.6% to 2003).

If one compares European Union Statistics (Eurostat, 2005), one gets the following results: 161 thousand farms larger than one European Size Unit (ESU)[6] used 4,081 thousand

[3] 1 January 1998. regarding Hungary
[4] In the literature examples of the joint discussion of land market and land rental market also can be found.
[5] The statistical economic threshold of land use is only 0.15 ha or in the cases of plantation or vineyards 0.05ha!
[6] The economic size of farms is expressed in terms of ESU.

hectares (96.6% of the Utilised Agricultural Area (UAA)[7]. In 2003 in Hungary the average agricultural area cultivated by these farms (25.3 ha) exceeded the EU-25 average (22.6 ha) by 11.9%, and the EU-15 average (24.0 ha) by 5.4%.

After Accession, in the year 2005, the average area of small cultivated plots statistically recognised as farms reached 8.6 hectares. However this figure requires further scrutiny as there are different trends governing small individual farms and other agricultural operations (agricultural enterprises, not including private farmers); the **average size of individual farms increased** to 3.4 hectares while the size **of other agricultural operations** fell to 485.7 hectares (Table 1).

Table 1

Number and area of individual farms and other agricultural operations using land

Size classes	Farm		Area		Average area (ha)	Farm		Area		Average area (ha)
	No.	Distr. (%)	ha	Distr. (%)		No.	Distr. (%)	ha	Distr. (%)	
	2003					2005				
Individual farms										
under 10 ha	662,856	93.6	669,752	28.4	1.01	616,070	93.45	574,154	25.3	0.93
10-50 ha	37,132	5.2	763,578	32.4	20.56	34,149	5.18	699,147	30.8	20.47
50-100 ha	5,130	0.7	354,326	15.0	69.07	5,340	0.81	369,990	16.3	69.29
100-300 ha	3,062	0.4	509,682	21.6	166.45	3,494	0.53	556,913	24.6	159.39
above 300 ha	153	0.0	60,351	2.6	394.455	198	0.03	68,281	3.0	345.25
Total	**708,333**	**100.0**	**2,357,689**	**100.0**	**3.33**	**659,251**	**100.00**	**2,268,486**	**100.0**	**3.44**
Agri-business operations										
under 10 ha	1,190	17.3	4,514	0.1	3.79	1,193	16.83	4,474	0.1	3.75
10-50 ha	1,764	25.6	46,526	1.3	26.38	1,784	25.17	46,803	1.4	26.24
50-100 ha	836	12.1	60,414	1.7	72.27	918	12.96	65,042	1.9	70.83
100-300 ha	1,567	22.7	307,975	8.9	196.54	1,486	20.97	282,194	8.2	189.91
above 300 ha	1,534	22.3	3,052,663	87.9	1,990.00	1,706	24.07	3,042,874	88.4	1,784.05
Total	**6,891**	**100.0**	**3,472,092**	**100.0**	**503.86**	**7,086**	**100.00**	**3,441,386**	**100.0**	**485.66**
Total of the farms										
under 10 ha	664,046	92.8	673,922	11.6	1.01	617,161	92.62	578,981	10.1	0.94
10-50 ha	38,896	5.4	810,340	13.9	20.83	35,982	5.40	745,709	13.1	20.72
50-100 ha	5966	0.8	414,497	7.1	69.48	6,264	0.94	435,092	7.6	69.46
100-300 ha	4629	0.6	817,918	14.0	176.69	4,998	0.75	838,780	14.7	167.84
above 300 ha	1687	0.2	3,113,103	53.4	1,845.35	1,932	0.29	3,111,309	54.5	1,610.09
Total	**715,224**	**100.0**	**5,829,781**	**100.0**	**8.15**	**666,337**	**100.00**	**5,709,872**	**100.0**	**8.57**

Source: Agriculture of Hungary 2003, Farm Structure Survey (FSS) Vol. I. Hungarian Central Statistical Office (HCSO) 2004., Agriculture of Hungary 2005 FSS, Vol. I. HCSO 2006.

In 2005 the 3.4 ha average area cultivated by the **659.2 thousand individual farms** was too small to provide a livelihood, and thus most should be considered as households[8] rather than authentic farms. One gets a more realistic picture on land use by filtering out small

[7] Utilised Agricultural Area (UAA)

[8] Since under 10 hectares of land, only farming generally is not providing sufficient income for an average family.

"statistical farms" with under 10 hectares. **43.2 thousand individual farms with *more* than 10 hectares**, meaning 6.5% of all individual farms, **used three-quarters** (74.7%) **of the total area attributed to individual farms**. **The average area of land use** is 39.2ha, an increase of 18.1% relative to 2000 and 5.7% compared to 2003.

The land use for other agricultural operations is more balanced than that for individual farms. About 7.1 thousand other agricultural operations use an average size of 485.7 hectares. The number of other agricultural operations increases (by 31.4% relative to 2000 and by 2.8% to 2003). **The average area decreases** (by 31.7% relative to 2000 and by 3,6% to 2003). This tendency in **land use concentration is also present for other agricultural operations.** 3.2 thousand of agricultural operations above 100 hectares (45.0%) use 96.6% of the total area attributed to other agricultural operations.

Leasehold

Regarding leased land, the pertinent literature and various databases differ regarding how much land is **rented**. However, all of them exceed the average EU-15 rates and the **tendency is increasing.** According to the FSS, **the share of rented agricultural area between 2003 and 2005 grew by 2% and reached 57.9% of the agricultural area used by farms** (Table 2). Enterprises farmed mostly on leased land (91.9%); and almost one fourth of the area cultivated by individual farms (22.7%) was also rented. The share of rented area parallels the increase in farm sizes. **Between 2003 and 2005, the share of rented land increased for both individual farms and enterprises** (by 8.9% and 2.3%, respectively).

Table 2

Share of rented agricultural land by farm size categories using land, (%)

Size classes	Individual farms			Enterprises			Total of the farms		
	2003	2005	Diff.*	2003	2005	Diff.*	2003	2005	Diff.*
under 10 ha	4.68	4.74	101.28	70.43	68.09	96.68	5.03	5.16	102.58
10-50 ha	16.68	16.82	100.84	81.50	79.71	97.80	19.35	19.73	101.96
50-100 ha	27.97	31.38	112.19	84.98	82.92	97.58	33.83	37.07	109.58
100-300 ha	40.04	39.19	97.88	88.75	89.47	100.81	56.23	53.71	95.52
above 300 ha	49.18	46.88	95.32	90.26	92.63	102.63	89.07	91.04	102.21
Total	**20.82**	**22.67**	**108.89**	**89.85**	**91.91**	**102.29**	**55.04**	**57.90**	**105.20**

* difference, change (index: 2003 = 100%);
Source: FSS 2003, 2005, HCSO 2006

In Western Hungary and Northern Hungary leasing land is more widespread, its share accounting for 64-68%. In the Great Plain regions farming one's own land is more prevalent and thus the share of rented land is 16-17 percent lower (Table 3). Between 2003 and 2005 the share of rented land mostly increased in Northern Hungary and in the northern Great Plain regions, a respective increase of 6.9% and 5.1 %. In the Northern Hungary region this increase was primarily due to more farm enterprises opting to rent land (7.8-7.0 percent) and then individual farms (5.2 percent). However, in West Hungary the rented land share decreased by 2.8 percent and in South Hungary it remained at the 2003 level. Average farms above two ESUs rent two thirds of the agricultural land used. For individual farms the situation is the opposite, primarily farming their own land and renting only one third of the land they utilise. 98% of the land used by farm enterprises is leased.

Table 3

Share of rented agricultural land in farms by regions, (%)

Regions	Individual farms			Enterprises			Total of the farms		
	2003	2005	Diff.*	2003	2005	Diff.*	2003	2005	Diff.*
Central Hungary	19.61	19.30	-0.31	90.30	88.97	-1.33	55.37	60.08	4.71
Central Transdanubia	28.51	25.51	-2.99	89.64	90.00	0.36	65.31	65.44	0.13
Western Transdanubia	35.96	35.83	-0.13	88.44	87.07	-1.36	67.07	64.30	-2.76
Southern Transdanubia	22.07	23.17	1.10	94.49	93.83	-0.66	65.85	67.92	2.07
Northern Hungary	24.40	29.57	5.17	91.01	98.77	7.76	57.21	64.10	6.89
Northern Great Plain	16.42	18.98	2.56	88.19	95.24	7.05	46.90	52.01	5.11
Southern Great Plain	15.76	18.02	2.26	87.42	89.17	1.75	43.95	47.09	3.13
Total	**20.82**	**22.67**	**1.85**	**89.85**	**91.91**	**2.06**	**55.04**	**57.90**	**2.86**

* difference, change of share (percent point)
Source: FSS 2003, 2005, HCSO 2006

Based on in-depth interviews with farmers it became apparent that leasehold contracts prevail. On average[9] the contracts last about 8 years. The majority of farm enterprise contracts last 10 years. However, more than half of the individual farms had contracts from 5 to 9 years. Longer contracts are a negligible factor (Kapronczai, 2005).

Rental fees

Nowadays, rental fees tend to be based on an area receiving direct payments rather than on Golden Crown (GC)[10] values; and probably this tendency will increase over the next period. In pre-Accession years 2003-2004 rents paid for arable land (crop-land) increased by 21.0% (Table 4). Between the post-Accession years 2004 and 2006 rental fees increased by 16.5%. **At present, the average cash rental rate for arable land (crop-land) reaches 66 euros[11]** per hectare. Presently **EU-15 rents are 3 to 6 times those of Hungarian rental fees.** This difference also exists among the old member states (Szűcs – Csendes 2002). Grassland rental fees also increased by 25% compared to the pre-Accession fee. Following Accession, rents for grazing fields did not change and remain 22 euros per hectare.

Due to a complete lack of official statistics, regional trends and differences in arable land rental fees (crop-land) were determined through empirical analysis. **The highest rental fees are in Southern and Central Transdanubia and in the Northern Great Plain** (Table 5). In the Southern Great Plain, Western Transdanubia and Central Transdanubia rents are slightly lower (by 10-15%), while in the Northern Hungary region rents are only one third of those mentioned above.

[9] The duration of the leasehold contract increased due to the 1995 Act CXVII on personal income tax in force, in accordance with paragraph 74 the income originating from land lease of more than 5 years is free of tax.

[10] The "taxable net income" of each parcel of land registered in the land cadastre was established more than a hundred years ago, through Act VII of 1875, and was later converted to Gold Crown, the monetary unit of the Austro-Hungarian Monarchy. This valuation still serves as a basis for evaluating agricultural land for various purposes. The national average of "taxable net income" of all agricultural land is approximately 20 Gold Crowns per hectare.

[11] Further the euro value calculated with HUF 250 "theoretical" exchange rate.

Table 4

Land rental fees by land-use category (euro/ha)

Land type	2003	2004	2005	2006	Difference* (%)		
					2004	2005	2006
Arable land	47	57	61	66	121.3	107.0	108.2
Grassland	18	22	22	22	122.2	100.0	100.0
Vineyard	77	101	105	109	131.2	104.0	103.8
Fruit plantations	54	61	62	70	113.0	101.6	112.9
Forest land	16	18	19	23	112.5	105.6	121.1

* (index: previous year = 100%);
Source: Yearbook of Agricultural Statistics, 2005, HCSO 2006

Table 5

Rental fees of arable land by regions and by the quality of land, January 2007 (euro/ha)

Region	Quality of land			
	Poor	Average	Good	Excellent
Central Hungary	60	80	100	120
Central Transdanubia	24-80	48-120	100-140	140-180
Western Transdanubia	40-60	60-80	80-100	100-120
Southern Transdanubia	60-100	80-160	100-200	120-280
Northern Hungary	20-28	32-40	40-80	40-80
Northern Great Plain	24-100	40-160	80-200	80-200
Southern Great Plain	48-80	56-112	100-140	120-160

Source: Based on the data supplied by Agricultural County Offices for empirical analysis, 2007

Trends in rental fees are determined not only by the location but also **by the quality of the soil**. In general, the rental fee for poor quality land (under 17 GC/ha) is 40-60 euros. For average quality land (20 GC/ha) it is 60-80 euros, and for good quality (25-30 GC/ha) 80-100 euros. For excellent land (above 30GC/ha) 100-120 euros is the annual rent per hectare.

After Accession the **largest rental fee increase was in the traditionally cheap rent region of Northern Hungary and it rose by 40-50%.** The increase was moderate in medium rent regions (Western Transdanubia, Central Hungary, and Southern Great Plain). In the high rent part of Northern Hungary rents increased only slightly. In some counties of Central and Southern Transdanubia (Komárom-Esztergom and Somogy) the rent increase was moderate (10%), while in the other counties the increase was more pronounced (25-50%).

4. Land market

The definition of land market is the sale of land and property accompanied by a change in owners. In countries with a well-entrenched land policy, only a small share of total land is ever on the market. In the majority of the old Member States, the volume of annual land transactions usually does not exceed 1% of total land assets. **Sale of land is also limited** by the fact that land/property is traditionally considered as a means of maintaining and increasing wealth. Change in ownership stemming from inheritance is the most common. The separation of land ownership and land use is increasingly prevalent in agriculture and this phenomenon is linked to leasehold. The land market is linked mainly to local factors of supply and demand.

Land ownership

To meet the demands of a market economy, land privatisation , and particularly **agriculture land** privatisation, was necessary. Nowadays in well-established farming areas[12] 86.9% of the arable land (crop-land), and 83.1% of the total agricultural area is owned by private individuals. Private individuals are less present in other productive areas (72.3%) due to state ownership of forests (Table 6).

Table 6

Structure of well-established farming properties by main owner groups, 2006 (%)

Denomination	Arable land	Agric. Area	Prod. area	Total area	Properties	
					No.	Aver. area, ha
Property of natural persons	86.9	83.1	72.3	66.6	75.3	88.3
Property of economic organizations	13.1	16.9	27.7	33.4	24.3	137.1
state	8.7	11.7	22.9	25.7	7.8	328.6
cooperative	0.7	1.0	1.0	1.4	3.2	44.1
business association	2.8	2.9	2.8	3.7	2.9	125.4
other*	0.9	1.2	1.1	2.7	10.4	25.4
Total	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

*local governments, societies, churches;
Source: National summaries by the administration districts and by locations (1 January) 2006, Ministry of Agriculture and Rural Development (MARD), Institute of Geodesy, Cartography and Remote Sensing (FÖMI), Budapest, 2006

Two years after Accession **no significant changes were detected in the structure of land ownership.** In fact, the share of arable land owned by private individuals and property concentration seemed to slightly decrease. Arable crop-land owned by private individuals decreased by 0.3 percent to 86.9% (3,936.2 thousand ha). Among other agricultural operations the share controlled by farm companies decreased by only 0.1 percent to 2.8% (127.7 thousand ha), and this was during the last two years up until to 2006. Cooperatives' share of land also decreased by 41.7% to 0.7% (29.5 thousand ha), while the share of state property increased by 0.9 percent point to 8.7% (395.2 thousand ha).

[12] Well-established agricultural and silvicultural use communities.

One sees that cooperative members and farm company owners were the major factors behind changes in land ownership. Land purchases by the state were connected to the life annuity program and the desire to sale land due to the inherent responsibilities that come from working the land. The previously mentioned land area **sizes** in terms of **property ownership titles** as well as other trends are not likely to **change considerably.** In the future private individuals will predominate.

Among types of land ownership, **undivided property ownership**[13] **should be emphasized.** A particular problem related to this property structure is not only how widely dispersed the locations are but also the establishment of property communities – of an area of 1.5 million ha – leaving the properties in one parcel due to the small sizes of the properties. The property communities utilize these areas by leasing the land. 240 thousand proprietors have asked the State for the right to establish independent properties (in order to make use of it by themselves or to sell it at higher price). There are 82 thousand such parcels with the total affected area of 1.1 million ha (MARD 2006). The areas assigned will lead first to even more widely dispersed land, but later higher land prices may ignite the land market.

Presumably **those benefiting most** from **Hungarian land acquisition** could be agri or food companies which are either partially or completely foreign owned. In fact, these businesses are already active on Hungarian soil.

Despite the prohibition on land purchase **resident legal persons**[14] (with or without legal entity) **can purchase land indirectly** through their private individual members or share holders in accordance with the rules regulating land acquisition by private individuals. The corporations – through the rents paid to their members or shareholders – may finance the land purchase of their shareholders and record it as an expense. Regarding the right to sell, the pre-emption right held by local members, meaning shareholders in terms of the rented areas, ensures the priority. The land purchase/lease rights for legal entities are not guaranteed in every old Member State. Denmark has the strictest regulations as Danish legislation allows only land purchase/lease by resident farmers, the only exception being the land purchase/lease by cooperatives with a member engaged in farming, thus allowing it to have members (among them legal entities) who are not engaged in farming (Erdélyi, 2004).

The prohibition on land acquisition does not apply to those EU farmers who **intend to permanently reside in Hungary as farmers and who have been legally residing in Hungary for at least three years and who have been engaged in farming** (Act XXXVI of 2004)**.** Presently the only other way of directly investing foreign capital in Hungarian agriculture is if the **foreign investor buys shares in a corporation which is using land**.

In agriculture the share of foreign control has largely remained at the same level as prior to Accession. In 2003, according to enterprises performing double-entry bookkeeping, there were 794 organizations, meaning 8.4% of the total agricultural organizations having a degree of **foreign control** (Figure 1). Foreign capital entailed 9.2% of the total share of agriculture capital. In 2005 the share of **foreign controlled agricultural enterprises** decreased by 8.1% compared to 2003. Between 2002 and 2005 the total volume of **foreign capital** in agriculture essentially did not change, while its total share increased by 0.2 percent between 2003 and 2005. The share of foreign capital in agriculture is 98.8 million euros, **accounting for 9.4% of the total capital structure in agriculture**. Among agri enterprises foreign

[13] Several landowner have property in the same parcel, which are not yet not separated by the ownership ratios.
[14] With the exception of the State of Hungary, local governments and public foundations.

control is the highest (10.8%) among those specialised in crop production and horticulture requiring large areas. In these enterprises, the rate of foreign capital amounts to 13.0%.

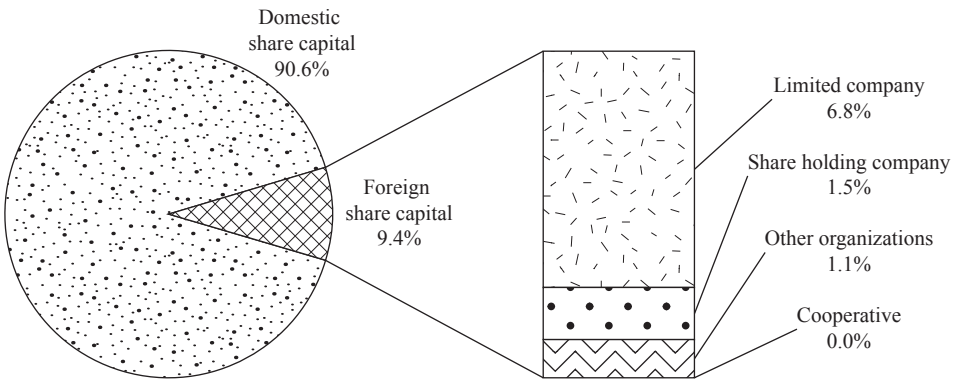

Figure 1: **The ratio of foreign share capital in agriculture, 2005 (%)**

Source: The main data from agricultural and food industrial enterprises doing double entry bookkeeping. 1999-2004, AKI, Budapest, 2006

In the Hungarian food industry, 9.2% of the enterprises have foreign ownership. Almost half (49.2%) of the total share of capital in Hungarian food industry companies have foreign ownership. The number of enterprises with foreign ownership (383) did not change significantly between 2003-2005, while their share among all food industry companies decreased by 1.5 percentage points. However, a significant change is the **34.7% decrease in the share of foreign registered share capital** which has occurred mainly in the following industries: milk processing, beverage, sugar and sweets manufacturing, preserved bakery products, meat processing and the manufacture of tobacco products. However, the amount of foreign registered capital increased significantly in oil processing, in fruit and vegetable processing, and bread and fresh pastry goods manufacturing. Due to changes occurring between 2003 and 2005 the amount of foreign share capital decreased by 290.0 million euros to 545.2 million euros. In 2005**,** almost 60% of foreign share capital was distributed among four sectors: beverage manufacturing (21.7%), oil processing (16.1%), milk processing (11.0%) and meat processing (10.6%).

Liberalisation of land acquisition could result in additional foreign investment in agriculture and **production/processing integration in food processing could be** strengthened. This would mainly occur in vegetable and animal oil processing, plus fruit and vegetable processing, due to the concentration of foreign investment in these fields. Therefore, rigidity over land supply could spark a rise in the price of land. This would be especially true if non-farming foreigners were allowed to purchase Hungarian agricultural land. **Foreign acquisition** would primarily **focus on large-scale farms**. However, even prior to Accession foreign investors withdrew dividend profits from Hungary (Rontóné et al., 2005); and this process continued after Accession.

Land transfers

In the year Hungary joined the EU, **total land transfers** (inheritance, purchase, donation and exchange) exceeded 213.3 thousand hectares, meaning **2.8% of the total productive area**. However, the land market remained stable despite the fact that in 2004 **land transfers** increased by 12.2%. In 2006, officially registered land transfers entailed 210.7 thousand hectares (Table 7).

Table 7

Land transfers by the main groups of pre-emption rights

Denomination	Registered productive area (ha)					
	thousand ha			distribution (%)		
	2004	2005	2006	2004	2005	2006
Acquisition with pre-emption right:	**91.1**	**90.5**	**95.5**	**42.7**	**45.2**	**45.3**
Co-ownership, close relatives	34.4	31.6	49.4	16.1	15.8	23.4
Local resident leaseholder, farmer	37.5	33.7	36.9	17.6	16.8	17.5
Settled (EU national) farmer	n.a.	0.4	0.3	-	0.2	0.1
Hungarian State (National Land Fund)	19.2	24.8	8.9	9.0	12.4	4.3
Acquisition without pre-emption right:	**122.2**	**109.8**	**115.3**	**57.3**	**54.8**	**54.7**
Inheritance, purchase, exchange and donation	105.8	96.9	103.8	49.6	48.4	49.3
Other transfer	16.4	12.9	11.5	7.7	6.4	5.4
Total land transfer	**213.3**	**200.2**	**210.7**	**100.0**	**100.0**	**100.0**

Source: Based on land market transfer volume data collection 2006 of the Department of Land and Geo-information of the Ministry of Agriculture and Rural Development (MARD FTF), 2007

Land acquisition is almost evenly distributed among the participant groups. In 2006 almost half of land transfers, meaning **103.7 thousand hectares, were related to inheritance, purchase, exchange and donation**. Purchases through pre-emption rights came to 45.3%, of which transfers between **co- owners or close relatives** entailed **one fourth** of total purchases (23.4%)**. Local resident leaseholders and farmers** acquired almost **one fifth** (17.5%) of the total land traded. Since 2004-2005 the National Land Fund's role in relation to buyers has significantly decreased, while land acquired by co-owners and close relatives has increased by **156.3%!** According to official records, land acquisition by **Member State citizens residing in Hungary is negligible;** in 2005 and 2006 it did not exceed **700 hectares,** about **0.2% of total land acquisition**. This amount hardly **threatens land acquisition opportunities for Hungarian farmers**.

The **empirical analysis also uncovered** another pertinent **land market** trend, indicating that **demand for land is almost exclusively restricted to crop-land** while interest in grassland is much lower. However, interest in grassland is increasing in the regions of the Northern Great Plain and Central Hungary. It is also growing in West Hungary and Southern Transdanubia counties (Zala; Bács-Kiskun), and in Northern Hungary in Borsod-Abaúj-Zemplén county. Interest in purchasing forest land is primarily in Western Transdanubia, Zala, and Southern Transdanubia. Forest land is also commercially popular in Northern Hungary, Borsod-Abaúj-Zemplén County, the Northern Great Plain, and in Szabolcs-Szatmár-Bereg County. When considering the entire land market, one sees that the **land market is demand**

driven, and most in demand is land with good quality soil, a favourable location (close to markets) and large parcels. However, there is a slight increase in demand for undivided properties and small areas (under 1 hectare). Demand is also growing for poor quality land and land in unfavourable locations (in particular as a result of the direct payments), but of course in these market segments supply outstrips demand.

Most of the land is purchased by individual farms in order to increase their production. On the other hand, land purchase by private individual **owners from other farm operations engaged in agricultural production is also significant**, of which the objective is to extend the size of these enterprises. Far fewer land purchases are made by **private persons not engaged in agricultural** production who are not residing in the area where the land is located. These purchasers see land as an **investment opportunity,** or as a chance to **increase their assets. In the land market purchases by the National Land Fund** are **also significant.** Primarily, **owners sell land due to financial problems, but other factors entail difficulties encountered while farming coupled with the obligation to work the land.** Higher prices also prompt owners to sell good quality land. Regardless of whether they reside in the local area, a large percentage of sellers are **not engaged in agricultural production**. Another category of sellers entails producers terminating or decreasing cultivation. Areas under corporate ownership are also sold, but mainly to their own members. Albeit to a smaller extent, the National Land Fund actively sells land in each Hungarian county.

It is difficult to sell undivided jointly owned properties, and they do not constitute a major factor in land sales. The reason for this is the slowness in distributing the land **plus** the greater **transaction costs** involved in the purchase. Another factor is the **obligation tied to existing leases** Initially, the proprietors endeavour to divest themselves of the minor owners. When this happens, the tenant might be the buyer. However, purchasers acquire the land (buy-ins) hoping to buy the whole parcel later.

Land price

In 2005 Kapronczai et al. conducted an analysis on the purchase of farmland which revealed an average price of around 1,200 euros per hectare for land of 20 Golden Crowns between the years 2002 and 2004 (see Figure 2). The **average sale price of arable land** varied **significantly between regions and even within regions**. The highest prices were in West Hungary, in the regions of Central and West Transduanbia, and in the Northern Great Plain. The lowest prices were generally in East Hungary, in the Southern Great Plain, and also in Northern Hungary and in Southern Transdanubia.

There are no official land price statistics, but based on an analysis performed in Jan.-Feb. 2007 the post-Accession **market price for arable land** (crop-land) **fluctuates sharply between counties and between regions** (Table 8). Between North-Hungary where land is cheapest and the Northern Great Plain where it is the most expensive, there is **17.5 fold** difference in land prices. Within the various land quality categories the difference in market prices for arable land (crop-land) is much smaller but the difference becomes more marked as quality increases. For poor quality land (under 17 GC/ha) it is 4.2 fold, and for average quality (about 20 GC/ha) 5 fold. For good quality (25-30 GC/ha) 7.5 fold and for excellent quality (above 30 GC/ha) the difference is 8.4 fold. A**rable land** (crop-land) **prices** are **highest in the Northern Great Plain and in Southern Transdanubia**; **prices are also high in the Central and West Transdanubia** region, but **lower in the Southern Great Plain and Central Hungary**. The lowest land prices are **in** the **Northern Hungary** region. Using

medium quality Hungarian crop-land as a yardstick, it is possible to determine three land price groups per hectare. In the **top group** (Northern Great Plain, southern Transdanubia) it is **1,400-3,000 euros per hectare**, **in Northern Hungary 600-1,400 euros** and **in other regions** the **market price fluctuates between 1,000-2,000 euros.**

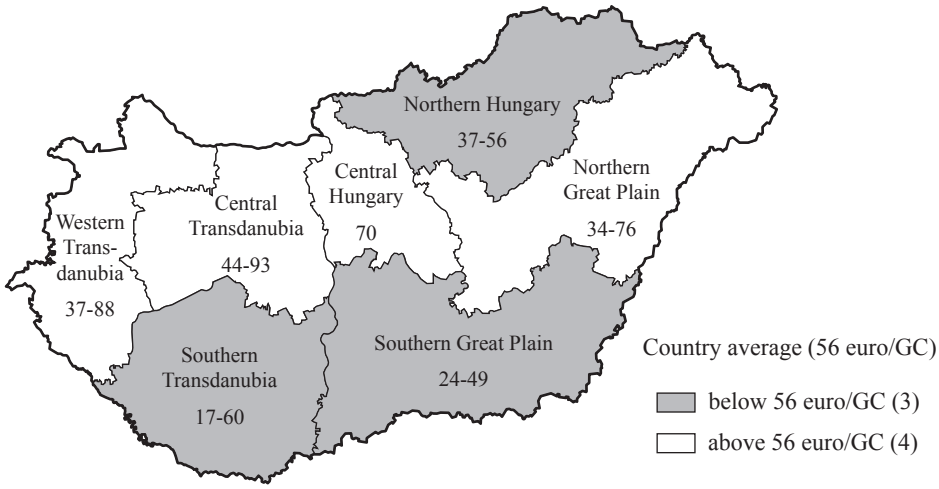

Figure 2: **Price of arable land by regions, 2002-2004 (euro/GC)**

Source: Kapronczai et al. (2005): Characteristics regarding the adaptation by Hungarian agricultural producers AKI, Budapest, p. 24. Calculated on the basis of county averages.

Table 8

Price of arable land by regions and quality of land, January 2007 (euro/ha)

Region	Quality of land			
	Poor	Average	Good	Excellent
Central Hungary	680-1,000	1,200-1,400	2,000-2,200	2,600-3,000
Central Transdanubia	1,000-1,600	1,600-2,400	2,000-3,000	3,200-4,000
Western Transdanubia	600-1,400	1,000-2,000	1,800-2,400	2,000-4,800
Southern Transdanubia	1,000-2,000	1,400-3,000	2,000-4,000	2,400-6,000
Northern Hungary	480-600	600-1,400	800-2,000	1,000-2,400
Northern Great Plain	800-1,400	1,400-3,000	1,600-6,000	2,400-8,400
Southern Great Plain	600-1,200	1,000-1,600	1,600-2,200	2,400-2,800

Source: Based on the data supplied by Agricultural County Offices for empirical analysis, 2007

Between 2005-2006 the **price increase for arable land** (crop-land) was the least (10%) in the regions where prices were previously high, meaning the Northern Great Plain counties. In the Southern Great Plain region prices grew by 15-20% and about 20% in the Southern Transdanubia and Central Hungary regions. An increase of above 20% was recorded in the Central Transdanubia and Western Transdanubia regions, which are close to the old member states. The highest increase – above 30% – was seen in the Northern Hungary counties, where prices are the lowest in Hungary.

Our empirical analysis showed the average price for Hungarian arable land to be about 1,600 euros, meaning that EU-15 land prices still remain 5-10 times higher than in Hungary. This difference can be largely explained by the the inclusion of high EU-15 subsidies in land prices (capitalisation). However, the demand for land by other sectors also drives prices higher. The proportion of lease payments to the price of arable land has not differed significantly since Accession, and rental fees are about 3.5-4.5% of the Hungarian arable land price.

Direct payments based on area are much lower in Hungary than those paid in the old Member States (Table 9). In fact, rising rental prices mean subsidies based on production which are granted to areas are incorporated into New Member State land prices (Ciaian-Swinnen, 2005.). If EU level subsidies had been paid directly after Accession, land prices and land lease payments would have more rapidly approached EU land prices and rents. This process is also hampered by the significant bargaining power of agricultural producers and the transition to the Single Payment Scheme (SPS) which is part of CAP reform (Kovács, 2006).

Table 9

Planned direct payments (SAPS and national top-up), (euro/ha)

Denomination	Ref. yield*	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Hungary	4.73	149.5	161.0	174.3	208.6	238.4	268.2	298.0	298.0	298.0	298.0
EU-15 average	4.77	300.5	300.5	300.5	300.5	300.5	300.5	300.5	300.5	300.5	300.5

* Reference yield (t/ha)
Source: AKI calculation based on Council Decision 2004/281/EC

According to Hungarian FADN indicators used to compare Hungarian and EU farms (Keszthelyi, 2007), between 2004 and 2006 the Hungarian gross farm income per hectare of land (EUR 312.7) increased by one fourth. However, at EUR 720.2 the 2004 EU-15 average is still 2.3 times higher than the Hungarian data.

According to Swinnen – Vranken's 2003 study, increases in area payments to the EU level along with a permanently growing demand for agricultural products will lead to increasing agricultural incomes and increasing demand for land rent and purchase. The GTAP (Global Trade Analysis Project) EU Accession impact analysis model regarding Central and East European countries had predicted a 170% land price increase between 1995 and 2010 if the full amount of area payment were to be paid (Frandsen – Jensen, 2000). However, by 2006 this prediction already held true even though the specified payments were only partially carried out. **In Hungary one can expect a permanent and gradual rental fee and land price increase.**

5. Arguments for and against the transitional measures

Based on a statistical analysis and a review of the pertinent literature, Accession **has not brought about major changes in Hungarian land use and ownership as** the changes which occurred prior to Accession and their impact are still **being felt. Between 2003 and 2006 land prices and land lease payments rapidly increased** by 30-40%, but still occurred **in a balanced and harmonized way**. A permanent increase in land prices is anticipated, but the rate of increase will likely gradually decline.

Arguments for maintaining the transitional measures:

1. **Hungarian land prices are significantly lower than those of the** EU-15, and low land prices and lease payments constitute an important factor in making Hungarian agriculture competitive. **Viable farms** and those farms capable of becoming viable are **not yet strong enough to compete.** A comparison between Hungarian farmers and old Member State farmers indicates that lower area subsidies mean **Hungarian farmers are in a "disadvantageous position."**
2. **Giving foreigners not engaged in farming the right to purchase land would increase demand for land, leading to higher land prices and lease payments.**
3. **Unlimited land acquisition and rental by legal entities is not allowed in all Member States. Security of supply can be increased through land acquisition by members or shareholders.**
4. **Demand for** land might increase without foreigners acquiring land due to permanent improvement in agricultural profitability and by decreasing land acquisition taxes (Szűcs – Csendes, 2002)**.**
5. **If one could prevent radical and sudden price** increases in rural areas where small-scale farming is common, the rural population's livelihood would be better ensured and **social problems avoided** (Tóth et al., 2004). Moreover, future generations could continue farming and they would have a greater chance of acquiring land.

Arguments against maintaining transitional measures:

1. **Despite available opportunities, land acquisition by foreigners residing in Hungary is insignificant.** The presence of foreign capital in agriculture could introduce **better technology** and improve efficiency and quality.
2. Limitations on land acquisition hinders foreigners from investing, and thus **capital investments by foreign food industry enterprises** operating in Hungary are also hindered.
3. **Foreign capital** is primarily **interested in purchasing large** farms that provide satisfactory income. **Purchasing small farms** to incorporate them into large holdings is **not lucrative due to the high costs of land transactions.**
4. **Land speculation** can be controlled by procedures which monitor **land** acquisition; thus, profits that don't lead to agricultural production can be prevented (Tanka, 2006).

Agricultural land is a part of the national wealth, and requires care and attention to guarantee that increases in the price of land primarily strengthen Hungarian agricultural production and the producers. However, an increase in land prices means a growth in **national assets.** Growth in mortgages means the surplus can be spent on developing production and also on land acquisition. **Land acquisition by foreigners could mean the consolidation of the national land market** but also lessen Hungarian farmers' bargaining power. An increase in land prices and lease payments will hasten competitiveness and production profitability but Hungarian farmers will enjoy fewer opportunities to purchase land. However, **improved profits and maintaining the present transitional measures prohibiting foreigners from acquiring land means Hungarian farmers will have a better opportunity to acquire land for a longer period of time.**

References

1. Act XXXVI of 2004 on amendment of Act LV of 1994 on Arable Land, Official Journal of Hungary, Hungarian Official Journal Publisher, Budapest, 2004. No. 61., 2004. május 1, pp. 6408-6410.
2. Act CXVII of 1995 on personal income tax as amended by paragraph 25. of Act XLII. of 2002 on modification of Acts on taxes and other budgetary payments, Official Journal of Hungary, Hungarian Official Journal Publisher, Budapest, 2002. No. 141, 2002. november 15., pp. 7738-7855.
3. **Antal**, K.; **Guba**, M.; **Hodina**, P.; **Lámfalusi**, I. and **Rontóné Nagy**, Zs. (ed.) (2005): A külföldi tőke szerepe és a gazdálkodás eredményességére gyakorolt hatása a mezőgazdaságban és az élelmiszeriparban (The share of foreign capital and its effect on the efficiency in agriculture and food industry), Agrárgazdasági Tanulmányok, Agrárgazdasági Kutató Intézet, Budapest, 2005. No. 1., p. 131.
4. **Ciaian**, P. and **Swinnen**, J. (2005): Land Market Imperfections and agricultural Policy Impacts in the New EU Member States: A partial Equilibrium Analysis, LICOS Centre for Transition Economics, Katholieke Universiteit, Leuven Discussion Papers 158/2005, Leuven, p. 48.
5. Council Directive 88/361/EEC of 24 June 1988 for the implementation of Article 67 of the Treaty, OJ L 178, 8.7.1988, pp. 5–18.
6. Council Decision 2004/281/EC of 22 March 2004 adapting the Act concerning the conditions of accession of the Czech Republic, the Republic of Estonia, the Republic of Cyprus, the Republic of Latvia, the Republic of Lithuania, the Republic of Hungary, the Republic of Malta, the Republic of Poland, the Republic of Slovenia and the Slovak Republic and the adjustments to the Treaties on which the European Union is founded, following the reform of the common agricultural policy, Official Journal- European Union Legislation L, 2004, Vol 47; Part 93, pp. 1-17.
7. **Erdélyi**, T. (2004): A dán Mezőgazdasági Birtok Rendelet és a földértékelés (The Danish Landed Property Regulation and land evaluation), Gazdálkodás, XLVII. évf. No. 9. számú különkiadása (special issue), pp. 82-86.
8. **Eurostat** (2006): Agriculture, Statistical Situation in 2005, European Commission, Eurostat
9. **Eurostat** (2005): Agricultural Statistics, Quarterly bulletin 5. 2005, Special Issue: Farm Structure Survey 2003
10. **Ministry of Agriculture and Rural Development** Department of Land and Geo-information of the (MARD FTF)) (2007): Ingatlanforgalmi Adatgyűjtés 2006 (Land market transfer volume data collection), 2007
11. **MARD** - Institute of Geodesy, Cartography and Remote Sensing (FÖMI) (2006): Országos igazgatási határos fekvésenkénti és összevont főösszesítők 2006. január 1. (National summaries by the districts of administration and by locations, Budapest
12. **MARD** (2006): Jelentés az agrárgazdaság 2005. évi helyzetéről (Report on the situation of agriculture in 2005), Budapest, 2006. szeptember, p.183.

13. **Frandsen**, S. E. and **Jensen**, H. G. (2000): Economic Impacts of the Enlargement of the European Union, Analysing the importance of direct payments, Danish Institute of Agricultural and Fisheries Economics (SJFI), Working Paper No. 15/2000, p.

14. **Hungarian Central Statistical Office** (HCSO) (2006): Magyarország mezőgazdasága 2005, Gazdaságszerkezeti Összeírás – I. kötet, HCSO, Budapest

15. **HCSO** (2006 b): Mezőgazdasági Statisztikai Évkönyv 2005, HCSO, Budapest.

16. **HCSO** (2004): Magyarország mezőgazdasága 2003, Gazdaságszerkezeti Összeírás – I. kötet, HCSO, Budapest

17. **Kapronczai**, I. (et al.) (2005): A mezőgazdasági termelők alkalmazkodóképességének jellemzői, Gazdálkodói válaszok időszerű kérdésekre (Characteristics of the Hungarian Producers, Current Questions of the Reactions of the Producers), Agrárgazdasági Tanulmányok, Agrárgazdasági Kutató Intézet, Budapest, 2005. No. 6., p 207.

18. **Keszthelyi**, Sz. (2007) A Tesztüzemi Információs Rendszer 2006 évi. Eredményei (Results of Hungarian FADN farms 2006), Agrárgazdasági Információk, 2007. No. 5., AKI, Budapest, p. 135.

19. **Kovács**, G. (2006): A KAP reform várható hatásai a mezőgazdasági üzemek termelésére és a földhasználati viszonyokra (The Expected impact of the CAP reform on the production of agricultural holdings and land use), Agrárgazdasági Tanulmányok, Agrárgazdasági Kutató Intézet, Budapest, 2006. No. 4., p. 97.

20. **Marton**, B. (ed.); **Malatinszkyné Fekete**, M. and **Kamarás**, K. (2003): Tőkemozgás az Európai Unióban és Magyarországon (Capital Movement in the EU and Hungary, Európai Füzetek 19., Miniszterelnöki Hivatal Kormányzati Stratégiai Elemző Központ és a Külügyminisztérium közös kiadványa, p. 36.

21. **Research Institute of Agricultural Economics** (AKI) (2007): A kettős könyvvitelt vezető mezőgazdasági és élelmiszeripari szervezetek gazdálkodásának főbb adatai 2000-2005 (The main data of agricultural and food industrial enterprises of double entry bookkeeping 2000-2005), AKI, Budapest, 2007

22. **Sadowski**, A. and **Takács-György**, K. (2005): Results of Agricultural Reforms: Land Use and Land Reform in Poland and in Hungary, Studies in Agricultural Economics No. 103, Agricultural Economics Research Institute, Budapest, pp. 53-69.

23. **Szűcs**, I. (1998): A föld ára és bére (The Price and Rent of Land), Agroinform, Budapest, p. 199.

24. **Szűcs**, I. and **Csendes** B. (2002): A földárak néhány elméleti kérdése napjaink hazai mezőgazdaságában (Some Theoretical Issues of Land Price in up-to-date Hungarian Agriculture), Gazdálkodás, Vol. XLVI, 2002. No.1, pp. 31-36.

25. **Swinnen**, J. F. M. and **Vranken**, L. (2003): Land Rental Markets and Household Farms in Transition: Theory and Evidence from Hungary, LICOS Centre for Transition Economics, Katholieke Univrsiteit, Leuven, Discussion Paper 129/2003, p.35.

26. **Tanka**, E. (2006): Javaslat a családi gazdálkodást megalapozó és a birtokszerkezetet korszerűsítő törvény megalkotásáról (Proposal for the creation of Act establishing family farming and modernizing estate structure), in Tanulmányok a Szent István-tervhez, Professzorok Batthyány Köre, p. 193-200.

27. Treaty of Accession to the European Union 2003 of the Czech Republic, Estonia, Cyprus, Latvia, Lithuania, Hungary, Malta, Poland, Slovenia and Slovakia, Signed in Athens on 16 April, 2003, AA2003/ACT/en, (www.ec.europa.eu)

28. **Tóth**, E. (ed.); **Biró**, Sz.; **Hamza**, E.; **Miskó**, K. and **Varga**, P. (2004): A hazai és az európai földpiac jellemzőinek feltárása, és javaslat a rendszeres földpiaci információs rendszer kidolgozására (Characteristics of the Hungarian and EU Land Market, Proposal for the Preparation of a Regular Land Market Information System (manuscript), AKI, p. 122.

29. Treaty establishing the European Economic Community, Rome, 25.03.1957.

30. Treaty on European Union, Official Journal C 191, 29 July 1992

Studies in Agricultural Economics No. 107. p. 79-96. (2007)

Analysis of agri-environmental measures in Hungary – a regional perspective

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Abstract

The hypothesis behind this paper is that agri-environmental measures (AEMs) in Hungary, and probably in the other EU New Member States, are not merely substitutes for traditional agricultural subsidies, but measures which could support rural development and encourage environmentally sustainable agricultural production. The first part of this paper examines concepts closely related to AEMs, as well as the place of AEMs in regional, rural, and agricultural development policy. The second part shows how agri-environmental measures have gained ground in Hungary. The third part presents the results of an analysis of the Hungarian AEMs' database. Finally, based on the literature and analysis findings, it is suggested that, for sustainable development, one needs to economically evaluate natural resources in agriculture.

Keywords

agri-environmental measures, Hungarian agriculture, multifunctional agriculture, sustainable development

1. Introduction

Currently there is a debate surrounding agri-environmental measures (AEMs), as to whether they are only repackaged covert price supports and production subsidies designed to gain access to the "Green Box"[2] category or whether they actually encourage environmentally sustainable production and rural development (Baylis et al., 2006; Claassen − Morehart 2006). This paper seeks to help to answer this question by analysing the Hungarian AEMs' results from 2005 and by emphasising the importance of sustainable development and multifunctional agriculture within regional development.

As natural resources form part of national wealth, it is pertinent to answer Gáthy's (2007) question: "*how much land do we need, can we occupy from nature,"* and what form should it assume, especially related to energy crops' increasing demand for territory and also to climate change?

1.1. Sustainable development and multifunctional agriculture

As a primary sector activity, agriculture is strongly linked to natural resources. Examining AEMs requires a proper understanding of definitions for sustainable development and multifunctional agriculture. Nowadays these concepts are frequently used, but often in a broader context than they should be. Van Huylenbroeck et al.'s 2007 study on agricultural

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[2] In World Trade Organisation terminology, subsidies in general are identified by "boxes" which are given the colours of traffic lights: green (permitted), amber (slow down - i.e. be reduced), red (forbidden). The Agriculture Agreement has no red box, although domestic support exceeding the reduction commitment levels in the amber box is prohibited; and there is a blue box for subsidies that are tied to programmes that limit production. Green box subsidies must not distort trade, or at most should cause minimal distortion. They have to be government-funded (not by charging consumers higher prices) and must not involve price support (WTO, without year).

multifunctionality provides the author of this paper with a good basis for clarifying the term.

The dilemma surrounding the definition of sustainable development is often transferred to different problems such as food supply for the increasing world population, or to bioenergy production to alleviate the depletion of non-renewable energy resources and so on. For the author of this paper, whose opinion is also backed by the literature (e.g. WCED, 1988; Láng, 2001; Meadows et al., 2005; Gáthy et al., 2006), sustainable development means development in harmony with nature. This is supported by the fact that the definition was created as a tool to manage environmental problems. Agriculture is one of the economy's primary sectors and its principal resource is natural capital. Van Huylenbroeck et al. (2007) states that "multifunctional agriculture" became an international issue as early as 1992 at the Rio Earth Summit. In the author's opinion the term surfaced in Rio because from a sectoral viewpoint sustainable development can only be achieved if agriculture is multifunctional.

The concept of multifunctionality has been closely related to the Common Agricultural Policy (CAP) since its second reform in 1999, when rural development became the second pillar of the CAP and formed an integrated part of it.

To clarify the definition multifunctional agriculture, the author agrees with Van Huylenbroeck et al. (2007:8) that "*as an analytical concept, multifunctionality refers to the fact that one activity can have different outputs. It is thus related to an economic activity, while diversification means that different economic activities (e.g. food production and tourism) are combined within the same unit. Pluri-activity refers to the fact that one person or group of persons are involved in different activities (e.g. farming or non-farming).*"

The working definition for multifunctionality, which is used by the OECD (2003), associates multifunctionality with particular characteristics of agricultural production and its outputs, namely:

- the existence of multiple commodity and non-commodity outputs that are jointly produced by agriculture,
- some of the non-commodity outputs may exhibit the characteristics of externalities or public goods, such that markets for these goods function poorly or are non-existent.

This paper analyses multifunctionality of agriculture in terms of green functions, in relation to groupings designated by Van Huylenbroeck et al. (2007:7): "*In the broadest sense, multifunctionality includes four kinds of functions provided by agricultural enterprises. The green functions consist, amongst others, of landscape management and the upkeep of landscape amenities, wildlife management, the creation of wildlife habitat and animal welfare, the maintenance of biodiversity, improvement of nutrient recycling and limitation of carbon sinks. Other public benefits that can be created by agriculture are the blue services and contain water management, improvement of water quality, flood control, water harvesting and creation of (wind-) energy. A third kind are called yellow services and refer to the role of farming for rural cohesion and vitality, ambience and development, exploiting cultural and historical heritages, creating a regional identity and offering hunting, agro-tourism and agro-entertainment. Finally, many authors acknowledge the white functions produced by agriculture, such as food security and safety.*"

The new Rural Development Regulation (EC, 2005) constructs a rural development policy along four axes, which are as follows:

Axis 1: Improving the competitiveness of the agricultural and forestry sector
Axis 2: Improving the environment and the countryside
Axis 3: Quality of life in rural areas and diversification of the rural economy
Axis 4: Leader

There are instruments – particularly related to Axes 2, 3 and 4 – which are budgetary sources available for financing the production of non-commodity outputs. The Regulation stipulates that a minimum of 10 % of the total fund has to be allocated to Axis 1, 25% to Axis 2, 10 % to Axis 3 and 2.5-5% to Axis 4. As far as the breakdown of National Rural Development Strategic Plans are concerned Forgács (2007) states that *"no clear relationship can be recognised between the farm structure and budget allocation structure of the CEECs"*.

For example, according to the European Commission (EC, 2007), the 2007-2013 Axis 2 share provided from the European Agricultural Fund towards rural development for the following countries' Rural Development Programmes is: 55% in the Czech Republic, 50% in Slovakia, 38% in Lithuania, 33% in Hungary and 32% in Poland.

Lichtenberg (2002:1255) states that: "*even when explicit markets for environmental quality are lacking, implicit linkages between agricultural productivity and environmental quality may give farmers incentives to provide some environmental protection. Policy discussions have traditionally referred to these incentives under the rubric of stewardship"*.

Agri-environmental measures could be interpreted as an instrument of multifunctional agriculture, meaning payments for mostly non-commodity outputs produced by farming when environmentally sound practice is carried out over the *markets s*tewardship regarding farmers.

1.2. Territorial cohesion and agri-environmental measures

Besides its production function, agriculture's environmental and social functions depend on regional characteristics (Popp, 2003; Ángyán et al., 2007). Social function differs among EU-27 regions because farm structure differs among EU member states. Compared to the EU-15, the number of agricultural holdings under one European Size Unit (ESU)[3] is much higher in those countries which joined the EU in 2004 and 2007. For example, in terms of utilised agricultural area, farms under 1 ESU constitute 25.6% of the total in Romania, 11 % in Poland, and 5.2 of Hungary. If we examine the proportion of these farms regarding regular labour force, the percentage is much higher (Figure 1).

Ángyán (2005) divided regional land use systems into three basic groups endowed with the following characteristics: 1. where the main function is production; 2. duality, where both production and environmental functions exist; and 3. where the main function is environmental management. Ángyán further contends that regional land use traits should determine the farmer's primary source of income. The earnings for the first group derive mainly from selling commodities and getting direct payments. In the second group, where production and

[3] For each activity on a holding, or farm, a standard gross margin (SGM) is estimated, based on the area (or the number of heads) and a regional coefficient. The sum of all margins, for all activities of a given farm, is referred to as the economic size of that farm. The economic size is expressed in European Size Units (ESU), 1 ESU being equal to EUR 1200 of SGM.

environmental functions exist, the proportion of rural development payments increases. And in the third, meaning environmentally designated regions, rural development payments play the most important role.

In the United States of America there is also a similar statement pertaining to farms. Claassen and Morehart (2006) point out that there are striking differences in the distribution of commodity and conservation payments across farm types and regions. Most income support payments go to large commercial farms, while most conservation payments go to rural residence farms[4].

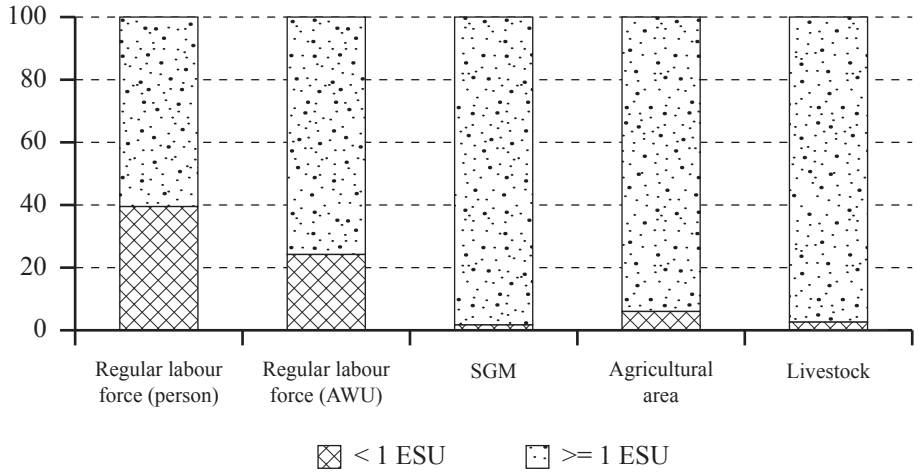


Figure 1: **Results of the farm structure survey, 2005, EU-27**
Source: Eurostat, 2007

Referring to other studies, Van Huylenbroeck et al. (2007) also states that farms that are less cost oriented seem to be more inclined to switch their farming system and to incorporate other functions into their activities.

This territorial nature of agricultural production also underlines the importance of the shift from sectoral to territorial development. It also means that it is important to identify the best guideline for interconnecting regional, rural and agricultural development, especially with respect to protecting the environment.

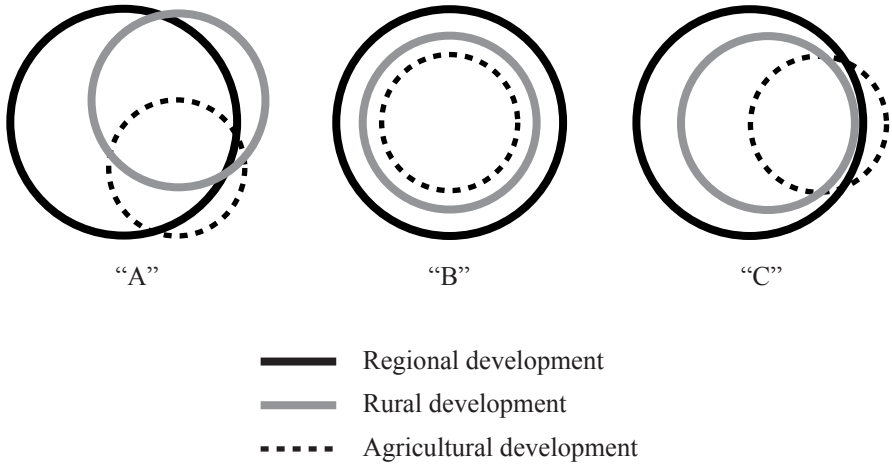
The relationship between these policies is viewed differently by the various players and there is no commonly accepted formula. In a workshop recently organised by the Cross-Border Centre of Expertise in Rural Development (HVTK) in Debrecen, three forms were identified (Figure 2). A slight majority of the participants believed that, although there was considerable overlap among the three, each also had some unique aspects (version A). A smaller number believed that agricultural development fell entirely within rural development, which in turn fell entirely within regional development (version B). The least favoured

[4] Commercial farms are large family farms with sales above USD 250,000 and some non-family farms organised as cooperatives or non-family corporations. Intermediate farms have sales below USD 250,000 and the operator reports farming as his or her major occupation. Rural residence farms have gross sales below USD 250,000 where farming is considered to be a secondary activity both in terms of resources invested in the farm and the amount of income it contributes to the farm household. (Eurostat, 2007).

option (version C) was that rural development fell entirely within regional development but that agricultural development had some unique aspects (Fieldsend and Katona-Kovács, 2007).

Although all three versions agree that rural development is a broader category than agricultural development, in the EU rural development policy falls under agricultural policy, and regional policy tends to be urban focused. This is especially a problem for those territories with an environmental determinate.

To achieve the aims of AEMs examined in this paper, those AEMs integrated into both agricultural and rural development policy should also be considered in terms of regional development policy. Shucksmith et al. (2005:202) states that: "*the integrated development of land use, linkage to other local sectors and the creative development of region-specific*



programmes are necessary to enhance the cohesion aspects of the CAP".

Figure 2: **Perceptions of participants in an HVTK workshop on the relationship between regional, rural and agricultural development**

Source: Fieldsend - Katona-Kovács, 2007

1.3. Agri- Environmental Measures in Hungary

Financial resources for measures similar to AEMs first became available in Hungary in 1997 and this was when farmers wanting to begin organic farming on their land could apply for payments. Between 1997 and 2001 about EUR 2 million was made available for this purpose.

This scheme was followed by the National Agri-Environmental Protection Programme (NAPP), which Hungary initiated in 2002. It was based on Council Regulation (EEC) 2078/92 and was part of the National Environment Protection Programme. In 2003 the NAPP provided EUR 18 million in payments (nearly twice the EUR 10 million available in 2002) for agri-environment protection. From this total, EUR 2 million was spent on animal husbandry.

The programme comprised five horizontal and one zonal action programme. The nation-wide horizontal action programmes were:

- Basic programme for agri-environmental management
- Integrated plant cultivation
- Organic farming
- Pasture management
- Wetland areas

The zonal, regional programme targeted environmentally sensitive areas (ESAs).

In 2002 there were more than 5,000 applicants, and from these 2,691 were successful in obtaining funding (Szabó et al., 2003) while in 2003, out of 7,529, there were 5,114 successful applicants. Those farmers taking part in given action programmes were able to apply for complementary payments for animal husbandry and in 2003 around 900 applicants obtained this kind of payment. In 2003 successful NAPP applications covered around 240,000 ha, or 4% of Hungary's agricultural area. The amount of land designated by the Action Programmes was as follows:

- Pasture management - 38%
- Organic farming - 25%
- ESAs - 18%
- Wetland programme - 8%
- Basic programme - 6%
- Integrated programme - 5%

At the NUTS II level, the North Great Plain (NP) was placed first with a territory of 72,041 ha (30.5% of the total), North Hungary (NH) and the South Great Plain (SP) were second and third with 21.0% and 20.0% respectively. They were followed by Central-Transdanubia (CD) at 10.0%, South-Transdanubia (SD) at 8.0%, Central Hungary (CH) 5.5% and West Transdanubia (WD) at 5.0% (Katona-Kovács et al., 2005).

Although the SAPARD Programme[5] allowed the Central and Eastern European Countries (CEECs) to include AEMs in their implementation plans, the various countries did not view AEMs as a priority item. In general, countries intended to devote less than 5% of SAPARD funds to AEM schemes. For example, from their SAPARD budgets, Hungary planned to allocate 4.2%[6], Slovakia 3.5%, the Czech Republic 3%, Poland 2%, Estonia 1.4%, and Latvia 4%. Almost every country spent the majority of its SAPARD designated budget (around 60-70% of the budget) on restructuring the "classical" agricultural sector, for example on investments in agricultural holdings and processing/marketing (Zellei, 2001).

After EU accession, Hungary had to prepare a National Rural Development Plan (NRDP) that included Hungarian regulations for AEMs to meet funding requirements from the EAGGF Guarantee Section. The payments, which were linked to meeting certain designated specifications, were paid annually in terms of area (per hectare) to agricultural producers to compensate them for extra costs and revenue losses they assumed by meeting the specifications. NAPP linked AEMs were included in the NRDP and new AEMs were also introduced. These measures aroused farmers' interest. In 2004 around 30,000 applications

[5] The SAPARD Programme was prepared for the period 2000-2006. As a result of the accession to the EU funds from this programme were available until May 2004.

[6] Finally Hungary did not spend budget resources for AEMs from SAPARD.

covering about 1.8 million hectares were submitted but farmers were not informed of the results until February 2005. This meant that farmers wanting to implement NAPP linked AEMS did not receive a subsidy in 2004. However, in 2005 Hungarian area covered by AEMs increased six-fold, representing 25% of the nation's agricultural area, meaning around 1.5 million hectares. Farmers could also apply for animal husbandry payments and in this regard the NAPP received around 900 such applications. Farmers were able to receive funding for native livestock breeds. A very high percentage (in most cases over 50%) of native breeds such as the "racka Hortobágy sheep" was entirely absorbed into the Programme. However, this study does not analyse these data, only those related to territory.

The next AEM initiatives are illustrated in the New Hungarian Rural Development Programme (NHRDP). The initial schedule for AEMs is as follows: 2008: anti-erosion measures (wind and water erosion), changes in environmental land use and nature conservation schemes (grassland), and maintaining wetlands and creating wetland habitats In 2009, after current NRDP schemes are phased out, the other schemes will commence. As with the earlier programmes (NAPP, AEMs in the NRDP), NHRDP agri-environmental support measures are undertaken in terms of established plans and include area-based supports which are composed of horizontal and zonal elements. If one considers agriculture areas' various characteristics, and what it takes to implement high quality environmental management programmes, 22 different schemes have been defined within the given plan's framework, which are: nine for arable plant production, six for grassland management and planting, three for environmentally friendly management of plantations and four for managing wetlands. Based on trends in agricultural land use, the plan can be divided into four sub-measures: arable farming, grassland management, permanent crops (fruit and grape production) and wetland management. Potential measures between 2007 and 2013 will be as follows (MARD, 2007) (the measures in bold were also financed from the NRDP):

A. ARABLE FARMING SCHEMES
A.1. Integrated arable crop production scheme
A.2. Management of traditional homestead scheme
A.3. Organic arable crop production scheme
A.4. Zonal schemes for nature conservation on arable land
A.5.Anti-erosion schemes
B. AGRI-ENVIRONMENTAL MEASURES PERTAINING TO GRASSLANDS
B.1. Extensive grassland management initiative
B.2. Organic grassland management scheme
B.3. Zonal initiatitves for nature conservation in grasslands
B.4. Initiatives for the conversion of arable land into grassland management
C. AGRI-ENVIRONMENTAL MEASURES FOR PERMANENT CROPS
C.1. Integrated fruit and grape production scheme
C.2. Organic fruit and grape production scheme
C.3. Traditional fruit production initiative
D. AGRI-ENVIRONMENTAL MEASURES FOR OTHER LAND USE
D.1. Reed management scheme
D.2. Scheme for the maintenance of natural wetlands, marshes, bogs
D.3. Scheme for the establishment **and management of wetlands**

Because of the great interest shown in NRDP linked AEMs, only those farmers who successfully applied for funds in the NRDP's first year (2004) were able to benefit. *This means that until 2009 it is impossible to participate in current measures.* Because of limited funds, some NRDP linked AEMs were not initiated, mainly those with higher environmental requirements (e.g. long-term environmental aspects, rare plant maintenance, wet grassland maintenance, bogs and marshland).

2. Methodology

In July 2003 the Hungarian national Agricultural and Rural Development Agency, (English name ARDA), was established. ARDA deals with funding agency activities. Its activities include receiving, assessing, and authorising applications. They also include support allocation, payment transfers, registration and accounting. This paper is based on ARDA's year 2005 database for AEMs.

Firstly, in order to analyse the importance of the various measures, data relating to the number of applications, territory, and funds were grouped according to the given AEMs. For the grouping pertaining to the Ministry of Agriculture and Rural Development's 150/2004 regulation (MARD, 2004b), territories were analysed according to how strict the measures were. In terms of regulatory strictness, AEMS were assigned a score from 1 to 4, and the higher the score, the more environmentally friendly the farming.

In the next step the database was analysed in terms of NUTS II regions. For measures related to rural development the territorial aspect is highly significant. In Hungary rural development programmes such as SAPARD, NRDP, NHRDP are prepared at the national level. However, rural areas and farms structures differ, and it is thus imperative to analyse the role of the different measures at the regional level. The results of an earlier study (Katona-Kovács, 2007) on the Single Area Payments Scheme (SAPS) showed that the structure of those farms receiving SAPS payments are more concentrated in western Hungary. The SAPS data also served as a basis for further research, indicating that the concentration of farms receiving SAPS payments were also linked to concentration of farms operating under AEMs at the NUTS II level. To determine if there is a link between farm structure and multifunctionality, analysis of a possible relationship between the AEMs'strictness and farm size was carried out.

Our question was whether or not AEMs are simply substitutes for traditional agricultural subsidies or measures which could support rural development and encourage environmentally sustainable agricultural production. To answer this question we endeavoured to determine if there was a correlation between natural protection and the NUTS III regions falling under the AEMs' umbrella and those regional areas defined as "Less Favoured" in regulation 137/2004 (MARD, 2004a).

Finally, following the method of an earlier study that researched NAPP (Szabó, et al. 2003), regional intensity indicators were calculated (applications were related to utilised agricultural area) and were correlated with those of NAPPs.

3. Results

Farmers were the most interested in the Arable stewardship scheme (ASS) (Annex 1). Presumably ASS criteria were the easiest for farmers to achieve. UAA is an abbreviation referring to the structure of utilised agricultural area, and in terms of UAA the ASS was viable for a wide range of Hungarian farmers. One of the ASS programme's major aims is achieving the correct nutrient balance in the soil.

The second most common scheme was the integrated crop management scheme, which is similar to the ASS programme, but has stricter criteria. Sharp interest in these measures caused a change in ranking regarding the measures compared to the NAPP where grassland management entailed the most territory, followed by organic farming and ESAs. In terms of AEM strictness, the NRDP's four regulatory categories (MARD, 2004b) ranked as follows: 69.8% of the territory lies in the first category, which specify the less normative, 19.5 % falls in the second category, 6.9% in the third, and 3.8% in the fourth (Figure 3).

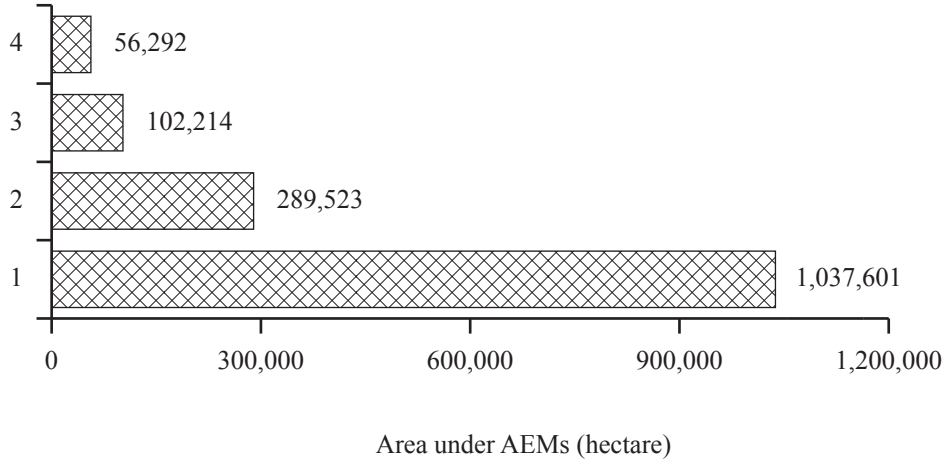


Figure 3: **Area under AEMs ranked in terms of the different measures' strictness.**
Source: Author's own calculation from the database

There is only a small change regarding NHRDP funds (2007:235-236) but special attention has been paid to the fact that the share of zonal schemes with higher environmental performance should increase in relation to NRDP data, and consequently, a major part of Hungarian agri-environmental resources should be directed (Table 1) toward solving area specific problems. Table 1 illustrates changes needed for directing subsidies toward farms representing the greatest environmental benefits.

Table 1

Percentage of zonal schemes in the NRDP and in the NHRDP

	Horizontal		Zonal	
	RDP	NHRDP	RDP	NHRDP
Share of area coverage	92	64	8	36
Share of allocated budget	88	61	12	39

Source: NHRDP, 2007:233.

The amount of support differs according to AEMs (Annex 2). The average funding per hectare is EUR 116, which is 1.6 times greater than the NAPP per hectare funding average. The average funding per application is around EUR 6,000, which is 1.8 times higher than the NAPP. The increase in funding differs between measures and is more pronounced when the regulation is stricter. For example, funding for the Grassland stewardship scheme increased by 80%, while funding for the HNVA increased by about 220%. Because funds differ between AEMs the territorial breakdown and funding somewhat vary from each other. As fruit and grape production schemes get the highest funds, 10% of total funds go to this group despite the small (3%) territory involved in the Integrated fruit and grape production scheme (IFGPS). As this programme has one of the smallest average farm sizes per application (Annex 2), the number of applications is the second highest. The average farm size per application was 46 ha for the NAPP and 51 ha for NRDP's AEMs. Possible reasons for the increase in farm size are:

- that the area under NRDP's AEMs in the western Hungarian NUTS II regions grew by a higher percentage (in the western regions the area under NRDP is ten times higher than for the NAPP, while in the eastern regions it is five times higher), this related to area under NAPP's AEMs (Annex 3), and
- that arable stewardship and integrated crop management cover the biggest area.

Table 2 contains the AEMs' breakdown between NUTS II regions. Although it can be seen that the AEMs' area growth was higher in the western NUTS II regions, those regions which are in eastern Hungary (in Table 2 and Annex 3 'E' means eastern and 'W' means western) still attract greater interest. The three NUTS II regions in the eastern part of the country entail 54.4% of the programme's total territory.

Table 2

Breakdown of AEMs by NUTS II regions as percentages (Hungary = 100%)

	NP * E**	SP E**	NH E**	CH	CD W**	SD W**	WD W**
Territory covered	20.6	20.6	13.2	8.0	12.4	15.0	10.1
Funding allocated	20.0	21.1	15.1	9.0	11.2	13.9	9.6
Number of applications	28.7	29.8	12.9	5.6	7.2	9.6	6.0

* North Great Plain (NP) South Great Plain (SP) North Hungary (NH) Central Hungary (CH) Central-Transdanubia (CD) South-Transdanubia (SD) West Transdanubia (WD)
** E- eastern, W-western part of Hungary
Source: Author's own calculation from the database

In examining the relationship between the programmes and environmental protection, the territory of NUTS III regions (counties) under natural protection, LFA, NAPP and NRDP was related to the total territory of the counties and correlated afterwards. Results show that estimating the correlation between the percentages of NAPP counties' areas to percentages of counties' areas under natural protection, the correlation coefficient value was r=0.55 (at the 0.05 level) which indicates a positive relationship, while for the NRDP it decreased and is zero. Results are the same for LFAs, where the correlation coefficient decreased from 0.67 to 0.22 (at the 0.05 level).

The average farm size per application is higher in western Hungary (Annex 3). An earlier study on the single area payment scheme (SAPS) (Katona-Kovács, 2007) also revealed that the farms in western Hungary are more concentrated. For communities where one application was submitted (representing 10% of the total number of the applications) 5% of the applications were over 300 hectares, covering 60% of the territory.

Upon evaluation of the various applications, it was observed that out of a maximum 100 points, 30 were related to regional agricultural employment. Along these lines, examining AEMs indicated a strong correlation between the number of applications per region and the number of persons employed in agriculture; Pearson Correlation is significant to 0.866 at the 0.05 level (2-tailed). Fehér's results (2005:132) for employment in the NP and NH regions indicate that the bigger the average size of a farm, the lower the number of employees. In eastern Hungary farms applying for NRDP funding are smaller, and this indicates that there employment plays a greater role in terms of the applications.

Examining the intensity indicators, the regional interest in AEMs (NRDP application/1000 hectares UAA) followed that for NAPP (NAPP applications/1000 ha UAA), Pearson Correlation is significant 0.826 at the 0.05 level (2-tailed).

4. Discussion

Agriculture and the environment are closely related. Agriculture externalities have both positive and negative effects on the environment and regulations should aim to lower the negative and increase the positive effects. This is very difficult as positive externalities are often agricultural non-commodity outputs. Liberalisation of world trade raises competition between farmers and this enhances intensive farming. Growing demand for energy crops (competition between feed, fodder and fuel for the UAA) as renewable resources also sparks intensive farming. Secchi and Babcock's (2007) results demonstrate that the environmental impact (sediment losses, nitrogen losses) increases dramatically as higher product prices cause more and more environmentally fragile land to enter into production. Meadows et al. (2005) emphasise the importance of choosing options with long-term costs and benefits.

The analysis results failed to support the hypothesis that NRDP's AEMs are not merely substitutes for traditional agricultural subsidies, but measures which could support rural development and encourage environmentally sustainable agricultural production This is because, for the NAPP, the results revealed a positive correlation between the proportion of counties areas involved in AEMs and the proportion of county areas under natural protection and LFAs. However, for the NRDP, the correlation was either low or non-existent. Thus, the NAPP served those aims better. One of the explanations for this negative change is the increase in area under arable stewardship measures in terms of those measures with a higher

strictness level. The increase in arable stewardship measures and integrated crop management also meant a higher average farm size. These two measures cover 60% of the area under AEMs in western Hungary, but under 50% in the eastern part of the country. There was a strong correlation between the average farm size per NUTS II region and the percentage of these two measures from the total area under AEMs.

Although there is a strong correlation between the number of applications per region and the number of persons employed in agriculture, the hypothesis, that "AEMs support rural development" requires further examination. One of the reasons for this is that a high proportion of payments related to AEMs (ASS, Integrated crop management, Grassland stewardship) goes to those farmers with arable land or pasture. Although these farms are less intensive than conventional farms, they do not need more labour.

To achieve sustainable development, negative externalities must firstly be decreased. This could be achieved through the "polluter pays" principle. The CAP tries to achieve this goal through cross-compliance, meaning for farmers not observing environmental regulations subsidies are limited or withheld. One of the most important ASS goals was establishing nutrient balance in the soil. Cross-compliance regulation is also an effective means of attaining this objective.

From 2009 onwards the NHRDP ASS measure will not be applied. This could mean that AEMs' measures will better encourage environmentally sustainable agricultural production and rural development. It is also important for farmers to permanently remain within the framework.

Results show that with SAPS there is a concentration in terms of farm size linked to AEMs. As funds are limited, following a 2002 Commission proposal, a ceiling of EUR 300,000 should be placed on payments for each farm. The NHRDP addresses the need for a ceiling with some AEMs as it states that the largest eligible monocrop parcel cannot exceed 75 ha 7 (MARD, 2007).

As regional, rural and agricultural development are tightly linked, it is vital that in practice different programmes, funds, and institutions for regional, rural, and agricultural development be associated with each other. In relation to CAP funds, tools have been used to develop information technology, and adequate availability of information[8]. This endeavour has made available a lot of data regarding the regions' territories (farm size, LFA, AEMs, Natura 2000). These data could constitute the supply side, providing a foundation for economic valuation for regional natural resources, which could prove useful when preparing the programme.

[7] Arises the question why 75 hectares?

[8] Buckwell (2007:13) also states that „a completely new administrative system had been set up across the whole EU involving the mapping of agricultural land".

Annex 1

Breakdown of AEMs according to the territory, applications and funds, 2005

Scheme	Strictness	AEM as a percentage of the total territory	AEM as a percentage of the total fund	AEM as a percentage of the total number of applications
Arable stewardship scheme	1	50.33	42.5	38.2
Integrated crop management	2	17.01	19.5	11.1
Integrated fruit and grape production scheme	1	3.00	10.0	20.9
Grassland stewardship scheme	1	13.92	7.1	15.0
Arable farming in High Nature Value Area	**4**	**3.46**	**6.9**	**3.5**
Alfalfa production for great bustard habitat development	**3**	**0.33**	**0.8**	**0.7**
Grassland development in HNVA	**3**	**4.27**	**4.7**	**3.1**
Organic farming scheme in conversion	3	1.14	1.7	1.4
Organic farming converted	3	1.46	1.6	1.2
Organic grassland management scheme	2	2.73	1.2	1.0
Organic fruit and grape production conversion	2	0.06	0.2	0.6
Organic fruit and grape production converted	2	0.04	0.1	0.4
Apiculture cropping	1	0.01	0.0	0.1
Tanya (homestead) farming system	1	0.21	0.3	1.5
Reed management	1	0.82	0.6	0.6
Extensive fishponds	*1*	*1.56*	*2.7*	*0.6*
Total		100.00	100.0	100.0

Source: Author's own calculation from the database

Annex 2

Average farm size and funds based on hectare for AEMs

Scheme	Hectares/ application	EUR/ hectare
Arable stewardship scheme	68	98 *173
Integrated crop management	78	133 *224
Integrated fruit and grape production scheme	7	388
Grassland stewardship scheme	48	59
Arable farming in High Nature Value Area	**50**	****from 204 to 251**
Alfalfa production for great bustard habitat development	**25**	**267**
Grassland development in High Nature Value Areas	**71**	****from 110 to 294**
Organic farming scheme in conversion	41	*177 326
Organic farming converted	60	*126 200
Organic grassland management scheme	119	59
Organic fruit and grape production conversion	6	396
Organic fruit and grape production converted	6	278
Apiculture cropping	4	75
Tanya (homestead) farming system	7	*145 216
Reed management	70	86
Extensive fishponds	*139*	*204*

* Higher subsidies are for vegetables.

** Amount of the subsidy depends on the kind of birds under protection.

Source: Amount of support per hectare from MARD, 2004b. The average farm size is author's own calculation on the basis of the data.

Indicators for NUTS II regions according to NAPP and NRDP

	NP E	SP E	NH E	CH	CD W	SD W	WD W	Total
**Number of applications in the AEM of the NAPP	1,854	1,053	851	212	440	320	272	5,002
Number of applications in the AEM of the NRDP	8,315	8,626	3,722	1,621	2,095	2,788	1,740	28,931
**Hectares under AEM of the NAPP	72,041	46,814	49,692	12,928	22,945	19,307	11,480	235,207
Hectares under AEM of the NRDP(1000 hectares)	306.6	306.5	196.4	119.1	184.3	223.0	149.8	1,485.6
Hectares/application of the NRDP	36.9	35.5	52.8	73.5	88.0	80.0	86.1	51.4
UAA (1000 hectares)*	1,269.6	1,324.5	751.5	397.6	642.3	835.7	649.2	5,870.4
***LFA 1000 hectares	331.7	274.8	91.4	23.5	76.4	10.5	70.2	878.6
NAPP applications/1000 hectares UAA	0.83	0.43	0.62	0.34	0.28	0.21	0.18	0.46
NRDP applications/1000 hectares UAA	6.5	6.5	5.0	4.1	3.3	3.3	2.7	4.9
Number of person employed in agriculture*	18,563	21,182	9,244	9,280	12,326	15,186	11,300	97,081
NRDP applications/person employed in agriculture	0.45	0.41	0.40	0.17	0.17	0.18	0.15	0.30

* HCSO, 2006,
** Katona-Kovács, 2006
*** Katona-Kovács et al. 2006
other data are result of own calculation based on the database of ARDA.

References

1. **Ángyán**, J. (2005): Az Európai Unió mezőgazdasági és vidékfejlesztési politikájának jelenlegi helyzete, aktuális problémák és lehetőségek. (Az Európai Mezőgazdasági Vidékfejlesztési Alap) The Situation, Problems and Possibilities of the Current Agricultural and Rural Policy of the European Union. (The European Agricultural Fund for Rural Development).CEWEB conference, 2005 http://www.nakp.hu/publi.htm.
2. **Ángyán**, J., **Magyari**, J., **Ónodi,** G., **Podmaniczky**, L. and **Schneller**, K. (2007): Csak rendezünk, vagy fejlesztünk is? A területrendezés és az agrár-vidékfejlesztés együttműködési lehetőségei. (Adjusting or Developing? Possibilities in the Cooperation between Regional-, Agricultural- and Rural Development.) Falu város régió. Területfejlesztési és területrendezési szakmai folyóirat. 2007 (2) 52-60.
3. **Baylis**, K., **Peplow**, S., **Rausser**, G. and **Simon**, L. (2006): Agri-environmental Policy in the European Union: Who's in Charge? CATPRN Commissioned Paper CP 2006-4. http://www.uoguelph.ca/~catprn/PDF/TPB-06-03-Baylis.pdf.
4. **Buckwell**, A. (2007): The Next Steps in CAP Reform. EuroChoices 6 (2) 13-19.
5. **Claassen**, R. and **Morehart**, M. (2006): Greening Income Support and Supporting Green. United States Department of Agriculture. Economic Research Service, Economic Brief Number 1 March 2006 http://www.ers.usda.gov/publications/EB1/EB1.pdf.
6. EC (2005): Council Regulation (EC) No 1698/2005 of 20 September 2005 on support for rural development by the European Agricultural Fund for Rural Development (EAFRD). Official Journal L 277 21/10.
7. European Commission (2007): Rural Development policy for 2007-2013. http://ec.europa.eu/agriculture/rurdev/countries/index_en.htm.
8. Eurostat (2007): Agriculture - Main statistics 2005-2006. http://epp.eurostat.ec.europa.eu/portal/page?_pageid=1073,46587259&_dad=portal&_schema=PORTAL&p_product_code=KS-ED-07-002.
9. **Fehér**, A. (2005): A vidékgazdaság és a mezőgazdaság. (Rural Economy and Agricultural Economy) Agroinform Kiadó, Budapest ISBN 963 502 832 6.
10. **Fieldsend**, A. F. and **Katona-Kovács**, J. (2007): HVTK - Giving Local Relevance to European-wide Rural Development Practice. Rural Areas and Development Series 5, "Values and Challenges in Designing the European Rural Structures - Research Network Experience". European Rural Development Network, in press.
11. **Forgács**, Cs. (2007): Development of Agriculture and Rural Areas in Central and Eastern Europe. Plenary Paper of 100th Jubilee Seminar of the European Association of Agricultural Economists. Novi Sad, June, 2007
12. **Gáthy** A., **Kuti**, I. and **Szabó**, G. (2006): Fenntartható fejlődési politikák és stratégiák az Európai Unióban. (Sustainable Development policies and Strategies in the European Union.) In: Fenntartható fejlődés Magyarországon – Jövőképek és forgatókönyvek. (Szerk.: Bulla, M. – Tamás, P.) Új Mandátum Könyvkiadó, Budapest 2006 ISBN 963 9609 38 2 165-194.

13. **Gáthy**, A. (2007): An Analysis of the National Strategies for Sustainable Development with Special Emphasis ont he issues of Agriculture and Rural Development. Summary of PhD Thesis. Doctoral School of Interdisciplinary Social and Agricultural Sciences, University of Debrecen.

14. HCSO (2006): Hajdú-Bihar megye statisztikai évkönyv, 2005. (Statistical Year Book of Hajdú-Bihar County). Központi Statisztikai Hivatal Debreceni Igazgatósága. Debrecen, 2006 (Debrecen Directory of Hungarian Central Statistical Office (HCSO)) ISSN 0133-9974.

15. **Katona-Kovács**, J. (2006): Az agrár-környezetvédelem és a vidékfejlesztés összefüggései az Európai Unióhoz történő csatlakozás tükrében. PhD dolgozat. Debreceni Egyetem, Interdiszciplináris Társadalom- és Agrártudományok Doktori Iskola (Agri-environmental Management and Rural Development after the EU Accession in Hungary. PhD Thesis, University of Debrecen, Doctoral School of Interdisciplinary Social and Agricultural Sciences)

16. **Katona-Kovács**, J. (2007): The Effect of CAP Payments on Territorial Cohesion in the North Great Plain Region of Hungary. Paper prepared for presentation at the 104th (joint) EAAE-IAAE Seminar Agricultural Economics and Transition: „What was expected, what we observed, the lessons learned." Corvinus University of Budapest September, 2007

17. **Katona-Kovács**, J., **Takács**, P. and **Szabó**, G. (2005): Farm Inputs and Agri-environmental Measures as Indicators of Agri-environment Quality in Hungary. Copenhagen, XI Congress of the European Association of Agricultural Economists.

18. **Láng**, I. (2001): Környezetvédelem – fenntartható fejlődés. (Environment Protection – Sustainable Development) http://www.mindentudas.hu/lang/index.html.

19. **Katona-Kovács,** J., **Kiss**, Zs. and **Szabó**, G. (2006): A Nemzeti Vidékfejlesztési Terv intézkedései a kedvezőtlen adottságú területekre. (NRDP Measures for LFAs) Gyöngyös X. Nemzetközi Agrárökonómiai Tudományos Napok „Agráralkalmazkodás a változó gazdasághoz" előadások összefoglalói. (Szerk.: Király Zs. et al.) 167, (CD, 7p).

20. **Lichtenberg**, E. (2002): Agriculture and the Environment. In: Handbook of Agricultural Economics. Edited by Bruce L. Garner – Gordon C. Rausser Volume 2A, Part 3, Chapter 23 1249-1313.

21. MARD (2004a): 137/2004. (IX. 18.) FVM rendelet a Nemzeti Vidékfejlesztési Terv kihirdetéséről, valamint az Európai Mezőgazdasági Orientációs és Garancia Alapból nyújtandó vidékfejlesztési támogatásokkal összefüggésben a kedvezőtlen adottságú területek és az azokhoz tartozó települések megállapításáról. LV. évf. 22. szám Földművelésügyi és Vidékfejlesztési Értesítő (Regulation for Less Favoured Areas).

22. MARD (2004b): A földművelésügyi és vidékfejlesztési miniszter 150/2004. (X. 12) FVM rendelete a Nemzeti Vidékfejlesztési Terv alapján a központi költségvetés, valamint az Európai Mezőgazdasági Orientációs és garancia Alap Garancia Részlege társfinanszírozásában megvalósuló agrár-környezetgazdálkodási támogatások igénybevételének részletes szabályairól. (Hungarian regulation on AEMs) Földművelésügyi és Vidékfejlesztési Értesítő 2004. LV. Évfolyam 25. szám 5426-5549.

23. MARD (2007): New Hungarian Rural Development Programme Annexes. Budapest, September, 2007 http://www.fvm.hu/doc/upload/200709/new_hungary_rdp_annexes_15092007.pdf. Loading date: 27th of September, 2007.

24. **Meadows**, D., L., **Randers**, J. and **Meadows**, D., H. (2005): A növekedés határai – harminc év múltán, Fordította: Déri Andrea, Kossuth Kiadó, Budapest (Limits to Growth, The 30-Year Update, translated by Andrea Déri).

25. NHRDP, 2007, New Hungary Rural Development Programme 19th February 2007, Government of the Republic of Hungary, 673 pp. [www document] (accessed 27 June 2007). http://www.fvm.hu/doc/upload/200702/nhrdp_070220.pdf

27. OECD (2003): Glossary of Statistical Terms. Created September 25, 1991. Last updated March 2003. http://stats.oecd.org/glossary/detail.asp?ID=1699.

28. **Popp**, J. (2003): KAP-reform és a többfunkciós mezőgazdaság (The CAP Reform and the Multifunctional Agriculture.) In: Gazdálkodás, 2003. 4. szám XLVII. évfolyam, (48-69. o.).

29. **Shucksmith**, M., **Thomson**, K.J. and **Roberts**, D. (2005): The CAP and the Regions. The territorial impact of the Common Agricultural Policy. CABI Publishing.

30. **Secchi**, S. and **Babcock**, B., A. (2007): Impact of High Crop Prices on Environmental Quality: A Case of Iowa and the Conservation Reserve Program. Working Paper 07-WP 447 Center for Agricultural and Rural Development Iowa State University. http://agecon.lib.umn.edu/cgi-bin/pdf_view.pl?paperid=26027.

31. **Szabó**, G., **Fésüs**, I., **Balázs**, K. and **Katonáné**, **Kovács**, J. (2003): A Nemzeti Agrárkörnyezetvédelmi Program pályázatainak elemzése. (Analysis of the National Agri-environmental Protection Programme) Gazdálkodás, XLVII. évf. (2003) 1. sz. 26-39.

32. Van **Huylenbroeck**, G., **Vandermeulen**, V., **Mettepenningen**, E. and **Verspecht**, A. (2007): "Multifunctionality of Agriculture: A Review of Definitions, Evidence and Instruments". Living Rev. Landscape Res. 1, (2007) 3. Online article Cited 6th December 2007. http://www.livingreviews.org/lrlr-2007-3.

33. WCED (1988): Közös Jövőnk. Mezőgazdasági Könyvkiadó, Budapest, 1988 *Our Common Future* report of the UN World Commission on Environment and Development.

34. WTO (without year): Domestic support in agriculture: The Boxes. http://www.wto.org/english/tratop_e/agric_e/agboxes_e.doc.

35. **Zellei**, A. (2001): Challenges for Agri-environmental Policies in CEE Countries. CEESA Discussion Paper No. 3/6/2001 ISSN 1616-9166.

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Characteristics of environmentally conscious production behaviour in agricultural waste management

Krisztina Kormos-Koch[1]

Abstract

When measuring environmentally conscious behaviour and determining its variables, focus often lies only on consumers, but environmental conservation requires not only the consumers' but also the producers' input. After defining environmentally conscious behaviour, I utilized the market research method to determine how participating in agri-environmental programs and subsidies affects producers' environmental consciousness and waste management behaviour. The research result indicates that participation in agri-environmental programs develops producers' environmental sensitivity, and improves their environmentally conscious behaviour, and this even holds true for waste management, which is not directly not subsidized by the programs.

Keywords

Environmentally conscious behaviour, agri-environmental program, survey, agricultural waste management

Introduction

For individual and organizational investigations defining environmentally consciousness is an essential task Both parties encounter the same difficulty in that those factors examined are characterized by a subtle system, of which the manifestation is influenced by the given researchers' perceptions (Nemcsicsné Zsóka, 2005). The investigated factors in the theoretical approach for environmental consciousness result in different models (e.g. Ajzen-Fishbein, 1980; Hines et al, 1986; Ajzen, 1991), which were subsequently systematized by Kollmuss and Agyeman (2002) which created three factor groups: demographic features, internal factors for the individual and external (economic, political) factors which are independent from the individual.

Stern (1997) defines environmentally conscious behaviour from two approaches. Based on one of them, environmentally conscious behaviour manifests itself in terms of how large the given behaviour type's effect is on the state of the environment. Here the individual does not have a definite role in evolving the behaviour, because the environmental effect may occur in an indirect way. The other approach, called will-oriented determination, defines environmentally conscious behaviour from the point of view of an active person, and does not concern itself with whether any change occurred in the state of the environment (Stern, 2000).

Researching environmentally conscious behaviour at the level of the individual first became a relevant research field within the framework of 1970s consumer society of which the principal contribution was showing that environmental consciousness was closely linked to a given consumer's behaviour. The investigations chiefly sought to describe consumer characteristics (e.g. Balderjahn, 1988; Schwepker-Cornwell, 1991). Environmental conservation requires not only consumer involvement but assumes and demands environmentally

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conscious behaviour from producers as well. This led to the realization that researching environmentally conscious behaviour also concerned agriculture. One group of researchers compared the farming practices of ecological and conventional farmers (e.g. Harris et al. 1980), while others analyzed farmers' ethics pertaining to production (e.g. Dahlberg, 1986) and Beus and Dunlap (1994, in: Mészáros, 2006). BEUS and Dunlap (1994, in: Mészáros, 2006) examined producers' farm practices using a developed behaviour index in relation to the paradigms in industrial and environmentally sound agriculture, and found that their opinions and values towards production mesh with their investigated behaviour.

Reviewing and analyzing the literature encouraged me to define environmentally conscious behaviour in terms of my investigations. I began with Stern's (2000) approach toward will-oriented definition, because to my mind, it expresses the definition of environmentally conscious behaviour well, revealing that the essence of environmentally conscious behaviour is in fact consciousness, meaning it depends to a great extent on the psychographic and behavioural characteristics of the individual. Stern's definition focused mainly on the consumer so I had to adapt it to the producers' level. Thus when formulating the concept, I relied on two relevant additional statements.

On the one hand, according to Velk (2000) most environmental problems may be attributed to behavioural, social and cultural reasons, meaning one's *environmentally* conscious behaviour is not determined by the nature of the activity one is performing. The other statement, which helped in arriving at the concept of environmentally conscious behaviour for producers, relates to profit maximalization, which may be considered as similar for both producers and consumers. The consumer always endeavours to get the best deal. The less valuable product is sacrificed for the more valuable to ensure the best profit. For producers the rule of economic logic also holds true, meaning that generally the producer (entrepreneur) aims to maximize profit (Koppányi, 1996) and private farmers tend to maximize gross profit. In this regard Roszik (2004) can be referred to, stating that environmental sustainability can only be achieved if the farmer can perform an activity in a profitable and safe way. Otherwise the farmer would become bankrupt, causing environmental sustainability in farming to fade away.

In the survey I considered *environmentally conscious production behaviour as being conscious human behaviour, which is based on factual and real environmental information and knowledge, occurring in decisions made based on the individual's environmental values related to farming activity. Its aim is to reduce overextending the environment by ensuring the livelihood of farmers.*

The definition includes the concept of Stern's (2000) will-oriented approach, as it strengthens the role of psychographic and behavioural features toward achieving the behaviour. At the same time, the definition makes it clear that the behaviour's objective is to reduce environmental damage, meaning the objective is also important, not just the willingness. The concept concerns the economic objective of the production activity, which is important as environmentally conscious behaviour cannot be developed by significantly curtailing the individual's economic interests.

Objectives

Environmental and nature conservation are dependent on co-operation with agriculture, but in turn agricultural performance depends mainly on environmental and natural resource conditions (Ángyán, 1995). It is thus relevant to develop environmentally conscious production behaviour, of which the significance is reflected in environmental and agrarian policy. According to Katonáné Kovács – Szabó (2007), the subsidy system for agri-environmental measures tends to strengthen environmental and social aspects of sustainable development rather than its economic side. The stricter the farming guidelines are, the more important the environmental and social dimensions.

In 2002 when the National Agri-Environmental Program (NAEP) first appeared in the subsidy system it meant a significant initial breakthrough pertaining to the Hungarian agri-environment (Katonáné Kovács, 2006). In Hungary, environmentally sound agricultural practices have been nationally subsidized. Because of this, land size and the number of farmers participating in agri-environmental programs have been increasing. Implementing agri-environmental rules governing everyday farming practices means farmers also become better informed regarding subsidies and the environment, which may enhance the environment's role in agriculture.

Based of the relevant literature, the hypothesis stemming from the analysis was that the National Agri-environmental Program started in 2002, and in 2004 was then integrated with the National Rural Development Plan, and Agri-Environmental Measures, which has had a measurable impact on the farmers' environmentally conscious behaviour. Thus the investigation's principal objective is to determine to what extent certain factors such as agri-environmental measures impact on farmers' environmentally conscious production behaviour.

Basically, the analysis does not concentrate on the farmers' knowledge of agri-environmental legal aspects and their practice, but on the effect environmental awareness has on poorly regulated agri-environmental actions. For this reason, I investigated the environmentally conscious behaviour of agricultural producers in the field of *waste management*, as it is not directly subsidized by the program, and thus adequately reflects producers' environmental values and behaviour.

Method

How to analyze behaviour patterns and their causal effects was adopted from consumer market research methodology. Gordon and Langmaid (1988) state that the **qualitative** method is suitable for examining an individual's behaviour. This is based on small-sized samples and the results are complemented with interviews. However, the **quantitative** method is based on statistics, numerical surveys, and allows for comparison between samples. Moreover, the quantitative method enables the test to be repeated as it is less dependent on the tester's approach.

The qualitative method is more likely better when it comes to interpreting the results, meaning the non-statistical results, however, would render it infeasible. Furthermore, qualitative method results may be less quantified and proving the results might only be able to be accomplished indirectly. Of course the subject of this paper falls under the category of

agricultural economics where quantitative proof is essential. For this reason the quantitative method is the chosen methodology for this paper which is combined with qualitative research elements.

Between April-July 2006, a questionnaire-based survey was used to conduct personal interviews among farmers in Hajdu-Bihar County with the help of consultants from Hajdu-Bihar County's Regional Chamber of Agriculture.

Using relevant reference literature and the objectives, necessary measurable variables were determined. My investigations used the following variables:

- environmental knowledge (declarative and procedural)[2],
- environmental attitudes (importance and inconvenience)[3],
- environmental responsibility,
- perceived efficiency[4],
- demographical (school, living place, age) characteristics and
- economic (organic farming, participation in agri-environmental programs, farm size, production profile) factors as well as
- environmental behaviour (as a dependent variable).

As typical with qualitative research, the questionnaire contained questions that did not exclusively deal with the variables' raw results but also with their deeper interpretations. These were useful in filtering data and in evaluating results. Filtering was necessary in order to diminish the distorting impact stemming from the difference between intentions and actual behaviour.

The questionnaire data were coded and the database was developed and analyzed with the help of Microsoft SPSS 13.0 for Windows. Statistical methods were chosen in terms of the analysis objectives and the variables' measurement level.

Ketskeméty and Izsó's (2005) recommendations were considered when selecting the appropriate method for measuring the data level. Non-parametric methods were used to examine the difference among ordinal independent variables (Kruskal-Wallis, Mann-Whitney and Wilcoxon test), and to compare frequencies a Chi^2 test was carried out. To investigate connections among independent variables correlation analysis was utilized. Nominal independent variables were only used for making segments, and thus only their frequency had to be determined. For analyzing relationships between dependent and independent variables, variance analysis (Anova and Turkey tests) and partial correlation were conducted. The reliability of statistical analysis was accepted by a probability level of 5% (P=5%).

When developing the sample, private farmers using land in Hajdu-Bihar County were viewed as the representative population. In joint ventures it is customary to separate strategic and operative management, and this is especially true for those having the biggest production size. Though the strategic manager's view basically influences the enterprise's operative

[2] Declarative knowledge means the knowledge of the operation of ecological systems (Schahn, 1993). Procedural knowledge is the understanding of access opportunities of the desirable environmental condition (Kaiser and Fuhrer, 2003).

[3] When studying environmental attitudes, a lot of relevant literature focuses on the importance of behaviour and on accepting inconvenience in accordance with environmental conservation (Laroche et al, 2001, McCarty and Shrum, 1994).

[4] The individual's own evaluation relating to his environmental friendly activity from the aspect of environmental conservation (Kinnear et al, 1974).

management, one can hardly expect him or her to deal with the whole production process in its smallest details. Given that waste management behaviour was being investigated on an operative level, in the case of a joint venture it would have been difficult to select the appropriate interviewee.

Table 1

Structure of the examined sample on the basis of land size of farms

Land size categories (ha)	Distribution of the basic population (%)	Number of farms in the sample
< 5 ha	17.59	18
5 - 9.99 ha	11.41	11
10 - 19.99 ha	14.59	15
20 - 49.99 ha	21.06	21
50 - 99.99 ha	15.52	15
100 - 199.99 ha	12.04	12
200 - 299.99 ha	6.64	7
300 - 499.99 ha	1.15	1
Altogether	**100.00**	**100**

Source: author's own calculation on the basis of HCSO, 2003

Given that the population contains numerous elements (52,235 private farms) and our financial resources were limited, we were not able to conduct an analysis of a large-sized sample. In line with Kotler's (1998) recommendations, probable sampling was used. Among the available criteria for studying the basic population, land use seemed the most appropriate tool for obtaining a representative sample. Therefore, the structure of the sample land was completed in line with categories based on data from the Hungarian Central Statistical Office (HCSO) (*Table 1*), after which stratified random sampling was conducted within the farming groups belonging to the given category. The element number of the sample was 100 farms.

Results

For questions gauging waste management behaviour, different types of waste were stipulated and the probable methods of handling the type of waste were added to each of them. The farmers were asked to identify how they handled different waste types. If they chose an environmentally sound method, they got 1 point, but if the method was not environmental friendly, they got 0 points. The answers were aggregated one by one. In order to differentiate between stated and real behaviour, filter questions were included in the questionnaire, and the answers given to these questions enhanced the accuracy for individual points. For example, if the farmer could not name the dangerous waste management firm where he disposes of his waste, he did not receive any points for disposing of dangerous waste even if he stated that he had actually done so.

In the questionnaire not every waste item was valid for every farmer, and thus invalid waste items were ignored. After developing the final points, the individual's waste management score was presented in a percentage form, showing what percentage of the given waste products were disposed of in an environmentally sound way. The answers were evaluated by developing a ratio scale.

After aggregating the frequency of the answers, interesting results emerged (*Figure 1*). More than one third of the farmers interviewed dispose of up to 25% of given waste products in an environmentally friendly manner. However, it is pertinent to mention that 17% of this production group dispose of none of their waste products using an environmentally sound method. Farmers disposing of at least 76% of their waste products in an environmentally friendly way constitute only 5% in the sample. The highest waste management value is 88%, meaning none of the farmers can be considered as environmentally conscious when it comes to disposing of waste products.

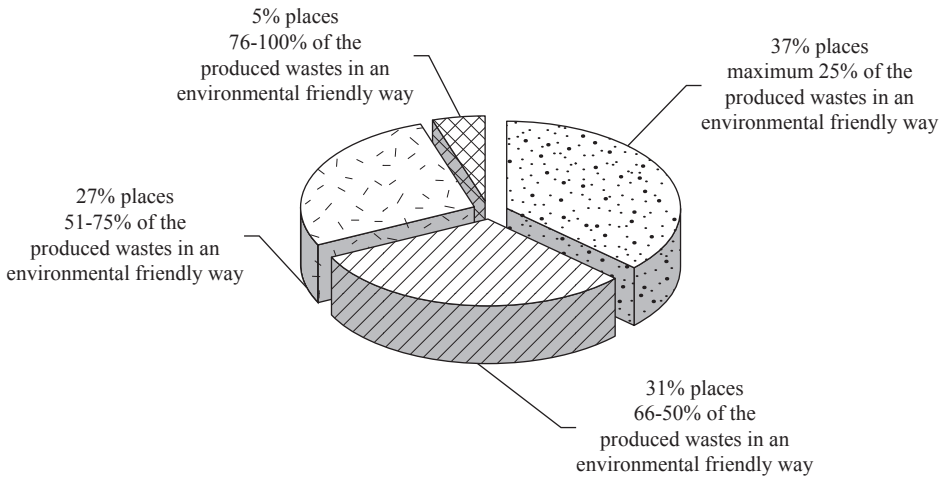

Figure 1: **Environmental friendly waste management of farmers in the sample**
Source: Author's own calculation

The results highlight the fact that there are serious deficiencies when it comes to agricultural waste management. This is hardly surprising as environmentally friendly waste management entails environmental conservation, which is hard to monitor, and there is no direct subsidy to facilitate the process. Moreover, in Hungarian society environmental consciousness has not reached a level where the majority of producers and consumers willingly obey environmental conservation rules.

When one probes the answers regarding certain types of waste materials, one sees that disposal of packaging for plant protection chemicals and disposal of animal carcasses are the cause of numerous environmental and conservation problems.

Only 46% of interviewed farmers dispose of packaging for plant protection chemicals in an environmentally friendly way. These farmers follow the regulations and return packaging to the vendor where it is handled in an appropriate manner. Those belonging to this farming group represent enough packaging to make disposal registration worthwhile.

The Chi^2 test's results reveal a significant difference between the answers of smaller and bigger farm operations at a probability level of 5% (P=5%). Small-size operations (size not exceeding 5 European Size Unit (ESU)) tend to burn the excess packaging on their farms, this despite the fact that it is considered as dangerous waste and burning plastics is basically frowned on. Moreover, despite the inherent risk, smaller farm operations tend to dispose of

plant protection material packaging with communal waste material. Obviously this is because the packaging entails such a small quantity that producers consider it easier to personally dispose of the redundant packaging instead of taking it to the appropriate disposal site. This is based on the environmentally friendly and professional packaging disposal practiced by larger farm operations.

It is also noteworthy that studied organic farmers, despite reaching markedly better results for several examined independent variables, are not more environmentally conscious than other farmers when it comes to waste management.

By segmenting the aggregated points of waste management according to participation in agri-environmental measures, the middle values of the given sub-samples were compared using variance analysis. There is a significant difference between the different farming groups at a probability level of alpha=0,05 (*Figure 2*). Private farmers participating in the National Rural Development Plan (NRDP), and Agri-Environmental Measures (AEM), naturally obtained higher points for waste management than those who were not involved in either agri-environmental program. Participation in NAEP also improves waste management behaviour. The results of the survey prove that participation in agri-environmental programs provides an environmental education for concerned producers even though environmental friendly waste management is not directly subsidized by the programs. However, subsidy payments do cover official local monitoring costs related to administrative control of waste management.

There was a definite correlation between farm size and waste management behaviour. At the level of alpha=5, there is a definite difference between the smallest (below 1 ESU size) and the other private farms. This result illustrates that the smallest farms are less environmentally conscious when it comes to waste management, and this is due to fewer waste products and to a lack of enforcement and consequences relating to their behaviour.

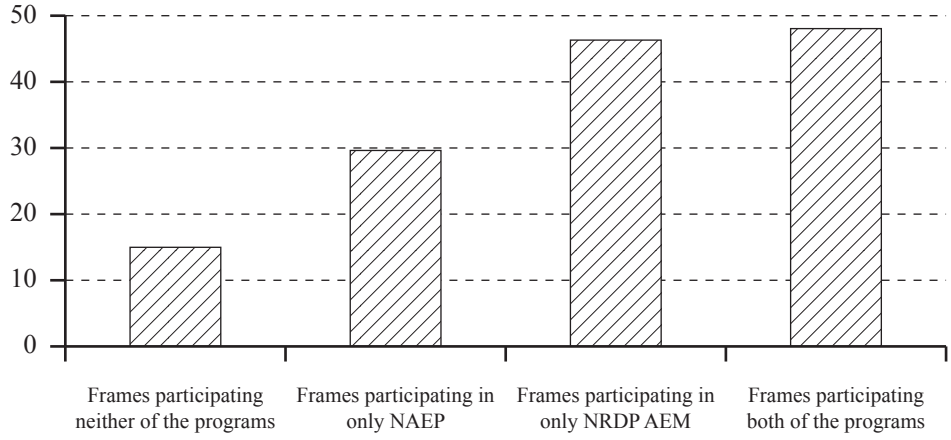

Figure 2: **The level of waste management segmented on the basis of participation in agri-environmental measures**

Source: Own calculation

Only place of residence seems to be an explanatory variable among the examined

demographic factors. Already at the level of P=1% one sees that those farmers whose farming and place of residence are the same are much more inclined toward environmentally friendly methods. This result is hardly a surprise as farmers residing on their farms obviously wish to maintain a clean environment in their place of residence.

Other than demographic and economic factors, a major part of my analysis entailed discovering what variables influence farmers' environmentally conscious behaviour (waste management) and to what extent. The statistical analysis revealed that waste management behaviour is, in terms of demographic factors, influenced by place of residence. Among economic factors participation in agri-environmental measures and farm size plays a role.

Partial correlation analysis was systematically applied for every independent variable to determine which independent variables correlate with waste management behaviour. Table 2 shows the results.

The results show that primarily economic factors such as farm size and participation in agri-environmental measures show a weak-medium, but still significant correlation with waste management behaviour. Both of the examined independent variables indicate significant correlation with waste management in a near equal ratio. Among the demographic factors, the previously mentioned place of residence reveals a similar correlation. Besides demographic and economic factors, only perceived efficiency has a correlation with waste management behaviour. Moreover, this correlation is even weaker than with demographic and economic factors.

Table 2

The correlation of the examined independent variables with the waste management behaviour (on the basis of the correlation co-efficient)

Independent variables	Waste management behaviour
Declarative knowledge	0.028
Procedural knowledge	0.046
Importance of environment	0.142
Inconvenience for environment	0.004
Perceived efficiency	***0.265**
Environmental responsibility	0.049
Participation in agri-environmental measures	****0.341**
Farm size (ESU)	****0.315**
Place of residence	****0.319**

* at the level of significant alpha 0.05
** at the level of significant alpha 0.01
Source: author's own calculation

It doesn't come as a surprise that, contrary to other consumption research, certain economic factors take precedence over psychological variables relating to personality as the other research focused on agricultural production as an economic activity and strove to investigate the environmentally friendly aspects and the relevant correlating factors. Clearly when formulating the production activity, it is not the farmers' personal traits but necessary profit-orientated decisions that usually prevail.

This result is complemented by other results to questions in the questionnaires. One of these questions dealt with the most important reasons behind environmentally sound agriculture (one had to select and rank three of the prefixed question choices). The results (*Figure 3*) show that farmers choose to take part in the program to receive the direct subsidy, and environmental conservation considerations do not prevail among the most frequent answers.

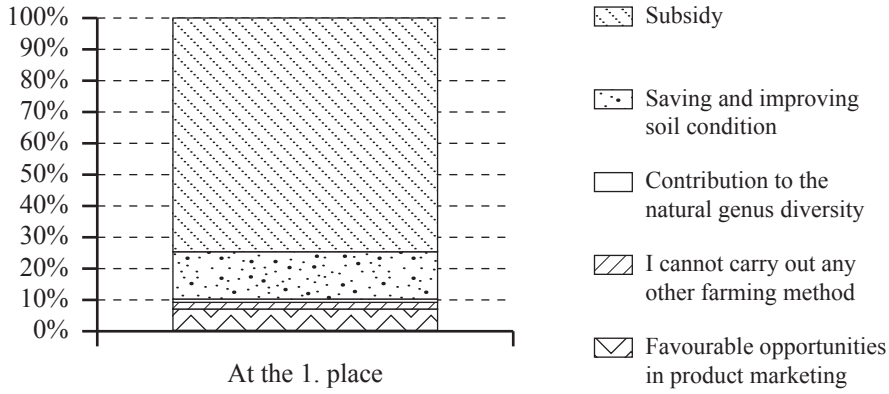

Figure 3: **Reasons for environmentally sound agricultural production – according to the opinion of the private farmers in the sample**

Source: own calculation

Conclusions

Based on the investigative results for environmentally conscious waste management, environmentally friendly waste disposal is a low priority for the interviewed agricultural producers. However, cost factors prevail over environmentalism when it comes to disposing of waste products. The producers tend to be especially lax when disposing of packaging and dead animals. In fact, even organic farmers are not shown to be more environmentally conscious than conventional farmers, and this despite their greater environmental knowledge and their greater sense of responsibility toward the environment.

For farmers environmentally conscious waste management behaviour is mainly motivated by economic factors such as participation in agri-environmental measures, and farm size. Although they are not directly subsidized, in terms of waste management behaviour agri-environmental programs have a positive impact on the farmers' environmental behaviour as they clearly serve to environmentally educate them. Naturally, for farmers the subsidy payment is an important consideration as those participating in the agri-environmental program strive to obey every law in order not to jeopardize their subsidy payment. Farm size also plays a positive role concerning environmental friendly behaviour as large farms are easier to monitor and thus they are more inclined to obey environmental conservation rules.

Among demographic features, place of residence clearly and positively contributes to environmentally conscious waste management because when farmers actually reside on their farms they tend to be more dedicated to environmental conservation.

Among consumers psychological variables have a greater impact on their behaviour than among farmers where non-demographical factors dominate environmentally conscious behaviour, with only perceived efficiency having a clearcut influence over waste management. This means that those farmers who are aware of how their environmentally friendly behaviour contributes to environmental conservation, actually do much more in concrete terms for the environment.

From the results it may be concluded that the hypothesis for examining environmentally conscious behaviour is true. Participation in agri-environmental programs has a clearcut positive effect on the examined behaviour. The results indicate that the formation of environmentally conscious agriculture requires extended participation in agri-environmental programs and financial subsidization, because the findings show that among farmers environmentally conscious behaviour is not particularly ingrained and one shouldn't expect this to change without definite incentives.

References

1. **Ajzen**, I. (1991): The Theory of Planned behaviour, Organizational behaviour and Human Decision Processes. Journal of Applied Social Psychology, 50, p. 179-211.
2. **Ajzen**, I. and **Fishbein**, M. (1980): Understanding Attitudes and Predicting Social behaviour, Englewood Cliffs, NJ, Prentice Hall
3. **Ángyán**, J. (1995): A fenntartható fejlődés és a környezetbarát rendszerváltás a mezőgazdaságban. A mezőgazdaságtól a vidékfejlesztésig III. Falukonferencia, MTA Regionális Kutatások Központja, Pécs, p. 196-206.
4. **Balderjahn**, I. (1988): Personality Variables and Environmental Attitudes as Predictors of Ecologically Responsible Consumption Patterns. Journal of Business Research, 17 (August), p. 51-56.
5. **Beus**, C. E. and **Dunlap**, R. E. (1994): Agricultural Paradigms and the Practice of Agriculture. Rural Sociology, 59(4), p. 620-635. in: Mészáros (2006): A paradigma fogalmának alkalmazása a mezőgazdaságban. Gazdálkodás, 50. évf., 6. sz., p. 42-50.
6. **Dahlberg**, K. A. (1986): Introduction: Changing Contexts and Goals and the Need for New Evaulative Approaches. in Dahlberg, K. (ed.) New Directions for Agriculture and Agricultural Resarch, Totowa, p. 1-27.
7. **Gordon**, W. and **Langmaid**, R. (1988): Qualitative Market Research. Gower Publishing Company Limited, p. 299.
8. **Harris**, C. K.; **Powers**, S. E. and **Buttel**, F. H. (1980): Myth and Reality in Organic Farming: a Profile of Conventional and Organic Agriculture. Newsline, 8., p. 33-43.
9. **Hines**, J. M.; **Hungerford**, H. M. and **Tomera**, A. N. (1986): Analysis and Synthesis of Research on Responsible Pro-Environmental behaviour: a Meta-Analysis. The Journal of Environmental Education, 18(2), p. 1-8.
10. **Kaiser**, F. G. and **Fuhrer**, U. (2003): Ecological behaviour's Dependency on Different Forms of Knowledge. Applied Psychology: An International Review, Vol. 52 No. 4, p. 598-613.
11. **Katonáné Kovács**, J. (2006): Az agrár-környezetvédelem és a vidékfejlesztés összefüggései az Európai Unióhoz történő csatlakozás tükrében. Doktori (PhD) értekezés, Interdiszciplináris Társadalom- és Agrártudományok Doktori Iskola, DE ATC AVK, Debrecen, p. 42.
12. **Katonáné Kovács**, J. and **Szabó**, G. (2007): Agri-environment measures effect on territorial cohesion in the North Great Plain Region. Debrecen, AVA 2007 „Agrárgazdaság, Vidékfejlesztés, Agrárinformatika Nemzetközi Konferencia kiadványa (CD melléklet)
13. **Ketskeméty**, L. and **Izsó**, L. (2005): Bevezetés az SPSS programrendszerbe. ELTE Eötvös Kiadó, Budapest, ISBN 963 463 823 6, p. 376-383.
14. **Kinnear**, T. C.; **Taylor**, J. R. and **Ahmed**, A. S. (1974): Ecologically Concerned Consumers: Who Are They? Journal of Marketing, Vol. 38. No. 2., p. 20-24.

15. **Kollmuss**, A. and **Agyeman**, J. (2002): Mind the Gap: why do people act environmentally and what are the barriers to pro-environmental behaviour? Environmental Education Research, Vol. 8., No. 3., p. 239-260.

16. **Koppányi**, M. (ed.) (1996): Mikroökonómia. Műszaki Könyvkiadó, Budapest, p. 6-7., 30

17. **Kotler**, Ph. (1998): Marketing menedzsment. Műszaki Könyvkiadó, Budapest, p. 158, 160.

18. **Központi Statisztikai Hivatal** (2003): Magyarország mezőgazdasága, 2003 *(Gazdaságszerkezeti Összeírás)*. http://portal.ksh.hu/portal/page?_pageid=37,567816&_dad=portal&schema=PORTAL

19. **Laroche**, M.; **Bergeron**, J. and **Barbaro-Forleo**, G. (2001): Targeting Consumer Who are Willing to Pay More for Environmentally Friendly Products. The Journal of Consumer Marketing, Vol. 18. No. 6., p. 503-518.

20. **McCarty**, J. A. and **Shrum**, L. J. (1994): The Recycling of Solid Wastes: Personal Values, Values Orientations and Attitudes about Recycling as Antecedents of Recycling behaviour. Journal of Business Research, Vol. 30., p. 53-62.

21. **Nemcsicsné Zsóka**, Á. (2005): Következetesség és rések a környezettudatos szervezeti magatartásban. Doktori (Ph.D.) értekezés, Budapesti Corvinus Egyetem, Gazdálkodástudományi Kar, Budapest, p. 4-12.

22. **Roszik**, P. (2004): Az ökológiai gazdálkodás magyarországi helyzete és perspektívái. in: Ökológiai gazdálkodás és a jövő, Nádasdy Akadémia Szimpóziumok 2004-ben, http://mek.oszk.hu/02500/02585/02585.htm#9

23. **Schahn**, J. (1993): Die Kluft zwischen Einstellung und Verhalten beim individuellen Umweltschutz. In J. Schahn – T. Geisinger (Eds.): Psychologe für den Umweltschutz. Weinheim, Germany p. 51-61.

24. **Schwepker**, C. H. and **Cornwell**, T. B. (1991): An Examination of Ecologically Concerned Consumers and Their Intention to Purchase Ecologically Packaged Products. Journal of Public Policy and Marketing, 10(2), p. 77-101.

25. **Stern**, P. C.; **Dietz**, T.; **Ruttan**, V. W.; **Socolow**, R. H. and **Sweeney**, J. L. (eds.) (1997): Environmentally Significant Consumption. National Academy Press, Washington D. C., p. 5.

26. **Stern**, P. C. (2000): Towards a Coherent Theory of Environmentally Significant behaviour. Journal of Social Issues, 56 (3), p. 407-425.

27. **Vlek**, C. (2000): Essential Psychology for Environmental Policy Making. International Journal of Psychology. Vol. 35., No. 2., p. 153-167.

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Articles::

Mergos, G.J. and Yotopoulos, P. A. (1988): Demand for feed input in the Greek livestock sector. **European Review of Agricultural Economics** 15(1): 1-17.

Proceedings, reports, theses etc.:

Koester, U. (ed.) (1988): Disharmonies in the EC and US Agricultural Policy Measures. Report prepared for the Comission of the European Communities. Brussels: EC Commission.

Internet sites:

EUROSTAT (2000): Regions: Statistical Year Book 2004. Luxemburg: European Communities
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