Doctoral School of Business and Management

THESIS SUMMARY

Ákos Szerletics

Regional Economic Impact of Common Agricultural Policy Direct Payments

Ph.D. thesis

Supervisor:

Attila Jámbor DSc
professor

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Agribusiness Department

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1. Research antecedents, justification of the topic

The aim of my doctoral dissertation is to analyze certain regional economic effects of Common Agricultural Policy (CAP) direct payments. My research focuses on the economic effects of direct payments in different regions of the European Union; on the difference of the effects in the old and new Member States; and the dynamics of these effects over time between regions.

The CAP is one of the European Union's key policies, encouraging the development of the European agricultural economy, the catching-up of rural areas and the achievement of certain environmental and climate protection objectives through its diversified support system and market regulation instruments. CAP resources accounted for about 36% of the EU budget in 2018. The most significant of the CAP subsidies are the so-called direct payments, which are generally available to farmers based on the size of their land or livestock. In the 2018 grant year, a total of € 41.74 billion in CAP direct payments was disbursed to 6.38 million beneficiaries across Europe. These figures well reflect the importance of direct payments in the life of the European agricultural economy.

My research goal is supported by personal, practical and scientific reasons. I have been working on the implementation of CAP subsidies in Hungary since 2003, as a government official at the Hungarian paying agency. Accordingly, my personal interest in the effects of direct payments is natural. The actuality of the research is given by the fact that the forthcoming reform of the CAP is already underway, one of the important topics of which is the future of direct payments. At the heart of the research's scientific interest is the understanding of how different economic policy instruments affect the operation of a given sector, as well as how their changes result in changes in the economic decisions of the actors involved.

It is important to emphasize the regional nature of my research. I chose the regional level as the basic unit of the applied quantitative models because it allows for a much more detailed level of research than examining aggregated data by country. Studies published so far on this topic most often include analyzes at Member State level, regional research is relatively rare or, if available, usually deals with comparative analysis of a small number of regions. The scientific relevance of the present research is reinforced by examining the economic impact of

CAP direct payments through a comprehensive analysis of the vast majority of EU NUTS2 regions.

I began my research by reviewing the relevant literature on the topic. In the Web of Science and Scopus databases, I used the words “direct” “support” and “impact” as a joint search. These words had to appear in the title, abstract, or between keywords. I was only looking for articles published in English, but I didn't apply any further search refinement. The above search resulted in a total of 1119 items, of which 725 items remained after filtering out duplicates. After reading the abstracts of these articles, I started processing them. By the end of the process, after a full reading of the title and abstracts, 150 articles remained that are specifically about this topic.

With regard to the effects on agricultural income, research to date has found that direct payments increase the income levels of their beneficiaries. In the new Member States, direct payments have been particularly successful in improving agricultural income positions since accession. Direct payments have been able to increase the level of agricultural income despite the fact that a significant proportion of them have leaked in the form of land rents to landowners. The system has been widely criticized for the nature of the distribution of the income in question: 80% of direct payments go to 20% of farmers, and the concentration of payments is very high in almost all Member States. Moreover, this disproportion is not limited to the level of support between farmers; there are also large differences in aid intensities between some Member States (mainly to the detriment of new Member States). In addition, the studies reviewed have shown that, although direct payments are a relatively stable part of agricultural income, they have little effect on other income elements; they have

With regard to the effects on agricultural production, based on a review of the literature, CAP direct payments have a production-boosting effect. However, some studies emphasize that the more a sector’s production relies on direct payments, the more vulnerable it becomes as a result. This is because direct support does not play a role in stimulating economic restructuring; on the contrary, they can preserve old production and ownership conditions, which can help stabilize markets in the short term but limit development and competitiveness in the long term. Consequently, direct subsidies can have a negative effect on the productivity and technical efficiency of farms. As a relatively stable source of income, direct payments do not encourage farmers to innovate, develop new technologies, restructure economic activities or invest.

The literature analysis also identified a number of other economic effects of direct payments. Based on the studies reviewed, direct subsidies (neither positive nor negative) had no effect on farm investments. With regard to the promotion of agricultural employment, the literature has produced quite ambivalent results. Other articles also drew attention to the trade-distorting effects of subsidies and the impact on traditional land use conditions.

2. Methodology

2.1 Research questions

The main aim of my research is to study the effects of direct payments at regional level in the Member States of the European Union. In accordance with the literature review, I deal with the most important socio-economic impacts. Accordingly, my research questions are:

1. What are the regional effects of direct payments in the European Union?
2. How different are the effects in the EU-15 and in the new Member States?

2.2 Hypotheses

I sought answers to the above research questions with the following hypotheses:

- H1: Direct payments increase agricultural income at regional level in the European Union.
- H2.1: Direct payments increase the productivity of agricultural labour at regional level.
- H2.2: Direct payments increase the productivity of agricultural land at regional level.
- H3.1: Direct payments alleviate income inequalities in the European Union.
- H3.2: Direct payments alleviate regional poverty in the European Union.
- H4: The regional effects of direct payments are balanced in time in the European Union.

2.3 Applied research methods

Several models have been built in recent decades to examine the effects of direct payments. These models are mostly ex-ante in nature, meaning they run simulations and scenarios and examine expected future impacts. However, my research questions focus on the ex-post analysis of CAP impacts, which is why the analytical tools listed above were of little relevance to my research. Furthermore, methods that compare the results of the observed and control groups cannot be effectively applied to the analysis of direct payments because it is not possible to form a control group (due to the lack of farmers who do not receive direct support).

For these reasons, I decided to carry out a classic ex-post impact analysis in line with the methodology of previous studies, based on regional data at NUTS2 level from 2008 to 2018. For the testing of to hypotheses 1 to 3, I used random effects panel regression models in which, in addition to explanatory and dependent variables, I also incorporated several control variables. In each case, I ran the models for all Member States and then separately for the old and new Member States. To test the fourth hypothesis on the convergence of the regional effects of direct subsidies, I used the Kernel density function and the Markov transition probability matrix methods. These methods are well suited for determining how asymmetric the distribution of the sample is, as well as for showing whether there are significantly different incomes, productivity, or social conditions over time.

2.4 Scope of research data

To test the research hypotheses, I built a unique database based on the following databases:

- Data on the volume of direct payments were taken from the Clearance Audit Trail System (CATS) database operated by the European Commission.
- I downloaded a number of regional data (for labour market, capital formation and gross domestic product) from the Annual Regional Database of the European Commission (ARDECO).
- The source of data on poverty and income inequality was the EU Statistics on Income and Living Conditions (EU-SILC) database.
- I collected several control variables for the applied models from the Eurostat database (income, agricultural land, population density data).

I have organized the data from the above sources into a balanced panel database, which contains the annual data of 244 European NUTS2 regions for the period 2008-2018.

3. Research results

3.1 Impact of direct payments on agricultural incomes

The first hypothesis is that direct payments increase agricultural income at the regional level in the European Union. The results of the model used to test this statement confirmed the hypothesis. The positive relationship between direct payments and agricultural income is in line with the findings of several previous studies. Studying the size of the coefficient, we can conclude that a one percent increase in the amount of direct payments results in a surplus of agricultural income of about 0.32%. The level of the coefficient is influenced, on the one hand, by the share of direct payments in agricultural income; on the other hand, the efficiency of the transfer of direct aids. In connection with the latter, in line with the results of scientific research to date, we have reason to believe that a surplus of one euro of direct aid will increase the level of agricultural income by less than one euro.

This circumstance was also confirmed by the results of the research. Assuming that a surplus of one euro of direct payments generates one euro of extra agricultural income (i.e. the transfer efficiency of the system is 100%), then, based on a coefficient of 0.32 from the model, the share of direct payments should be 32% of the total agricultural income. But in the period under review, the median share of direct payments was 45%. Thus, we can say that the transfer efficiency of direct subsidies is 32/45 = 71%, i.e. a surplus of one euro of direct subsidies results in an average income surplus of 71 cents. The remainder is absorbed by the market-distorting effects of direct payments. Most direct subsidies are mainly leaked in the form of increased land rents by landowners.

It is also interesting to note the differences between the old and new Member States. For both the old and the new Member States a positive correlation was found between the level of agricultural income and direct payments, but the coefficient is higher in the new Member States (0.46 compared to the coefficient of 0.23 in the old Member States). That is, direct payments have a greater impact of 46% on the level of agricultural incomes in the new

Member States than in the old ones (23%). This is mainly due to the higher share of direct payments in agricultural income in the new Member States. Due to the higher income share of direct payments, the functioning of the agricultural sector in the new Member States may become much more dependent on CAP payments than in the old ones.

3.2 Impact of direct payments on productivity

My second hypothesis is that direct payments increase regional agricultural productivity in the European Union. In connection with the hypothesis, I first modelled the support effect on labour productivity. The calculations have contradicted my hypothesis: direct subsidies have a negative effect on labour productivity in agriculture. With a 1% increase in direct subsidies, the labour productivity indicator will deteriorate by 0.016%. The negative impact on efficiency is due to the fact that direct subsidies are a stable source of income, increasing the income from agricultural activity, regardless of how technically efficient the production process is. Thus, farmers may become interested in sub-optimal production activities, thus reducing efficiency. For all these reasons, direct payments do not encourage farmers to innovate, develop new technologies or restructure economic activities. Producers' efficiency efforts are therefore declining, and the phenomenon of wastage of factors of production, such as agricultural labour, is emerging.

There is an interesting difference between the old and the new Member States. While the regression model run on data from the old Member States did not find a significant correlation between direct payments and labour productivity, a significant negative effect can be identified in the new Member States. Based on these, direct payments do not seem to affect labour productivity in the old Member States, while they are negatively affected in the new ones.

Secondly, I analyzed the support effect on agricultural land productivity. The results of the model ran counter to our original expectation: direct subsidies have a negative impact on agricultural productivity of agricultural land. With a 1% increase in direct payments, the land productivity indicator will deteriorate by 0.08%, i.e. the agricultural value added per hectare. The negative link between the productivity of agricultural land and direct payments is due to the fact that farmers receive payments mainly on the basis of the size of the agricultural land used. Thus, in order to maximize direct support amounts, market participants have an interest in getting as much agricultural land as possible for their own use. They can basically achieve

this by two means: either they buy or rent more land, so the market demand for arable land increases accordingly; or they subject previously unused land to agricultural production. In doing so, farmers may also involve marginal, inferior land in production, merely to establish the entitlement to direct support. The standard of agricultural production in these areas lags behind that of better quality land, and consequently the productivity of the land decreases. It is interesting to note that the increased demand for agricultural land can, in extreme cases, culminate in the phenomenon of "land grabbing". As part of this, capital-intensive market actors embark on large-scale land acquisitions, which upset traditional land use conditions and lead to a high concentration of holdings, which may lead to social tensions and environmental problems. "Land grabbing" is a well-known phenomenon in many regions of the world, driven by a number of market factors. One such factor in Europe is the CAP area-based direct payments, which contribute to the growing pressure on the agricultural land market.

The impact on land productivity is negative in the old Member States, while not significantly different from zero in the new Member States. Interestingly, this is the opposite of what has been experienced in terms of labour productivity: here the old Member States have a more unfavourable effect. This may be due, on the one hand, to the fact that the old Member States have, on average, higher levels of direct aid per hectare than the new Member States. Thus, the inclusion of less productive land in agriculture may also pay off in order for farmers to receive higher amounts of direct support. On the other hand, the new Member States have a relatively larger area of relatively productive land that can be freshly involved in agricultural production. Therefore, the inclusion of new land in the new Member States does not lead to the same reduction in productivity as in the old Member States.

3.3 The impact of direct payments on income inequality and poverty

My third hypothesis is that direct payments alleviate regional income inequalities and poverty in the European Union.

First, I examined the issue of income inequalities. The issue of income equalization was examined through the share of agricultural income in total income. Income inequality is thus understood here as the difference in the level of agricultural and non-agricultural income (rather than the specifics of the income distribution between individual beneficiaries).

The results of the model are in line with our preliminary expectation that direct payments will help increase the share of agricultural income within total income. A one percent increase in

direct payments increases the share of agricultural income within total income by 0.001653%. The average rate in question was 2% during the period considered. Direct payments increase agricultural incomes more than non-agricultural ones, but the effect is only small.

It has long been a fact in the scientific literature that the profitability of the agricultural sector lags behind that of the economy as a whole. Incidentally, this is a phenomenon not only in the European Union, but in many regions of the world. At the beginning of the study period, in 2008, a European Commission study found that per capita farm entrepreneur's income was around 58% of the EU average wage.

We have already seen when testing the first hypothesis that direct payments increase agricultural income. In addition, direct payments can have a positive effect on non-agricultural employment, production and income as a kind of spill-over effect. Partial leakage of subsidies will also lead to an increase in non-agricultural incomes. The positive sign of the coefficient indicates that the agricultural effect is stronger than the non-agricultural one, so agricultural incomes are moving towards the average income level of the whole economy. However, the value of the coefficient is quite low, so the displacement is only small. Direct payments appear to be effective in moving the profitability of economies from a critically low level, but are not in themselves able to catch up with the average of other sectors.

A comparison between the old and new Member States shows that the coefficient for direct payments is positive in both models, but not significant for the old Member States. Accordingly, direct payments appear to be more effective in helping the income share of those working in agriculture in the new Member States. This can be explained by the fact that in these countries they make up a larger share of agricultural income (and even total income), so their countervailing effect can be proportionally more pronounced.

In the second part of the third hypothesis, I assumed that direct subsidies alleviate regional poverty in the European Union. I modelled regional poverty by the rate of material and social deprivation. The results of the model confirm our hypothesis: direct subsidies reduce the rate of material and social deprivation. This is in line with the results of other studies that have found that agricultural support schemes in different parts of the world are generally successful in alleviating poverty and social exclusion.

3.4 Convergence of the effects of direct payments over time

As for **the fourth hypothesis**, I examined whether the regional effects of direct subsidies converge or diverge over time.

First, I examined the dynamics of the distribution of direct subsidies in the period 2008-2018. The Markov transition probability matrix showed that we could not detect a large rearrangement in the regional level of direct payments during the period under review. The only exception to this finding is that some of the regions receiving direct payments well below average in 2008 were able to catch up with the average by 2018. This is certainly due to the phasing-in phenomenon in the new Member States during the study period. The representation of the Kernel density function confirmed that the distribution of direct subsidies is strongly asymmetric between different regions of Europe. Accordingly, previous studies in the literature, which call for further convergence of direct payments between countries, seem well-founded.

Calculations of the convergence of agricultural incomes show that at the end of the period, most of the regions with average or above-average incomes had lower agricultural incomes in the past. This dynamics is presumably due to the emerging regions of the new Member States, where the previously very unfavourable income position of farmers has been able to improve significantly since accession. This is in line with the finding of the first hypothesis that direct payments increase agricultural incomes to a greater extent in the new Member States than in the old ones. At the same time, based on the Kernel density functions, we can say that there may have been some rearrangement in the income conditions within the sample, but the effect is not strong enough to change the distribution of incomes to a large extent and to implement external convergence processes.

With regard to the use of agricultural labour, the methods used do not show any convergence during the period under review. This finding is in line with previous research results that direct payments do not affect the level of agricultural employment. After decoupling, the effect of the subsidy on the volume of agricultural labour was further weakened. The demand for labour is mainly determined by the level of agricultural production and wages instead of subsidies.

The situation is similar for agricultural labour productivity. The applied methods did not indicate any equalization of the labour productivity indicator between the regions in the examined period. This is in line with the result of Hypothesis 2.1, according to which direct subsidies do not have a large impact on agricultural productivity, and their effect is rather negative. Previous research has also found that there is no convergence between labour

productivity indicators in the agricultural sectors in the old and new Member States. A major restructuring of farms is likely to be needed to start levelling off.

A similar situation has developed with regard to the productivity of agricultural land. Similarly to labour productivity, there is no trace of regional convergence in agricultural land productivity over the period under review.

However, in terms of the poverty rate, there was some realignment between regions during the period under review. The curves showing the distribution of the proportion of the population at risk of poverty become more and more flattened over time during the study period. In addition, regions with an average poverty rate at the end of the period could be described as having an above-average poverty rate at the beginning of the period, i.e. the percentage of people at risk of material deprivation or social exclusion reduced. Examining Hypothesis 3.2, I have already shown that direct subsidies have some role in reducing poverty. This is consistent with the above findings on the dynamics of the rearrangement of poverty. However, it should be noted that the value of the poverty indicator is obviously shaped by a number of other factors in addition to CAP subsidies.

3.5 Summary of research results

In light of the above results, my findings on research hypotheses are summarized in Table 1.

Table 1 – Summary of research results

Hypothesis	**Hypothesized effect**	**Demonstrated effect**	**Conclusion**
H1 effect of direct payments on income	positive	positive	Accept H1
H2.1 effect of direct payments on labour productivity	positive	negative	Reject H2.1
H2.2 effect of direct payments on land productivity	positive	negative	Reject H2.2
H3.1 effect of direct payments on the ratio of agricultural income in total income	positive	positive	Accept H3.1
H3.2 effect of direct payments on poverty	negative	negative	Accept H3.2
H4 convergence of direct payment effects:			
- income	convergence	partial convergence	Partially accept H4 – income.
- employment	convergence	no convergence	Reject H4 – employment.
- labour productivity	convergence	no convergence	Reject H4 – labour productivity.
- land productivity	convergence	no convergence	Reject H4 – land productivity.
- poverty	convergence	convergence	Accept H4 – poverty,

Source: own composition

During the testing of the hypotheses, the effect of direct subsidies on increasing agricultural income was confirmed. A percentage increase in the level of direct payments, all other factors being unchanged, resulted in a surplus of around 0.32% in agricultural income in the study period. Considering the share of direct payments in total agricultural income, this means that the transfer efficiency of direct payments is 71%, i.e. a direct support surplus of one euro results in an average income surplus of 71 cents. The remainder is absorbed by the economic (side) effects of direct subsidies, such as rising input prices. Most direct payments are leaked in the form of increased land rents by landowners.

Contrary to our hypothesis about labour productivity, the results showed that direct subsidies have a negative effect on labour productivity in agriculture. The result is in line with the findings of previous research, which generally showed a negative relationship between productivity and the level of direct support. The effect is mainly due to the fact that direct

payments are a stable source of income, increasing the income realized from agricultural activity, regardless of how technically efficient the production process is. Direct payments therefore do not encourage farmers to innovate and reorganize their economic activities, so factors of production, such as agricultural labour, may be used in an irrational, wasteful way.

Likewise, I identified a negative correlation between direct payments and agricultural land productivity. This is due to the fact that farmers receive payments primarily on the basis of the size of the agricultural land used, which increases the demand for land. Farmers buy or rent more land, or involve marginal, less productive land in production, leading to reduced efficiency.

Regarding the hypothesis of income inequality, I wondered whether direct subsidies increase the share of agricultural income in total income. The result, in line with Hypothesis 3.1, suggests that direct payments help to increase the share of agricultural income in total income, but the effect is small. Based on these, direct subsidies appear to be effective in moving the profitability of farms from a critically low level but are not in themselves able to catch up with the average of other sectors.

Poverty studies have confirmed my hypothesis that direct payments reduce the incidence of material deprivation and social exclusion. This finding is consistent with the results of previous research that found that agricultural support systems in different countries of the world are generally successful in alleviating poverty and social deprivation.

With regard to the comparison of the economic effects of CAP direct payments between old and new Member States, it can generally be stated that in the new Member States modelling has generally shown a stronger, more pronounced effect than in the old Member States (except for land productivity). For example, in terms of the impact on agricultural incomes, the coefficient for direct payments is much higher in new Member States (0.46 compared to 0.23 in the old Member States). This is mainly due to the higher share of direct payments in agricultural income in new Member States. The situation is similar when examining the share of agricultural income in total income or labour productivity. The more a sector relies on direct payments, the more vulnerable it can become as a result. All in all, we can conclude that direct payments increase incomes to a greater extent in the new Member States, but due to their high ratio in agricultural income, the sector may become too dependent on support payments.

In connection with Hypothesis 4, I came to the conclusion that there is some convergence in the distribution of agricultural incomes and poverty indicators over the study period among the regions included in the analysis. This rearrangement is presumably due to the emerging

regions of the new Member States, where the previously very unfavourable income position of farmers has been able to improve significantly since accession. Consequently, poverty-related conditions in some regions could also improve. I did not find any signs of an equalization process in the extent of agricultural employment or in relation to land and labour productivity indicators in the study period. Accordingly, it can be stated that direct payments could not generate a significant realignment between the regions concerning these factors. Therefore, the cohesion objectives of the Common Agricultural Policy, according to which decision-makers seek to encourage regional economic and social convergence, is only partially achieved through direct payments.

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