Czech University of Life Sciences Prague

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Diploma Thesis

Statistical Analysis of Farm Economy in the Czech Less Favored Areas

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DIPLOMA THESIS ASSIGNMENT

MAKINA RAHMAN

Informatics

Thesis title

Statistical analysis of farm economy in the Czech Less Favoured Areas

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Objectives of thesis

Diploma thesis deals with evaluation of farm economy of agricultural enterprises in the Czech Less Favoured Areas. The main goal is to evaluate economic performance and related indicators.

Methodology

The evaluation of farm economy and the impact of LFA policy changes on selected economic indicators will be carried out by statistical analysis, such us exploratory data analysis, distribution analysis, hypothesis testing and regression analysis.

The proposed extent of the thesis

60 – 80 pages

Keywords

Less favoured areas, Common Agricultural Policy, payment, current subsidies, statistical analysis

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ALWANG, J R. – MASTERS, W A. – NORTON, G W. *Economics of agricultural development : world food systems and resource use.* London ; Routledge: London ; Routledge, 2010. ISBN 9780415494243.

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Declaration

I hereby state that, the thesis paper titled “Statistical Analysis of Farm Economy in the Czech Less Favored Areas” is my own work and was completed as a requirement for Master Degree with specialization in Informatics, Faculty of Economics and Management, Czech University of Life Sciences in Prague. To the best of my knowledge, this paper is authentic, the source I have used are mentioned at the end of the thesis.

Prague, 2017

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Makina Rahman

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Statistical Analysis of Farm Economy in the Czech Less Favored Areas

Abstract

Farm performance in agriculture is a complicated concept and there are varieties of viewpoints among scholars about performance indicators. However, various dimensions for measuring agricultural performance have been proposed. This paper reviews some aspects of agricultural evaluation by referring to social, economic, ecological aspects and their interaction. The purpose of this paper is to (i) make an objective assessment of the agricultural farm performance based on some chosen economic and related indicators, (ii) evaluate the performance for Czech Less Favored Areas (LFA) in comparison with selected EU member states over five-year (2009-2013) period, (iii) impact of LFA policy changes on selected economic indicators; with the help of statistical analysis. Agriculture in Europe has seen a dynamic development over the years and a further significant growth is foreseen. Economic aspect is widely seen as an important factor determining the performance of agricultural farming. This aspect should be kept in mind when evaluating the economic data of agricultural farms. Consecutive reformation of the Common Agricultural Policy (CAP), time to time variations in Rural Development Programs and LFA policy have enlarged the diversity of European agriculture. These changes have resulted in the escalation of agricultural activities in some regions, followed by the impact of financial support for farming in less favoured areas in most countries influences the increased importance of agricultural performance. The comparability of farm performance among countries is a bit difficult analysis, due to the differences in overall facilities and economic power of the countries. Therefore, an evaluation of selected economic indicators with appropriate unit of measure has been carried out using suitable statistical methods – Descriptive Statistics, Cluster Analysis; to realize the performance differences in less favored area types.

Keywords: Less favoured areas (LFA), Common Agricultural Policy (CAP), Agricultural Farm Performance, Rural Development Program (RDP), Subsidies, Statistical Analysis.

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Abbreviations

ANC	Areas with Natural Constraints
AWU	Annual Working Unit
CAP	Common Agricultural Policy
DAS	Disadvantage Areas Scheme
EAFRD	European Agricultural Fund for Rural Development
EAGGF	European Agricultural Guidance and Guarantee Fund
EC	European Council
EU	European Union
FADN	Farm Accountancy Data Network
FNI	Farm Net Income
FNVA	Farm net value added
GDP	Gross domestic Product
LFA	Less Favored Areas
NPV	Net Present Value
RDP	Rural Development Program
ROA	Return on Assets
SFP	Single Farm Payment
SME	Small and Medium Enterprises
SPS	Single Payment Scheme
WTO	World Trade Organization

1 Introduction

Although the European Union (EU) agriculture sector is highly productive, agriculture makes up 6% of GDP. Agriculture remains one of the largest employers in EU, and over 77% of EU territory is rural and around 50% of its population is directly depends on agriculture in one form or another for their livelihood. However, the difference between the amounts of crop actually produced and the potential for crop production remains huge as several constraints hinders the maximum use of land. Increasing agricultural productivity and improving the condition of the farmers is important to ensure food safety and rural development in EU. Lack of crop variation, declination of cultivable land and poor associations to markets contain a crucial part in EU agriculture. Pollution from agriculture plays a fundamental role on the quality of ground and surface waters in the EU. Improvement in EU agriculture is a precondition for sustainable development of food, rural areas and environment. Agriculture is not just about food, it's a main source of economic linkage in rural areas and the people who lives there; it plays a fundamental role in reducing poverty. The agricultural development depends on the policy and institutional structure comprising laws, administrative directives, institutions, services, infrastructure support, and incentives. So, to provide 500 million of EU consumers reliable supply of healthy and nutritious food at an affordable price, safeguarding the environment and allowing farmers to make a living, EU supports a particular European model of agriculture – Common Agricultural Policy (CAP) – vibrant partnership between farmers and Europe, to support farming in all member states.

Agriculture is the oldest profession in human civilization. Changing of eras and modernization of the agricultural sector do not change farmers' position significantly. Evolution of civilization and improvement of industrials did not decrease the importance of the agriculture sector. At present, because of population growth and the harmful effects of climate change, agriculture has become essential requirements for the whole world. But agricultural sector and farmers both are facing several challenges constantly which hinder development.

In the field of EU agriculture, a new definition has been introduced which is known as Areas with Natural Constraints (ANC), previously known as Less Favored Areas (LFA). A set of eight biophysical criteria covering soil, slope and climate to be used for such areas ensuring a transparent system across the EU. Member States will have time to arrange their necessary activities to implement the new delimitation until 2018. It is predicted that the ANC scheme will operate in much the same way as Less Favored Areas/Disadvantage Areas Scheme (LFA/DAS) program of year of 2007 - 2013.

Less Favored Areas (LFA) can be characterized by lower competitiveness of agricultural production caused by worse conditions of climate and production. Farmers in less favored areas have to face a lot of significant handicaps such as remoteness, difficult structure of landscape and poor soil conditions. They tend to have lower farm productivity and higher unit production costs than other areas farmers. Farms in the LFA get lower profit due to the increased cost revenues ratio caused by a poor land productivity, shorter vegetation period and the increased slope. The harvest structure of these areas is limited and the natural yields are inadequate. Without monetary support for farming, these lower returns would create a significant threat to the future opportunity of these farming people (Areas of Natural Constraint Scheme (ANCS) Formerly known as LFA/DAS, n.d.).
The stated purposes of this arrangement are to:

- Ensure agricultural land use with sustainable farming, thus helping towards the preservation of a workable rural society.
- Maintain the countryside.
- Maintain and encourage sustainable farming systems, which precisely take account of environmental safety measures (Areas of Natural Constraint Scheme (ANCS) Formerly known as LFA/DAS, n.d.).

57 % of the overall utilized agricultural area in the EU is designated as Less Favored Area. Despite the wide percentage of field classified as LFA, only a fraction of farmers is benefitted from a compensatory grant. In 2005, around 1.4 million farms, representing about 13% of the

overall number of farms in the EU25, received funding under all LFA schemes. Significant distinctions among Member States can be detected, this variation is because of the different eligibility rules set by the Member States. Amount of financial support per hectare can vary from 25 €/ha to 200 €/ha (Rural Development Policy 2007 – 2013, n.d.).

2 Objective and Methodology

2.1 Objective

(I) Make an objective assessment of the agricultural farm performance based on some chosen economic and related indicators,
(II) Evaluate the performance for Czech Less Favored Areas (LFA) in comparison with selected EU member states over five-year (2009-2013) period,
(III) Impact of LFA policy changes on selected economic indicators.

2.2 Methodology

The goal of this paper is to investigate the farm economy of agricultural enterprises in different less favored areas in Czech Republic. The main goal is to evaluate performance based on economic and related indicators of agriculture of Czech and other chosen EU countries in LFA and non LFA areas. Farm performance and system of subsidies paid are dependent on the land area size, as a result of that, the area size of the member states was taken into account and related indicators were calculated per hectare of utilized agricultural area wherever it was necessary. This paper discusses the impact of LFA policy changes on the selected economic indicators from various points of view and an international comparison was carried out by monitoring the indicators in the selected EU member states using statistical analysis such as Exploratory Data Analysis. After that Cluster Analysis was applied to classify selected EU member states according to different economic performance of agricultural farms.

3 Literature Review

3.1 Common Agricultural Policy (CAP)

Common Agricultural Policy is common for all the member states of European Union, is the most integrated and one of the most important EU policies, launched in 1962 primarily to improve agricultural productivity and to ensure a fair standard living for farmers. Later on, more challenges added to the policy such as food security, environmental safety and rural development which gave farmers double challenge of producing food while protecting nature and safeguarding biodiversity.

The CAP was created so that people could enjoy good food at affordable prices and farmers earn a fair living. Still after more than fifty years, these aims are still valid. Through the years, the EU has modified the CAP to the changing needs of society. This is the story of a dynamic partnership between farmers and Europe. Today, the policy is again being reformed; the aim is to strengthen the competitiveness and the sustainability of agriculture and rural areas across the EU. The new policy responds to the economic, environmental and territorial challenges Europe faces today (The Common Agricultural Policy – A story to be continued, 2012).

3.1.1 CAP Formation and Reformation Through Time

1962 – Following the 'Treaty of Rome' signed in 1957 to establish the Common Market between six western European countries, the Common Agricultural Policy was born. It was created after Second World War as a response on the fears of food shortages experienced during the war times. At first it focused mostly on good prices for farmers, increasing productivity and stabilizing markets. It worked too well, because with every passing year farmers produce more food and Europe faced a food surplus (The Common Agricultural Policy (CAP): Purpose, History & Current Events, n.d.).

1970s-1980s – Farmers were growing foods more than needed. Shops were full of food at affordable prices. The CAP became victim to its own success. Specific measures were required to bring production levels align with market needs. A revised CAP set quotas to try to control the problem, to balance supply and demand (The Common Agricultural Policy – A story to be continued, 2012: 3).

1992- EU decided that CAP needed a major update. The CAP shifted from market support to producer support by reducing the level of market support and introducing direct aid payments to farmers and encouraging them to be more environments friendly so that they could care for their farms and environment at the same time. The new CAP added production limits to address surpluses, environmental focus to its agenda to encourage farmers to make their decisions based on natural resources and climate change, requires farmers to assume responsibility for environment protection and sustainable agriculture (Cantore, Kennan, Page, 2011: 3). The principal of sustainable development of 1992 Earth Summit in Rio de Janeiro has since been incorporated in EU policies including agriculture.

Mid 1990s – Over the next few years the policy introduces new measures to encourage farmers including small farmers to engage in rural development, support farm investment and training, start organic movements, and focus more on food quality. The reforms started in 1990s are continued to protect traditional and regional foods, Europe's agricultural market opened to export and import food to and from other countries (The Common Agricultural Policy (CAP): Purpose, History & Current Events, n.d.).

2003 – CAP made huge difference in farmers' lives. The CAP revision increased income support to farmers who keep their land in good agricultural condition with strict food safety and respect environment and animal welfare standards (The Common Agricultural Policy – A story to be continued, 2012: 3). This revision made a reduction of 5% from direct payment to increase spending in rural development to strengthen rural development policy. The 2003 reform introduced Single Payment Scheme (SPS) or Single Farm Payment (SFP).

2013 - Most recent reform was made in 2013 which is a major reform, designed to lead Europe's farmers in to a bright future. The latest reform focuses specially to ensure viable food production and stable food supply, strengthen the competitiveness of the sector while considering sustainable farming and innovation, food safety, rural economy, animal welfare, jobs and growth in rural areas, social and environmental concerns (The Common Agricultural Policy (CAP): Purpose, History & Current Events, n.d.).

3.1.2 CAP Performance Measurement

The newly formed Common Monitoring & Evaluation Framework for the first time, will deliver important information on the performance and policy implementation of the CAP. Member States together identified common effective indicators and more specific result and output determinants. Based on these, the Commission will provide annual reports on the performance of the CAP, the first report being due in 2018. Until then, information of these kind will continue to assess ongoing policy and the insights will be used in the DG AGRI Annual Activity Reports (AARs) (EU agriculture spending – focus on results, 2015). For example, the performance of Rural Development Programs is assessed as follows (figure 1):

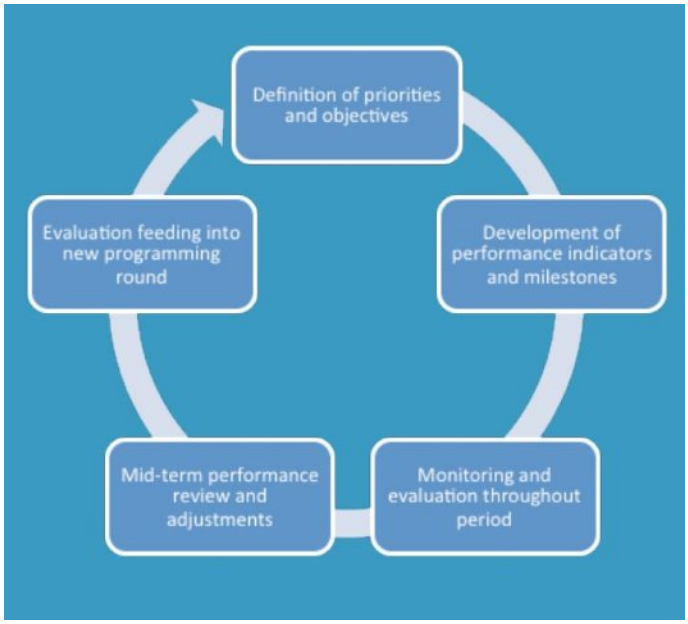

Figure 1: The performance of rural development program assessment
Source: http://ec.europa.eu/agriculture/cap-funding/pdf/cap-spending-09-2015_en.pdf

CAP is fully integrated and sponsored primarily by the EU budget. It finances activities that deliver on purposes related to the climate action, environment, food safety, research, health and innovation, and energy. It has facilitated EU farm businesses in a place to follow new prospects, for example through innovation or export interests in trade negotiations, it has built a framework for developing a strong agri-food sector which can be a model for developing world. The CAP also handles investments under other EU funds (such as regional development, employment and fisheries). For example, extensive structural investments made for Structural Fund projects are sometimes facilitated by rural development support to help nurture rural SMEs. Both features are important if the Commission's growth agenda is to be accomplished in all corners of the Union (EU agriculture spending – focus on results, 2015).

3.1.3 CAP Contribution to Agri-Food Sector

EU agricultural sector has become more competitive and more responsive to new market opportunities, because the CAP is interested towards market orientation. Since 2009, the EU has become a net exporter of food & drink, which helped EU agri-food exports rising to an estimated 122 billion EURO a year, resulting a stable annual growth of 8.6% over the last 10 years, with a robust increase in primary and processed products and more complex food arrangements (figure 2). This diversity of exports imitates the variety of European agriculture and the appeal of its safe and high quality production (EU agriculture spending – focus on results, 2015).

CAP has achieved the basis for competitive agricultural production due to successive reforms. And the EU agricultural sector now has significant interests in bilateral trade relations, for instance with Japan and the USA (EU agriculture spending – focus on results, 2015).

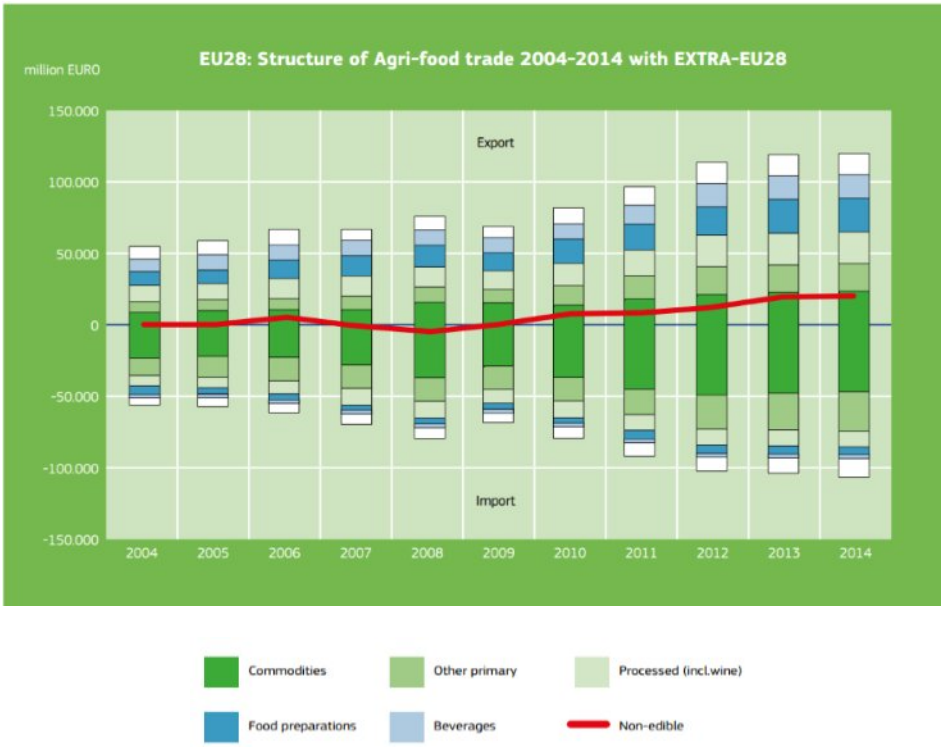

Figure 2: EU-28: Structure of Agri-food trade 2004-2014
Source: (http://ec.europa.eu/agriculture/cap-funding/pdf/cap-spending-09-2015_en.pdf)

3.1.4 The CAP and its Social Benefits

The position of agriculture in society spreads beyond its role as a basis of principal production. Even though the agricultural sector facilitates only 1.7% of Gross Value Added in the EU, farmers are responsible for the delivery of public goods to half of the EU's territory and they deliver healthy, affordable food to all of the EU's 500 million consumers (EU agriculture spending – focus on results, 2015).

In addition to these basic needs, CAP also acts in variety of ways to increase the quality of life in rural areas and decrease the gap between rural and urban regions. One case is the fact that the employment rate in rural areas has stays in lower level at all times than the overall EU trend. Rural development policy is participating severely to improve this situation. For example, in the perspective of the Digital Single Market, the 2007- 2013 rural development

programs already invested 337 million EURO in broadband coverage for rural areas. In the current period, another 1.6 billion EURO will be invested, rolling out broadband to an estimated 27 million people in remote areas. This is a huge support for assisting SMEs establish themselves in rural areas. In addition to this, rural development programs will cooperate in setting-up and development of some 58 000 rural SMEs over the next seven years, in which many of them are linked to agriculture (EU agriculture spending – focus on results, 2015).

No other EU policy could make it happen as the CAP when it comes to the context of delivering rural growth and jobs. It provides the appropriate setting for private investments while preserving cultural heritage and helps to ensure that rural areas will remain attractive to visit and even more importantly to live in (EU agriculture spending – focus on results, 2015).

3.1.5 The CAP Today – Looking to the Future

The new CAP lays out to cover the period from 2014 to 2020 aiming to make it fit for 2020 to beyond. After approximately two years of consultation between the Commission, the European Parliament and the Council, this was the first time that CAP transformation was selected under the ordinary legislative procedure, where the Council co-legislates with the European Parliament. A political agreement on the reform of the legal texts of CAP by the Council took place on 16 December 2013. Although the new CAP was supposed to be effective from January 2014 but to make sure that the member states have enough time to impose the new policy, many of the new rules of CAP were applied from 2015. There are four basic regulations of the reformed CAP which were published in the Official Journal on 20 December 2013.

3.1.5.1 Direct Payments

Direct payments are paid to farmers to ensure their basic income support, which are not related to the proportion of their production. Direct payments of large farms will be reduced

by at least 5% and these savings will be used for rural development. This scheme was introduced to reduce the biggest differences in the levels of support received by farmers across the EU. Direct payment is also for helping small, new and young farmers as they make up a third of EU's agricultural population. Proposed CAP reform will simplify administrative and payment procedures for these farmers so that they can do more farming. Some new terms are related to new direct payment method such as – Green Farming, Organic Production, Active Farmers. If the farmers practice green farming maintaining a minimum area of grassland, growing at least three different crops and promoting climate and environment; 30% of direct payment will be granted to these farmers. Organic production is automatically included in the green farming practice and penalties will be imposed if farmers fail to maintain these. On the other hand, only active farmers will receive the payment; big land owners with no actual farming activity will receive no payments.

3.1.5.2 Rural Development

Rural areas are far away behind the economic development and losing population. This accelerates Europe's rural land abandonment. The CAP is therefore to support farming, economic diversification and the quality of life in rural areas. Rural development policy has been updated to increase its effectiveness. Under rural development policy, member states will continue to design their own programs in response to the needs of their own rural areas to prevent desertification and preserve the richness of the land, to further help farmers in areas with natural handicaps with additional support.

3.1.5.3 Common Market Organization

There are some changes in Common Market Organization to respond to market imbalances and crisis. There will be some revised tool to reduce the impact on farmers in case of market disturbance or extreme price volatility.

3.1.5.4 CAP Financing

CAP financing is a single regulation which has been composed by the rules of financing, management and monitoring of the CAP and many of the rules on financing and management of direct payments, market measures and rural development have been synchronized.

3.1.6 How CAP Operates and Administers

3.1.6.1 Who Runs the CAP

Decisions are taken based on support from both the European Parliament and the Council of Ministers. In technical terms, the CAP should go through the system of the “ordinary legislative procedure”. Before representing the proposals, European Commission collaborates with the stakeholders mainly through its many advisory groups. On lawmaking, the Commission's proposals are determined by the Council of agriculture ministers of the 27 EU countries, together with the European Parliament. The CAP is in fact the only incorporated European policy and additionally the first user of Community funds. It is therefore typical that co-decision applies as this procedure symbolizes European integration (Guéguen and Marissen, n.d.).

Governments of member states determine Europe’s agricultural policy and the day-to-day operation of the CAP is the responsibility of the member countries. The EU's Court of Auditors also takes part in a major role of supervising expenditure. Over the course of the meetings, proposals go back and forth between the respective bodies and the Council, the aim is to get qualified majority of voting on the amendments to the Commission’s proposal. At the same time the European Parliament performs the same task. A lead committee (AGRI) and four other opinion giving committees (DEVE/BUDG/REGI/ENVI) indirectly involved in the dossier discuss proposals for amendments and present in the plenary session for a vote of majority (Guéguen and Marissen, n.d.).

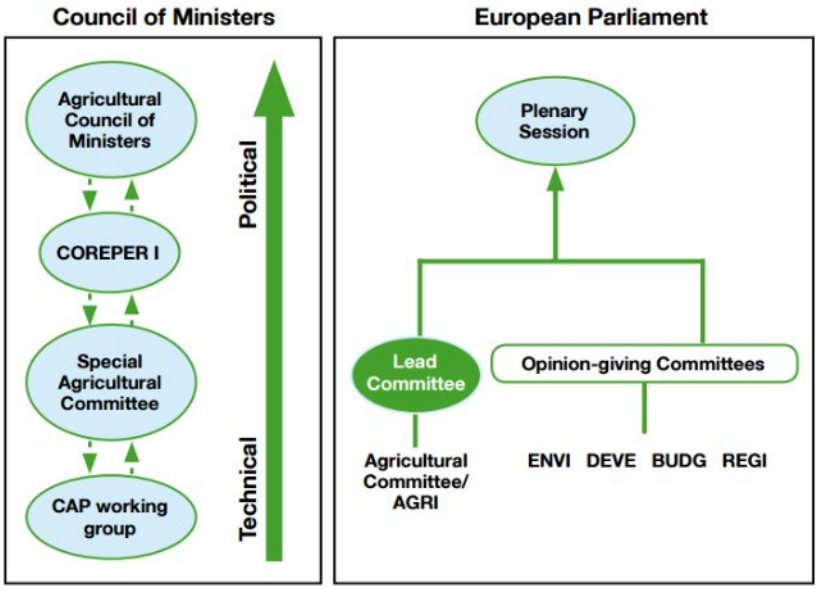

Figure 3: Internal decision-making processes within the Council of Ministers and the European Parliament
Source: http://www.pacteurope.eu/pact/wp-content/uploads/2012/04/CAP-2014-a-new-institutional-environment.pdf

3.1.6.2 How the Budget is Used

Agriculture is one of the few areas where a common policy is not financed by national budgets, rather by EU budget. The CAP is financed by two funds as Commission gave conditions and specific rules for a single framework for CAP financing (figure 4 and 5). The European Agricultural Guarantee Fund (EAGF) provide expenditures such as direct payments to farmers, intervention actions to adjust agricultural markets, refunds for exporting to non-EU countries etc. while the European Agricultural Fund for Rural Development (EAFRD) financing expenditure related to the rural development programs of the Member States. Although these two funds work in a similar way, each fund has specific features. In short, the CAP budget is spent in three closely interrelated sectors which must be managed coherently:

Direct payments – Direct Payment is about providing income support for farmers and assisting them to comply with sustainable agricultural practices. Farmers receive annual payments so that they can stabilize farm revenues with the ongoing volatile market prices, variable input costs and unpredictable weather conditions. These payments are fully financed by the EU, and account for 70% of the CAP budget. Farmers can be benefitted from these payments by following the rules and practice farming considering regional environmental standards, animal welfare, food safety. Under the June 2013 reform, 30% of direct payments will be linked to European farmers' compliance with all those rules. To avoid markets distortion, payments are granted based on how much land farmer uses and how he uses it, not how much a he produces.

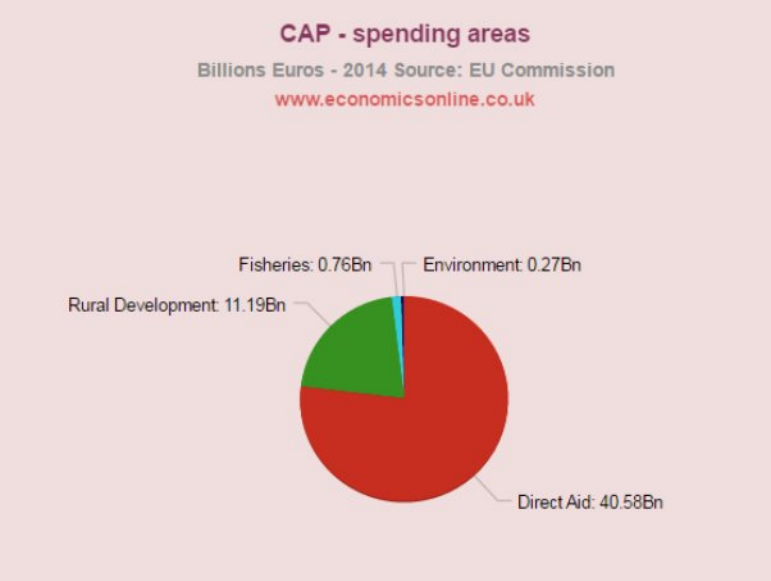

Figure 4: CAP spending areas
Source: http://www.economicsonline.co.uk/Updates/EU_CAP.html

Market measures – These measures are linked to certain market situations or when adverse weather conditions destabilize markets, as well as support for the school milk and fruit schemes, trade promotion and producer organizations; assist farmers obtain a greater deal when negotiating prices and setting with processors and supermarkets. Such payments account for less than 10% of the CAP budget.

Rural Development Programs - Provide funding for projects with environmental, economic, or social objectives; primarily focus on farms and SMEs in rural areas. These are projected to help farmers bring up to date techniques to their farms and become more competitive, while caring the environment, contributing to the diversification of farming and non-farming activities and the vitality of countryside. These payments are part-financed by the member countries, generally extend over a number of years, and account for some 20% of the CAP's budget. The budget is spent according to the plans that are designed nationally or regionally corresponding local challenges and opportunities.

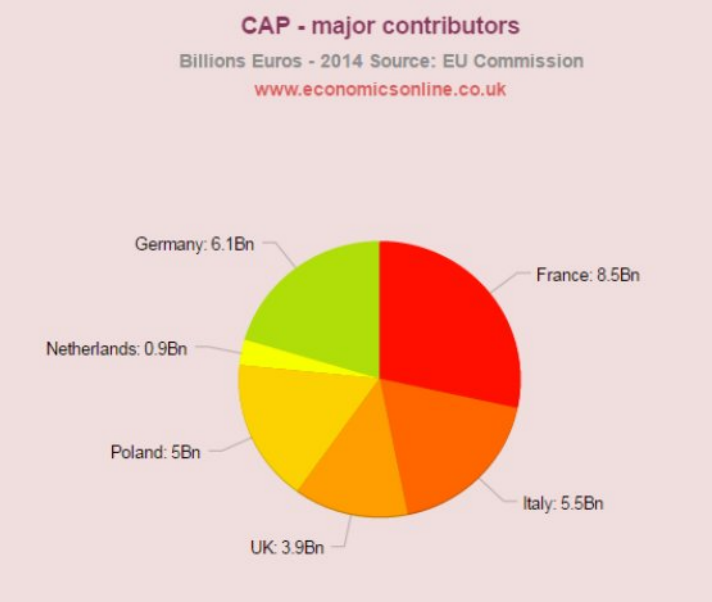

Figure 5: CAP major contributors
Source: http://www.economicsonline.co.uk/Updates/EU_CAP.html

3.2 Less Favored Areas (LFA)/ Areas with Natural Constraints (ANC)

The aim of LFA scheme was to maintain agriculture in areas with structural and permanent natural handicaps in order to ensure a minimum level of population and land preservation. This has created a legal framework for the provision of financial support in the LFA from

European Agricultural Guidance and Guarantee Fund (EAGGF) and national funds. The financial support to LFAs was €8 billion, almost 18 % of the Community funding for Rural Development meant for 2000-2006. In the period of 2007-2013, the allocation of the European Agricultural Fund for Rural Development (EAFRD) dedicated to the scheme is € 12.6 billion or 13.9 % of the total Community funding allocation, corresponding to 32 % of the resources dedicated to the development of the sensitive environment and the countryside by supporting sustainable land management (Rural Development Policy 2007 – 2013, n.d.).

3.2.1 Types of LFA/ ANC

According to the Articles of Council Regulation (EC) 1257/1999 still in force, an area can be categorized as less favored based on one of three categories. Each type symbolizes a different collection of handicaps which are common to some agricultural land across Europe, and which are threat to the continuation of agricultural farming:

- In Article 18, **Mountain Areas** are defined as areas affected by any of the following limitations:
    - altitude (at least 600-800 m), resulting in the existence of unfavorable climatic conditions, shortening the growing season;
    - in areas with lower incidence of altitude slopes (minimum 20%) restricting the use of agricultural machinery or requiring some particular or expensive equipment;
    - and the combination of these two factors causing the similar disabilities (Rural Development Policy 2007 – 2013, n.d.).

- In Article 19, **'Intermediate' Less Favored Areas** are those areas in risk of abandonment of agricultural land and where the maintenance of the countryside is obligatory. They demonstrate all of the following handicaps:
    - Poor or less efficient land;

- Low productivity of crops; hence the income level of farmers farming in such areas are low with an income of less than 80% of the regional or national average.
- low or dwindling population mainly dependent on agriculture (Rural Development Policy 2007 – 2013, n.d.)

- Under Article 20, **Areas Affected by Specific Handicaps** are defined as areas affected by specific constraints in the form of unfavorable soil and production conditions which includes farming in coastal areas or on small islands, in bad water regime of soil, in remote areas with high transport cost with protection of landscape, coastal ecosystems and the environment. In these areas farming should be continued so as to:
  - preserve or improvement of the environment;
  - maintenance of the countryside;
  - preserve the tourist potential of the areas;
  - protect the coastline (Rural Development Policy 2007 – 2013, n.d.)

3.2.2 Financial Support for LFA/ ANC

In Less favored areas, agricultural production or activities is more tough because of natural constraints such as steep slopes in mountain areas, difficult climatic conditions, or low soil productivity. Due to the difficulties of farming, there is a high-level risk of agricultural land abandonment and consequently a possibility of desertification, loss of biodiversity, forest fires and the loss of most precious rural landscape. To mitigate these obstacles, the Less Favored Areas (LFA) payment scheme, though not a compulsory measure, implemented by all the Member States. The aid to farmers in Less Favored Areas help them maintaining the countryside where fragile and sensitive environment make agriculture production or activity more difficult.

3.2.2.1 Justification of The Measure

The purpose of financial support in mountain areas or in other areas facing natural or other specific constraints (ANCs) is to compensate farmers totally or partially for difficulties to which the agricultural production is unprotected as a result of natural or other specific limitations in their area of activity. Such payment shall allow farmers to continue agricultural land management in order to protect from land abandonment being a prerequisite for preserving the countryside and sustainable farming methods in the troubled areas. In order to ensure the efficient use of Union funds and equal opportunity for farmers across the Union, mountain areas and areas facing natural or other specific constraints are to be determined in accordance with particular criteria (Payments to areas facing natural or other specific constraints, 2015: 1).

3.2.2.2 Reformed Compensations

For the period 2014-2020, the maximum amount of payment increased from € 250 to € 450 per hectare in mountain areas and from € 150 to € 250 per hectare in areas of other natural or specific constraints. These amounts can be increased in case of specific circumstances, and have to be justified in the Rural Development Program. The minimum amount of € 25 per hectare stays the same throughout the new period 2014-2020 (Payments to areas facing natural or other specific constraints, 2015: 2).

3.2.2.3 Payments Under Two Pillars

The payment for natural constraints received in the first pillar is to be taken into account in the payment scheme under second pillar. So that the new payment scheme for farms in areas with natural constraints in Pillar I must not lead to double funding of the same disadvantage. The new Pillar I scheme for areas with natural constraints would allow Member States to realize a more equitable distribution of income throughout their agricultural area by aiming partial income support to farmers whose farming procedures and the income obtained from it is

permanently limited by natural obstacles (Payments to areas facing natural or other specific constraints, 2015: 2-3).

3.2.2.4 Payment Refinement

In some areas entitled to natural constraints or disadvantages have been defeated, e.g. due to investments or shifts towards certain production systems or farming methods that are favorable for those areas and, as a result of this, profitable agriculture can be carried out. In such cases, the inherent natural features of the area remain unaffected, while the handicap has been managed and, therefore, there is no reason for categorizing the area as ANCs. Those areas in which obstacles have been documented but overcome by investments (e.g. irrigation in dry areas) or by economic activity (e.g. wine production on stony soils) should be omitted from the support under the ANCs. This so-called "fine tuning" must be carried out by Member States according to their own method and is evaluated by the Commission services (Payments to areas facing natural or other specific constraints, 2015: 3).

3.2.2.5 Phasing Out Scheme

In areas facing specific natural constraints other than mountain, there payments can be granted to farmers under the "old" specification (Article 36(a)(ii) of Regulation (EC) No 1698/2005) between 2014 and 2020. Those areas eligible for the LFA-payments during the period 2007-2013 but excluded from the ANC payments in 2014-2020 due to the new criteria or refinement, may be approved phasing out assistance, as defined in Article 31(5) of the Regulation 1305/2013. Member State may select this arrangement in order to ease the adaptation of farmers in given areas to the new condition. It should be mentioned that phasing out support is appropriate only for “areas other than mountain areas” as defined under Article 32(3) of Regulation (EU) 1305/2013. Phasing out scheme finance are not applicable for mountain areas (Article 32(1)(a) areas) or for the areas affected by significant constraints (Article 32(1)(c) areas) that may be subject to a new delimitation (Payments to areas facing natural or other specific constraints, 2015: 4-5).

3.2.3 Comparisons of LFA/ ANC Measures in EU Countries

3.2.3.1 LFA Scopes and Allocation of Funds

LFA measure in rural development programs has different weight in the EU Member States. The share of the funds allocated for this measure depends on the extent of disadvantaged areas in the country, on the priorities that the country intends to support, on the size of farms and not the least the overall economic strength of the country. The share of individual types of LFA area of agricultural land by EU countries is shown in the chart (figure 6). Czech Republic is the state in eighteenth position according to the total range of less favored areas, but ranked tenth under the mountain range LFA. Czech Republic had LFA approximately one half of the agricultural land in 2010. Thus, it belongs to countries like Germany, France, Italy and Sweden. The highest proportion of LFA countries are Finland, Portugal, Luxembourg, Slovenia, on the contrary, a very low proportion of LFA characterizes Denmark, as well as the Netherlands, Belgium and Hungary (Marie Štolbová et al. 2012: 30-31).

Planning for 2007-2013, the extent of LFA in the EU countries remained practically unchanged. The extent to which individual countries have decided to support a single axis by NR (EC) No 1698/2005 are reflected in the allocation of resources for the RDP 2007-2013 time period (figure 7). LFA measure belongs to Axis 2 "Improving the environment and the countryside" (Marie Štolbová et al. 2012: 32).

Axis 1 "Improving the competitiveness of agriculture and forestry" allocate within the EU the highest share of funds in Spain, Portugal, Hungary, Romania, Poland, Baltic countries, industrialized countries e.g. in Belgium. Czech Republic allocated to this axis, the sixth lowest share of funds (22.5%). Thus, belongs to Ireland, the United Kingdom, Finland, Sweden and Austria (Marie Štolbová et al. 2012: 33).

Czech Republic with its 52% share in total resources, are among the countries that have pushed larger part of funds to Axis 2 "Improving the environment and the countryside". Along

with the Czech Republic there are Nordic countries in the group- Finland, Sweden, but also Austria, Ireland, the United Kingdom and France (Marie Štolbová et al. 2012: 33).

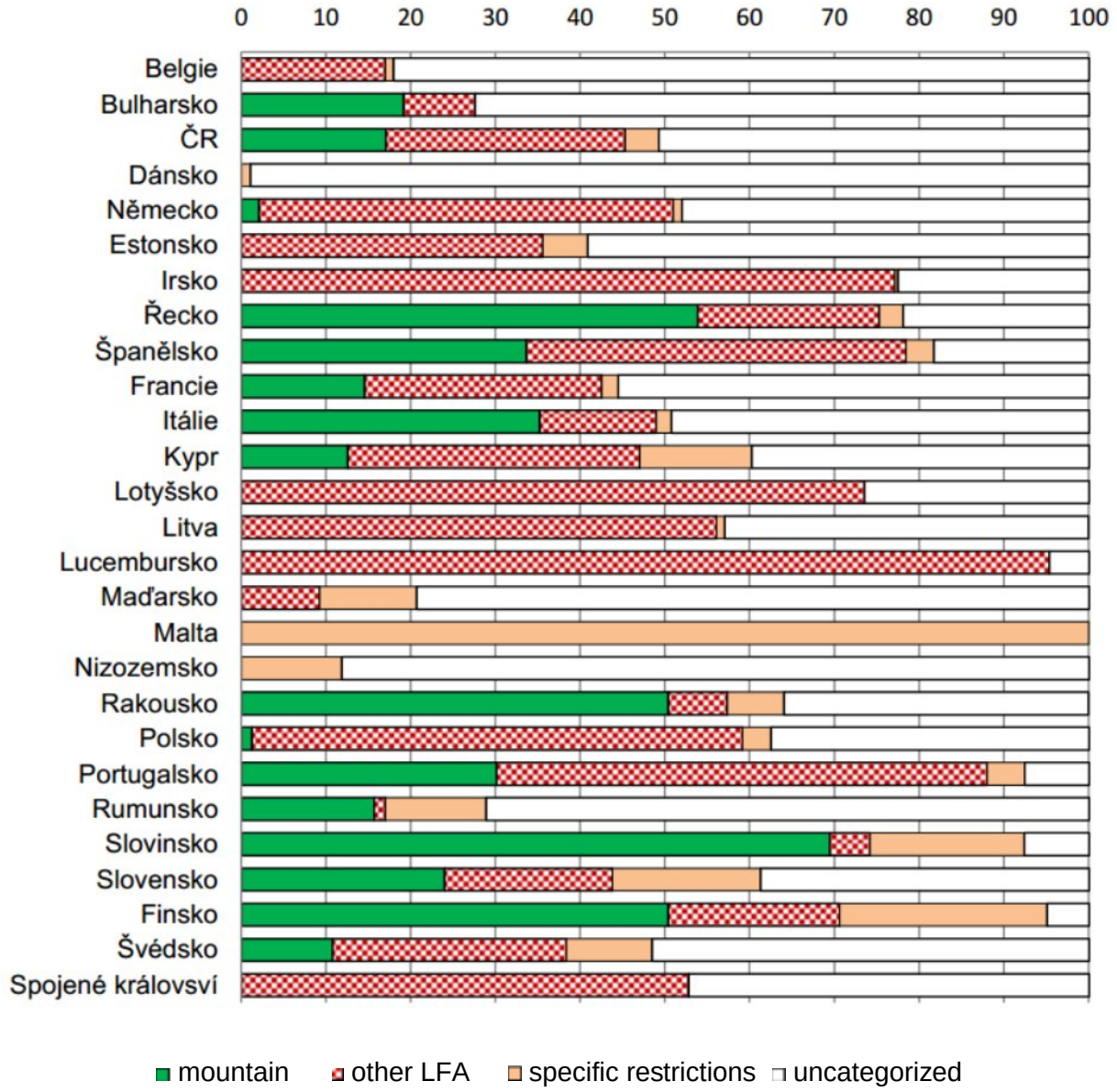

Figure 6: LFA share of the total area of agricultural land in the EU countries
Source: http://www.uzei.cz/data/usr_001_cz_soubory/studie107_.pdf

From EU countries Bulgaria, the Netherlands, Romania, Germany, Poland allocate the highest shares in Axis 3 "Quality of life in rural areas and diversification of the rural economy" where

Czech Republic contribute to its 17%. Conversely, the lowest shares in Axis 3 has allocated to Ireland, Portugal, Spain and France (Marie Štolbová et al. 2012: 33).

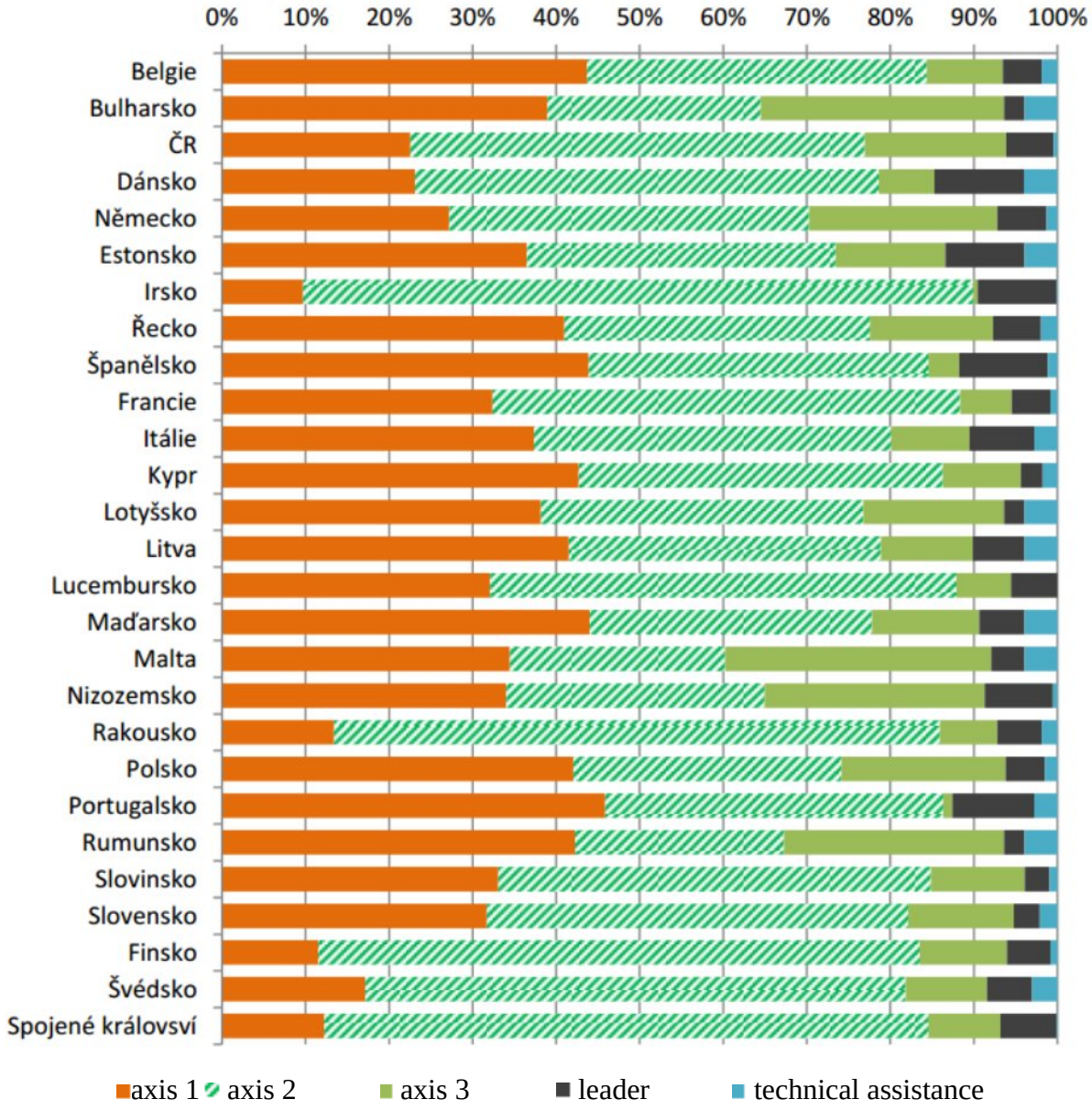

Figure 7: The share of funds allocated to the various axis of the RDP for 2007-2013
Source: http://www.uzei.cz/data/usr_001_cz_soubory/studie107_.pdf

The percentage of funds allocated for payment of LFA in individual countries depends on area of the LFA and also there is difference in rates. LFA payment rates vary from EUR 25 per ha of agricultural land in Estonia to EUR 250 per ha of agricultural land in Malta. Rates in the Czech Republic are relatively high. However, they are provided only to hectares of grassland, while most EU countries provide payments, although at a lower rate, but on a much broader area. EU countries differ in a number of different rates, which are used for grading the LFA payments. The number of different rates is primarily influenced by the diversity of natural conditions. E.g. Estonia, Lithuania, Ireland and Finland manage with a small number of rates payments. On the other hand, many distinctly regionally differentiated tariff is applied in Italy and France (Marie Štolbová et al. 2012: 34).

Varieties of LFA payments depend on company size reported by individual EU countries, it is possible to divide the EU into three groups:

- Countries with distinct dynamics of the decline in rates depending on the size of the farm. Payments are directed to small and medium-sized farms. That group corresponds to a low threshold of eligible farm area (between 10-100 ha) from which there is a reduction (or end) of the LFA payments. These countries include Ireland, Greece, France, Austria, Portugal, Sweden, Cyprus, Luxembourg, Bulgaria and Slovenia (Marie Štolbová et al. 2012: 35).
- Countries with a slight digression payment. Threshold (or ceiling) set to cut rates by size of eligible farm area is set relatively high (over 100 ha). An example is England, Wales, Poland, Hungary, Romania and Lithuania (Marie Štolbová et al. 2012: 35).
- Countries not apply rate cut at all. Among the countries are Czech Republic, for example, and also Slovakia, Finland, Scotland and Malta. Furthermore, Estonia provides only the minimum rate, i.e. 25 EUR and Latvia providing rate to range from 25 to 58 EUR. Slovenia, which belonged to this group in 2004-06, implemented in the next time period, a 50% reduction in rates from the area of 100 ha. Similarly, Lithuania has introduced since 2007, gradually lowering rates from land of 150 ha along the ceiling of 500 ha of agricultural land in LFA farm (Marie Štolbová et al. 2012: 35).

3.2.4 LFA/ ANC Scheme in Czech Republic

The Rural Development Program (RDP) for the Czech Republic was formally adopted by the European Commission on 26 May 2015, defining the Czech priorities for using almost € 3.1 billion of public money, available for the time period of 2014-2020 (€ 2.3 billion from the EU budget, including € 135 million transferred from CAP direct payments, and € 769 million of national co-funding) (Factsheet on 2014-2020 Rural Development Programme for the Czech Republic, n.d.).

The Czech Republic covers an area of 78 860 km², constituting 54 % is agricultural land and 34 % is forest land. Agricultural land comprises of 72 % arable land, 27 % permanent grassland and meadows and 1 % permanent crops. 50 % of agricultural land has production constraints and thus classified as areas with natural constraints (Factsheet on 2014-2020 Rural Development Programme for the Czech Republic, n.d.).

To prevent land abandonment and to preserve organic farming (either maintain or convert 400 000 ha to organic farming), RDP will target more than 1 million ha. This will promote sustainable farming in areas with natural handicaps. It will also bring benefits in terms of biodiversity, water and the fragile environment. Nearly 870000 ha of farmland will be focused to voluntary agro environmental and climate-related commitments by farmers, who will receive training and instruction so that they can better deliver environmental and climate-related benefits. Preventive and restorative actions will increase the resilience of forests in the face of natural disasters (Factsheet on 2014-2020 Rural Development Programme for the Czech Republic, n.d.).

In Czech Republic, mountain areas were in accordance with Art. 18 of Council Regulation (EC) No 1257/1999 determined based on altitude and slope. Level criteria were as follows:

- the average altitude of the municipality is greater than or equal to 600 m,

- or the average altitude of the municipality is greater than or equal to 500 m and less than 600 mA at the same time with a slope above 7 ° (12.3%) over an area greater than 50% of agricultural land in the village (Marie Štolbová et al. 2012: 24).

Other less favored areas under Art. 19 of Council Regulation (EC) 1257/1999 satisfy the criterion of unfavorable natural conditions, so-called demographic criteria. These areas were defined as complete territory with less than 80% of agricultural land, with a population density under 75 inhabitants per km^2 and farmers' share of the economically active population of over 8% (Marie Štolbová et al. 2012: 24).

Czech Republic LFA payments were:

- to ensure adequate income for farmers farming in difficult conditions;
- to contribute to the sustainable use of agricultural land and the protection of other natural resources (especially water resources);
- to contribute to the stabilization of the rural population;
- to maintain the attractiveness of landscape (landscape character);
- to promote environment friendly farming systems (Marie Štolbová et al. 2012: 25).

Planning for 2007-13, the Commission failed to timely propose appropriate criteria for defining "other" LFA. Czech Republic has not changed the existing methodology for defining LFA. In proposing measures of the Rural Development Program for 2007-2013, the definition of LFA has been updated and clarified. As part of the Rural Development Program for the period 2007-2013, LFA measure were set on the following objectives (Marie Štolbová et al. 2012: 26)

- Contribute to the agricultural use of the land in disadvantaged areas.
- Sustainable use of agricultural land.
- Improving the environment and landscape (Marie Štolbová et al. 2012: 26).

Czech Republic missed the opportunity to update the rate of LFA payments by the changed economic situation of agriculture after accession to the EU. It also has not been applied tariff

reduction for areas exceeding the specified threshold for the size of the land holding in the LFA. Until 2011 there have been only minor corrections in specific LFA. Eligible applicant for payment must meet the following conditions (Marie Štolbová et al. 2012: 26):

- farm of at least 1 ha of agricultural land to grassland in less favored areas;
- commit that it will pursue farming activity for at least five calendar years following the year for which it will be granted a payment first time;
- farm in accordance with good agricultural and environmental condition (GAEC);
- shall assure that grasslands are grazed or mowed at least twice a year (in acceptable cases once a year) within the deadline and mowed grass will be removed from the section;
- observe stocking density of herbivores in the specified date range from 0.2 LU / ha of grass (Marie Štolbová et al. 2012: 27)

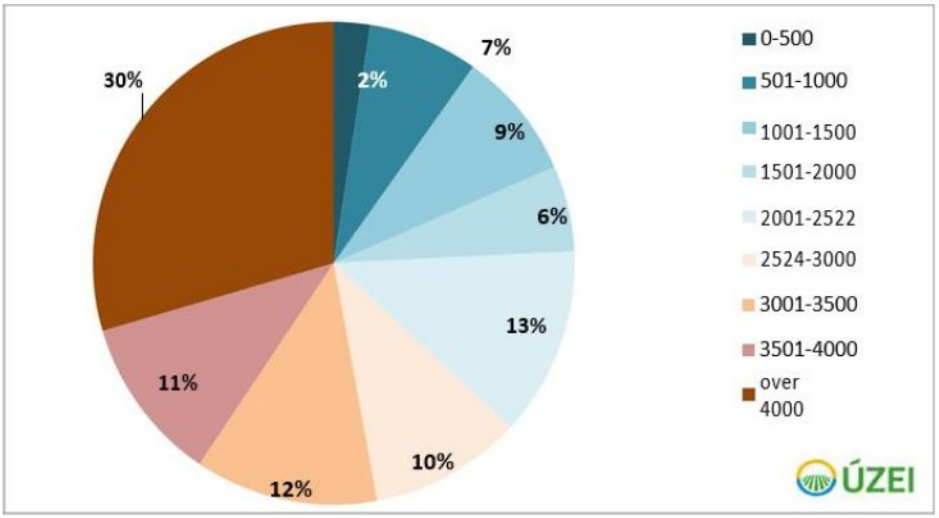

Figure 8: The structure of farms in mountain areas by volume of LFA payments (CZK per ha of agricultural farms)
Source: http://www.uzei.cz/data/usr_001_cz_soubory/studie107_.pdf

Czech Republic is among the countries where the vast majority of agricultural land covered by the LFA is managed by larger farms, as opposed to Slovenia, Greece, Poland and Austria. Authorized area for LFA payments in the Czech Republic make up only grassland. This leads to large imbalances in terms of the amount of aid granted to the LFA among the farms. At the

farms surveyed within the FADN, all of those utilized agricultural area belongs to mountainous area, was calculated the average amount of LFA payments 2,523 CZK per ha of cultivated areas (average for 2007-09). For each of these farms, support ranged from exceptional CZK 0 to CZK 4,300 LFA payments per ha of agricultural land (figure 8) (Marie Štolbová et al. 2012: 77).

At the farms, all of whose utilized agricultural area is located other than mountain LFA, the LFA payments per ha of agricultural land ranged from 0 CZK (without subsidies LFA farms farmed 19%) to CZK 3,220 per ha of agricultural land (figure 9). The average LFA payment per ha of agricultural achieved in 2007-09 in this group of farms was 860 CZK per ha of agricultural land (Marie Štolbová et al. 2012: 77).

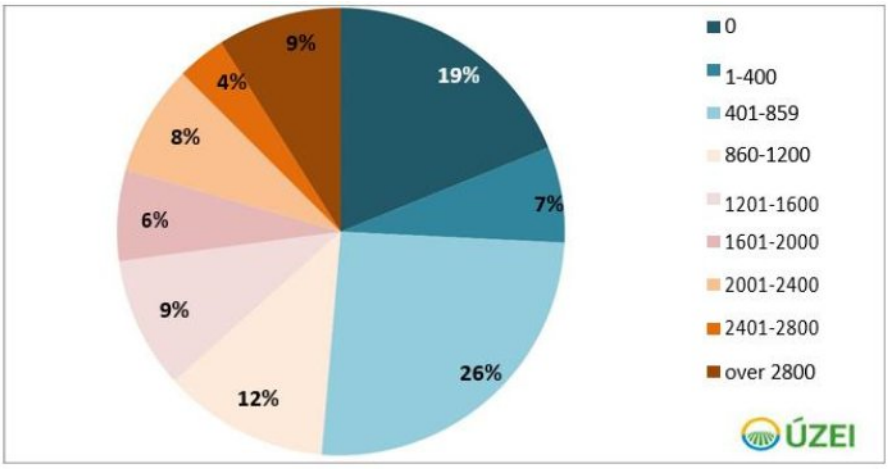

Figure 9: Structure of farms other than mountain LFA by LFA payment volume (CZK per ha of agricultural farms)
Source: http://www.uzei.cz/data/usr_001_cz_soubory/studie107_.pdf

Figure 8 and 9 shows that a certain proportion of the farms gain per ha of the LFA incomparably lower support compared to other farms, farming in the same area. On average for the farms, the amount of aid granted seems rational, but in some cases the differences in the support are so high that it may threaten the viability of some farms (Marie Štolbová et al. 2012: 78).

3.3 Economic Indicators of Farm Performance

3.3.1 Agricultural Income

Agricultural income is a significant indicator as it gives information on the feasibility of the agricultural sector. Agricultural income per Annual Working Unit (AWU) is determined by two key features: the income of total farming activities and the change in labor force. Agricultural income includes the total value of production, subsidies minus taxes, the costs of intermediate inputs and the depreciation of farm capital. The total labor force is measured as annual full time equivalents. The main intermediate costs are seeds (5% of intermediate costs in 2013), feed (38 %), energy and fertilizers (20 %) and other costs (37 %), such as plant protection products, maintenance of materials and buildings and agricultural services provided. The depreciation of fixed capital, such as equipment and buildings, follows the change in the quantity of modelled products produced and in inflation. Subsidies cover all coupled and decoupled payments, including state aid and production-related rural development support (e.g. for areas with natural constraints) but no investment subsidies (Prospects for EU agricultural markets and income 2014 2024, 2014: 47).

3.3.1.1 Inconsistency of Income in Previous Years

Over the past decade (2003-13) there was a reasonable increase in nominal income and a reduction of total labor employed in agriculture. That time agricultural income per AWU in the EU-28 was increased in both nominal and real terms. Over this period average real growth in agricultural income per AWU was 2% per year. However, the income pattern was relatively unstable, because of variations in agricultural commodity prices. With these fluctuations in price and economic recession, agricultural income decreased significantly by 8% in 2009, followed by a strong escalation in income of 23 % between 2009 and 2012. Thus, real agricultural income per worker in 2012 was 33% higher than in 2000. In 2013, income fell slightly again, by 2 %, from 2012’s record level (Prospects for EU agricultural markets and income 2014 2024, 2014: 47).

Agricultural income per worker decreased on average by 1.7% in 2014 in the European Union in comparison to the previous year, was about 33% higher than in the crisis year. Average income reduction is stronger in the EU-15 (-2.4%) than in the countries that joined the EU in or after 2004 (EU-N12: -0.4%). The income growth per worker in 2014 reflects a 4% decrease in factor income in the EU-28, which is similar in the EU-15 (-3.9%) and the EU-N12 (-4.3%), combined with an average reduction in labor input by 2.3% which is more pronounced in the EU-N13 (-3.4%, including Croatia) than in the EU- 15 (-1.3%) (EU agricultural income 2014 – first estimates, 2014: 1-2).

3.3.1.2 Factors Influencing the Trend in Income

- Farm income per worker has increased over the last decade because of the gains in labor productivity driven by structural adjustments, i.e. the reduction in the labor force employed in agriculture, the decrease in the number of farms and the increase in the average farm size (Income developments in EU farms, 2011: 6).
- Another crucial factor is the gradual change from market price support to direct payments, more directly transferred to income. After subtracting wages, rents and interests paid from farm income, the share of direct payments in this new value is called family farm income (Income developments in EU farms, 2011: 6).
- Costs of production have risen due to the increase in input prices, whereas on the long-term agricultural prices are decreasing in real terms (Income developments in EU farms, 2011: 6).
- With the recent economic crisis, the divergent development of input and output prices has been accelerated, squeezing significantly the farmers' margin and therefore income (Income developments in EU farms, 2011: 6).

3.3.1.3 Farm Income Measuring Tools

Farm net value added (FNVA) is equal to gross farm income minus depreciation costs. It is used to compensate the fixed factors of production (capital, labor, land), whether they are external or family factors. Thus, agricultural holdings can be compared regardless of whether

family or non-family factors of production used (EU Farm Economic Overview FADN 2013, 2016).

FNVA = output + Pillar I and Pillar II payments + any national subsidies + VAT balance — intermediate consumption — farm taxes (income taxes are not included) — depreciation.

The value is calculated per annual work unit (AWU) to consider the differences in the scale of farms and to obtain a better measurement of the productivity of the agricultural workforce (EU Farm Economic Overview FADN 2013, 2016: 9).

Farm net income (FNI) comprises the remuneration of family labor, own land and own capital. It is calculated by deducting the external factors of production from the FNVA and by adding the balance of subsidies and taxes on investments (EU Farm Economic Overview FADN 2013, 2016: 9).

FNI = FNVA — total external factors + balance of subsidies and taxes on investments

Remuneration of family labor in the agricultural sector, the bulk of the workforce consists of family members who do not receive a salary but have to be remunerated from farm income. As the FNVA is required to finance not only family labor but all fixed production factors, remuneration of family labor is another way of estimating income.

Remuneration of family labor = FNVA + balance of subsidies and taxes — total external production factors — opportunity costs of own land — opportunity costs of own capital.

Or starting from the previous indicator: farm net income — opportunity cost of own land — opportunity cost of own capital

The value is calculated per family work unit (FWU). Only farms that use unpaid labor (which in most cases means family members) are included in the calculation (EU Farm Economic Overview FADN 2013, 2016: 9).

Return On Assets (ROA) measures the effectiveness of a company's assets in generating income. It is defined as the ratio of net income over total assets, where the net income is defined as the sum of FNVA and investment subsidies minus rent paid, wage costs and the opportunity costs of own labor (EU Farm Economic Overview FADN 2013, 2016: 31).

ROA = (FNVA + Balance of investment subsidies and taxes - Wages paid - Paid rent - Capital costs - Opportunity costs of family labor) / Total assets

3.3.1.4 EU Farm Income Dependencies

Despite the significant reformation of the CAP structure over the past two decades, EU agriculture remains immensely reliant on public support. The importance of public transfers, including direct payments, to EU farmers are observed in several ways. One indicator is the importance of direct payments relative to the value of total output in the total revenue of farms. Public transfers play a role in supporting farm income - factor income or entrepreneurial income (Mathews, 2016).

Agricultural factor income includes income generated by farming which pays for (1) borrowed or rented factors of production such as - capital, labor and land, (2) own production factors. This notion of income showed the impact of changes in the level of public support for farmers to reimburse capital, pay rent and wages as well as to compensate its own production factors. This income indicator is important in comparison among member states, because the portion of own and external production factors frequently differs significantly among member states (Mathews, 2016).

EU producers extremely rely on public support. The EU average portion of direct payments in agricultural income in between 2010 to 2013 came to 28%. Nevertheless, this considerable

differences among member states, fluctuating from 15% or less in Cyprus, Lithuania, Malta, the Netherlands and Romania to more than 40% in Ireland, Luxembourg, Slovakia and Sweden. These differences reflect the specialization of member states in different sectors as well as differences in the historical basis of payments. Considering all subsidies, total public support from the EU budget in agricultural income reached 40% of average agricultural income in the EU (Mathews, 2016).

Farmers receive public support through different types of payments. There can be a difference between support and subsidy. Whereas support covers all transfers to farmers, the impression of a subsidy suggests that there is a benefit to farmers. The chart shows the evolution of segregating farm net income over time. Over the period 2004-2013, direct payments have contributed 47% of farm net income, other public transfers include 15%, and market income the remaining 38%. Direct payments have been the most stable component of farm net income (Mathews, 2016).

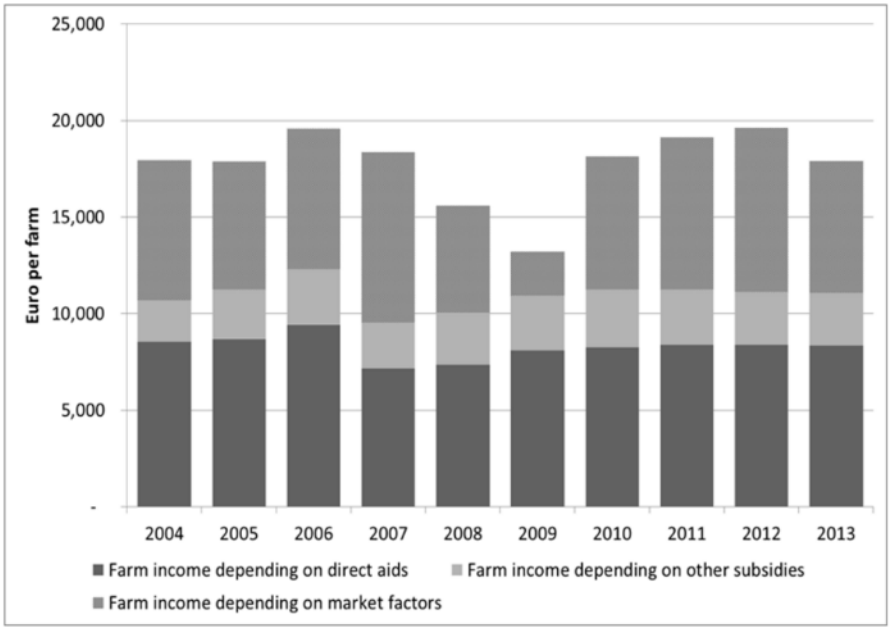

Figure 10: Subsidies from the majority and most consistent part of EU farm income
Source: http://capreform.eu/the-dependence-of-eu-farm-income-on-public-support/

3.3.2 Labor Productivity

Labor productivity is important in several ways. It drives economic growth – a highly productive economy means that it produces more goods or services with the same amount of resource or produces the same level of goods and services with less resources. Labor productivity affects everyone - for businesses, increased productivity brings higher profit and opportunity for more investment; for workers, increased productivity tends to higher wages and better working environments; for the government, increased productivity results in higher tax revenues.

3.3.2.1 Work Type

Farmers from small farms do not get a worthwhile income for his/her family. Many farm workers practice agriculture as a part-time activity and have other sources of income. Moreover, agriculture is considered as seasonal work, where vast number of workers may be employed for relatively short periods. In 2013, 42% of total farmers were full-time workers. Bigger farms tend to have higher share of full-time farmers – apart from farms such as, pig and poultry holdings, which are without any agricultural land at all, also had a large share of full-time farmers (EU farms and farmers in 2013: an update, 2015).

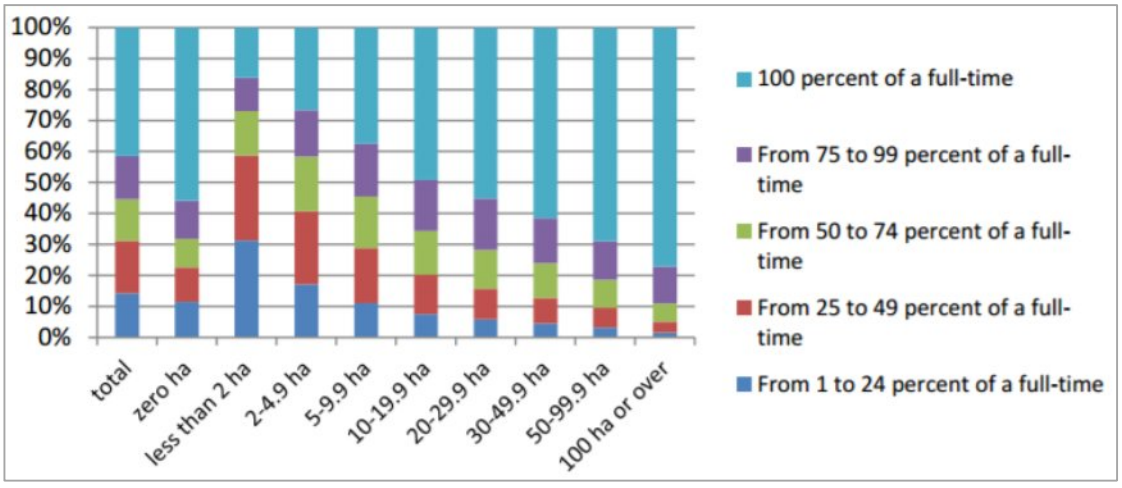

Figure 11: Farmers' working pattern EU-27, 2013
Source: http://ec.europa.eu/agriculture/rural-area-economics/briefs/pdf/009_en.pdf

In most Member States agriculture is still run by family farms, where family members provide labor input at different times of the year. Family members still deliver the majority of agricultural labor on EU farms (more than 75%), even though since 2005, the share of regular and non-regular labor input provided by non-family members has increased. In 2013, 97% of all farms were in the process of being family farms as opposed to legal entities and group holdings (EU farms and farmers in 2013: an update, 2015).

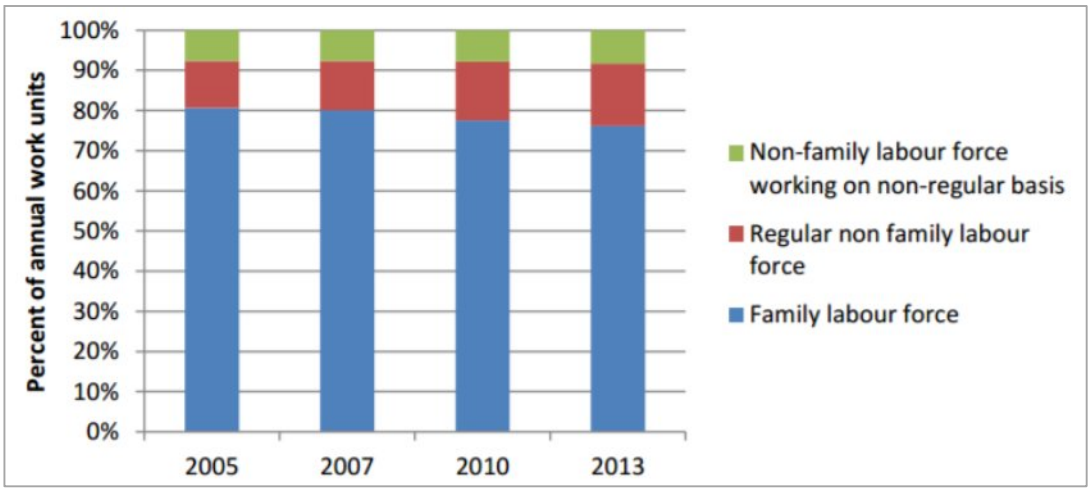

Figure 12: Composition of labor force EU-27
Source: http://ec.europa.eu/agriculture/rural-area-economics/briefs/pdf/009_en.pdf

3.3.2.2 Farmer's Age

In 2013, most EU farmers, the persons responsible for the daily activities and management of a farm, were older than 55 years and only 6% were younger than 35 years. Approximately one-third farmers are above the usual retirement age of 65. The proportion of young people in the agricultural segment (31.5%) is lower than in any other part of the economy (43% on average). The overall ratio of young (below 35 years) to elderly (over 55 years) farmers were 0.11 in 2013, indicating that for every young farmer, there were 9 senior farmers. However, there has been a huge decline in the number of elderly farmers between 2005 and 2013 (EU farms and farmers in 2013: an update, 2015).

3.3.2.3 Agricultural Training

Majority of EU farmers have gained their skills only through practical experience. This is mostly true for the oldest farmers, among which more than 80% never had any actual agricultural training. However, more disappointing is the fact that this also the case for over 60% of the youngest farmers, who need up-to date advanced knowledge if they want to stay and do better in business. While only 20% of total farmers have received basic training, an unsatisfactory percentage (9%) have achieved a full agricultural training sessions – this is more common among the group of younger farmers. There is a much room for improvement in training levels (EU farms and farmers in 2013: an update, 2015).

3.3.2.4 Remuneration of Farm Workers

The minimum wage legislation is relatively widespread across the EU countries. However, Finland, Germany, Italy and Sweden do not have minimum wage legislation throughout the wider economy. Some of these countries have industry level agreements regarding levels of minimum pay rather than national level minimum wages. For example, in the case of Italy, it was found that there are 15 regional agreements in addition to 8 industry-level agreements and 100 agreements at the province level (Loughrey, Donnellan, Hanrahan & Hennessy, 2013: 128)

The agriculture minimum wage is highest for workers in Ireland, France and the Netherlands. The minimum wage is lowest for employees in Macedonia, Croatia, Poland and Slovakia (figure 13). It is worth mentioning that in some countries, the minimum wage varies according to the level of job experience, age or education. In Belgium, the minimum wage for uneducated agricultural workers is €8.34 per hour but it is higher for educated employees, at €9.20 per hour. In Greece, the minimum wages vary according to experience (Loughrey, Donnellan, Hanrahan & Hennessy, 2013: 128)

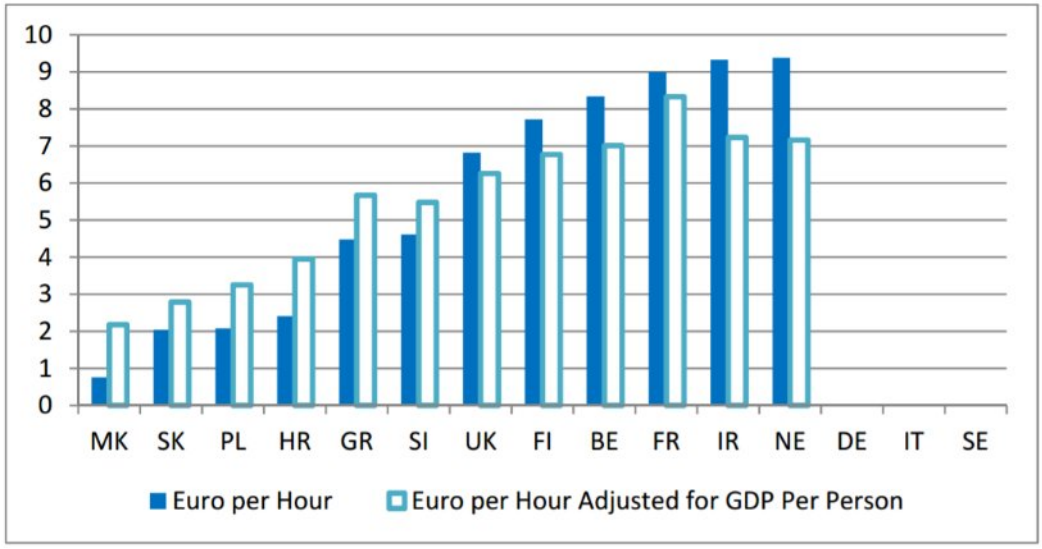

Figure 13: Minimum wage in the agriculture sector (adjusted and unadjusted for GDP)
Source: http://aei.pitt.edu/47677/1/Land_Labour_&_Capital_Markets_Final.pdf

3.3.3 Agricultural Farm

Farms are the basic organizational unit for agricultural production. Agriculture in the EU is experiencing a stable but non-dramatic process of structural modification. Farms are becoming bigger and more productive, with less dependence on labor, but there are still huge numbers of very small farms, mainly run in a part-time manner and often by elderly farmers. Around 75% of agricultural labor input is delivered by family members. While the number of aged farmers has decreased severely over the years, they still represent the majority of farmers in Europe. In fact, agriculture is the sector where it is common for people to continue working after the age of 65. Young farmers, best-trained group of EU-farmers, hold bigger farms; even though the overall training levels could be improved (EU farms and farmers in 2013: an update, 2015).

In 2013, a total of 10.8 million farms functioned in the EU- 28, down from 12 million farms in 2010. It is worth mentioning that the long-term declination of the number of agricultural enterprises thus sustained - the average annual rate of decline came to -3.7% between 2005 and 2013. An aggregation towards bigger, more competitive farms is carrying out across the EU, with average farm size increasing from 14.4 to 16.1 ha of utilized agricultural land

between 2010 and 2013. The average numbers of holding improved, representing a development towards bigger, more productive farms (EU farms and farmers in 2013: an update, 2015).

3.3.3.1 Farm Size

Despite this consolidation process, still most farms in the EU are very small. Over two-thirds of all enterprises have less than 5 ha of utilized agricultural land and more than half holdings have a Standard Output (standardized sales value over the course of one year) below 4000 euros or approximately 333 euros per month, without deducting the production costs. The total area used by these small farms can be measured to 6%, though more than half of the land belongs to farms which have over 100 hectares. The practices on big farms are much more considerable than those on smaller holdings. The fraction of the smallest farms is constantly declining - when a small farm stops farming, the land is then acquired by another farm, which is then included to the next bigger size class. The overall number of large farms in the EU is still inadequate, with considerable regional differences (EU farms and farmers in 2013: an update, 2015).

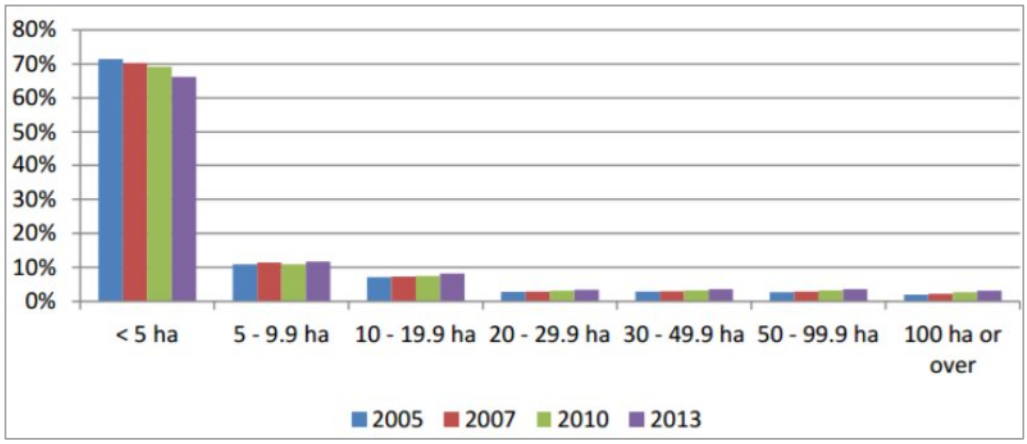

Figure 14: Farms by land size class EU-27
Source: http://ec.europa.eu/agriculture/rural-area-economics/briefs/pdf/009_en.pdf

Although average farm sizes have widened for farmers of all age groups, but the statistical evaluation implied that this has been most meaningful for the youngest farmers. Interesting

fact is that, young farmers now own the biggest farms, outdoing those elderly farmers. Their farms now appear to have a equivalent economic size as those of well-established farmers up to the age of 54 (EU farms and farmers in 2013: an update, 2015).

3.3.3.2 Land Price

There is a mutual relationship between land price and the value of agricultural products. It can be hard to differentiate correlation from connection between the two. However, because agriculture has a land-intensive production process, land values have a noticeable influence on its input expenses. Assuming productivity remains unchanged, rising land prices tend to indicate rising agriculture prices.

The determinants of agricultural land prices either refer to the net present value (NPV) method or the hedonic pricing approach. According to the NPV model, the maximum price a farmer would be keen to pay for a specific part of agricultural land at a particular time is equal to the summed and discounted anticipated future stream of earnings from this land. In contrast, the hedonic pricing approach is based in consumer theory, and starts from the assumption that the price of a good (in this case, agricultural land) can be explained by a set of characteristics (e.g. land quality) affecting it (Feichtinger & Salhofer, 2013: 15-16)

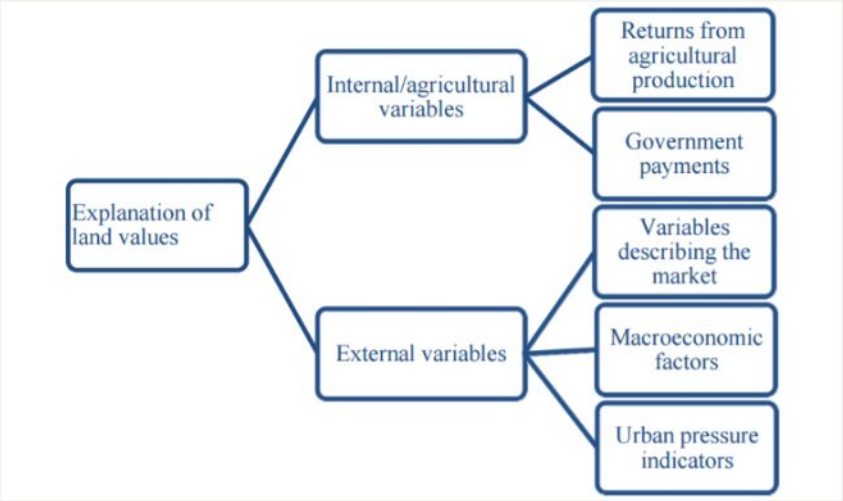

Figure 15: Land price measurement variables
Source: http://aei.pitt.edu/47677/1/Land_Labour_&_Capital_Markets_Final.pdf

Because of structural change in the agricultural sector, number of farms are steadily decreasing. Therefore, the remaining active farms are getting larger as they buy or rent the land formerly used by farms which have stopped farming. As land prices are often affected by aspects initiating outside the agricultural sector, the yearly rent farmers should pay for one hectare of land is typically considered the best representation for the cost of land. land scarcity is causing by rental value; rent level can be used as an indicator of the risk of land abandonment. For example, if land rents are high, it can be expected that farming is profitable and that there are plenty farmers eager to use the land. However low land rents indicate that there is slight potential for making economically profitable use of the land. Adverse variations in the economic environment are highly likely to end up in land abandonment (EU Farm Economic Overview FADN 2013, 2016: 53-55).

3.3.3.3 Financial Structure of Agricultural Holdings

Total asset Value Total assets are the property of the agricultural holding and comprise current and fixed assets. Current assets include non-breeding livestock, holdings of agricultural shares, stock of agricultural products and other circulating capital, and amounts receivable in the short term or cash balances in hand or in the bank. Fixed assets are agricultural land, permanent crops, forest capital, farm and other buildings, machinery and equipment, and breeding livestock (EU Farm Economic Overview FADN 2013, 2016: 38).

Total Liabilities

Farm net worth is classified as the difference between total assets and total liabilities at the end of the accounting year (EU Farm Economic Overview FADN 2013, 2016: 42).

Solvency is measured using the liabilities-to-assets ratio, which shows the percentage of an agricultural holding's assets that are financed through debt. This gives an indication of a farm's capability to meet its obligations in the long term (or its ability to repay liabilities if all assets are sold). The results should be interpreted with caution as a high liabilities-to-assets ratio is not essentially a sign of a financially vulnerable position. In fact, a high ratio could

also be an indication of a farm's economic viability (i.e. its ability to access outside financing), however there is definitely a threshold beyond which indebtedness will compromise a farm's financial health (EU Farm Economic Overview FADN 2013, 2016: 43).

Current and Fixed Assets Fixed assets include agricultural land, farm and other buildings, forest capital, machinery and equipment, and breeding livestock. Fixed assets account for the largest proportion of total assets (EU Farm Economic Overview FADN 2013, 2016: 45).

4 Data Analysis

Agriculture is a significant sector in Europe, has contributions in the national economy, one of the main sources of income for rural population and plays a vital part in social aspects. In terms of agricultural performance, the current stage of development of European agriculture varies between LFA and non-LFA areas among the countries, which leads to the necessity of analyzing the performance of farms based on the area types. In literature, there are different approaches to measure performance. Considering such different views, performance of agricultural farms has been observed in this paper from several perspectives, such as farm income, total production of crops and livestock, total input costs, subsidies, labor costs etc.

4.1 Methods: Data and Statistical Models

4.1.1 Data

Data was taken from the FADN (Farm Accountancy Data Network) for 2009-2013 to examine how agricultural performance varies from LFA to non-LFA areas among selected Member states (Austria, Czech Republic, Finland, France, Germany, Poland, Portugal, Slovakia, Slovenia, Sweden). FADN is a European system of conducting sample surveys every year and collect accountancy data from agricultural farms; to monitor the income and business activities of EU agricultural enterprises. The FADN database helps policy-makers and researchers to understand the behavior of farmers and the agricultural economy.

4.1.2 Variables used in the Analysis

Annex-I contains a list of all variables that are used in the analysis and are referred in the text.

4.1.3 Statistical Methods

The evaluation of farm economy and the impact of LFA policy changes on selected economic indicators were carried out by statistical analysis, such as Exploratory Data Analysis, Cluster Analysis. Significant differences were revealed between the counties and the area types (Less Favored Mountain Area, Less favored mountain area, Not less favored area). Exploratory Data Analysis was used to analyze the characteristics of the data, as it should be done before any data modeling. Because it is very important to understand the nature of the data without making any assumptions. Using bar chart, line graph with selected indicators, assumptions were made based on exploratory visualization.

Data was processed using cluster analysis, a multivariate method which enables to classify a sample of subjects on the basis of a set of measured variables into a number of different groups such that similar subjects are located in the same group. Cluster analysis does not possess mechanism for distinguishing between relevant and irrelevant variables. Therefore, the selection of variables included in a cluster analysis must be supported by conceptual considerations. This is very important in a way that the clusters formed can be very dependent on the variables included. This similar way applied to the classification of the chosen EU countries according to total output per hectare, total input cost per hectare, environmental subsidies per hectare, family farm income per hectare, farm net value added per AWU, LFA subsidies per hectare, wages paid per paid AWU.

K-means method was used in this study for clustering. It is a widely-used unsupervised learning method in cluster analysis. This method does not require any assumptions, only a data set and a pre-specified number of clusters, k, then apply this algorithm. The goal of this algorithm is to find groups in the data, with the number of groups represented by the variable K. The algorithm works iteratively to assign each data point to one of K groups based on the features that are provided. Data points are clustered based on similar features.

5 Results and Discussion

Attempt has been made in this section to examine the results; monitor the Czech agricultural farm performance of LFA and non-LFA areas with respect to selected indicators over the past five years. Performance calculations in less favored areas result from comparison with other productive areas which are not affected by any natural or other restrictions. Although exact measurement of agricultural performance is not possible, rather when specific parameters or criteria are selected, it is possible to say whether certain variables are stable, going up or going down.

Variation in Output per Hectare

Agricultural performance of a country or region is closely related with production of the crops and livestock. From time to time, significant efforts have been made to increase the productivity level in both LFA and non-LFA areas. The measurement of farm performance helps in knowing that which areas are performing less or higher in comparison with other areas.

Because of the area constraints, non LFA areas have higher amount of crop output per hectare than LFA areas. In LFA mountain areas, it's not unusual to see that Czech Republic (276 €/ha) was not in a good condition, similar countries are Austria (175 €/ha), Slovakia (227 €/ha). Portugal (764 €/ha) and Finland (750 €/ha) had better situation in comparison with other countries.

Though Czech Republic had almost double and triple crop output per hectare in LFA non-mountain area (527 €/ha) and non-LFA area (992 €/ha) respectively than in LFA mountain areas; still was not in a good position compared to other leading countries. Portugal (378 €/ha) had less while Austria (1,105 €/ha) had more crops output in non-mountain areas than in mountain areas. In non LFA area, Portugal (2,853 €/ha) did excel in crops output per hectare.

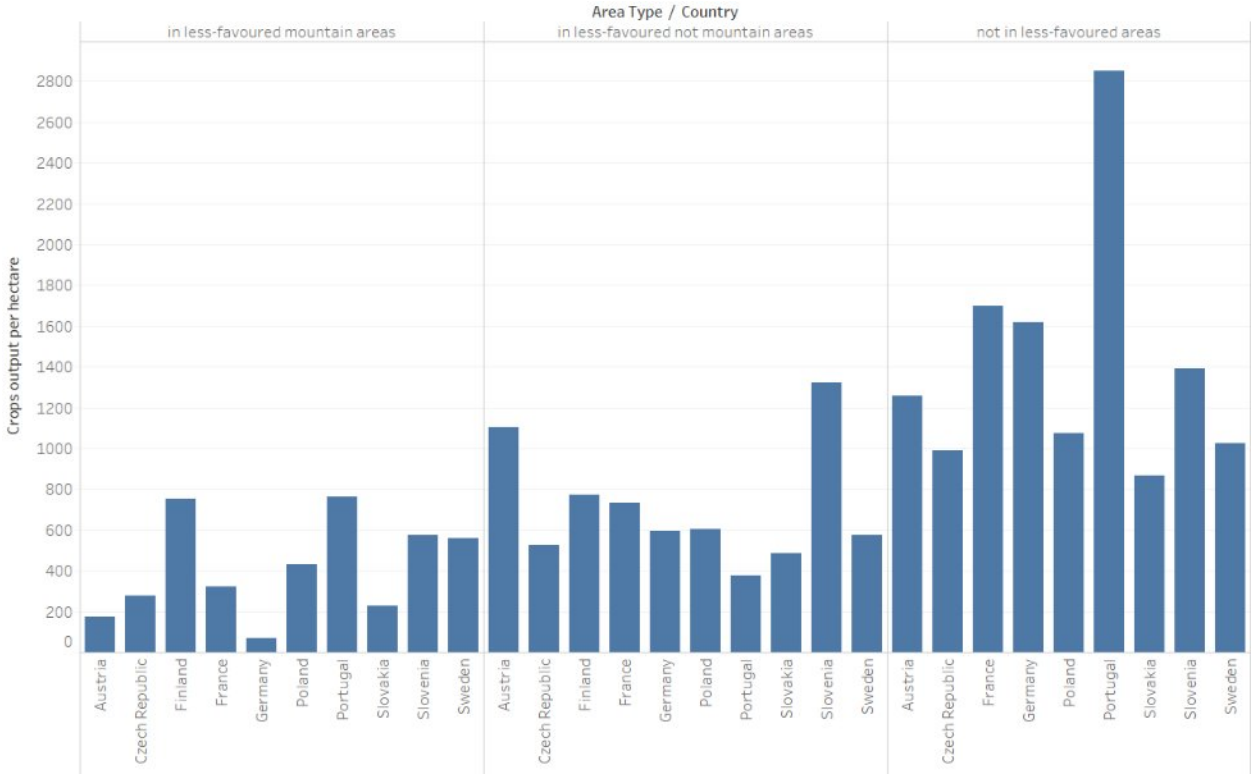

Figure 16: Differences in yearly average of total output crops and crop products per hectare among countries with respect to area types

Most of the countries had higher rate of livestock output than crops output over the period under consideration. In mountain areas, Finland (1,700 €/LU) and Germany (1,690 €/ LU) are in leading positions followed by Austria (1,346 €/ LU), Sweden (1,210 €/ LU). Whereas Czech Republic (824 €/ LU) was among countries with lower productivity performance; though did slightly better in non-mountain areas (1,036 €/ LU). Finland and Germany had far more livestock output in mountain areas than in not mountain areas.

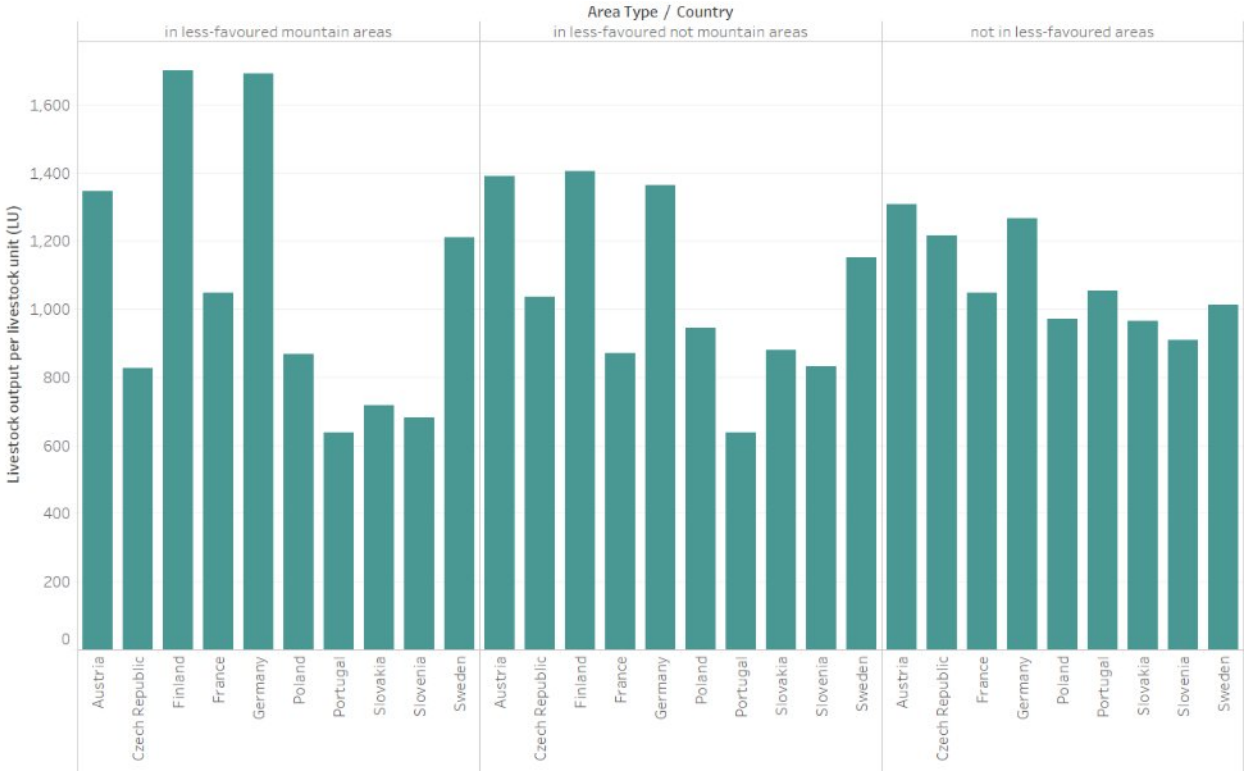

Figure 17: Differences in yearly average of total output livestock and livestock products per LU among countries with respect to area types

Differences in Labor Force

Labor force as performance indicator is important as a determinant of the income of the population engaged in agriculture. In general, labor productivity can be measured by the total agricultural output per unit of labor. It is a key determinant of living standards of the agricultural population. In most Member States, agriculture is still dominated by family farms, where family members provide labor input at different times of the year. Many farmers and farm workers pursue agriculture as a part-time activity and have other more or less important sources of income. Agriculture is characterized by seasonal labor peaks, where large numbers of workers may be hired for relatively short periods. Based on all these labor force is categorized as unpaid and paid labor and expressed as number of hours applied in agricultural activities.

Unpaid labor (sole holders and their family members) is still predominant in most countries. The highest shares of unpaid work hours are found in the Poland (3666.38 hr), then Austria (3296.79 hr), followed by Germany (3149.328 hr) in less favored mountain areas.

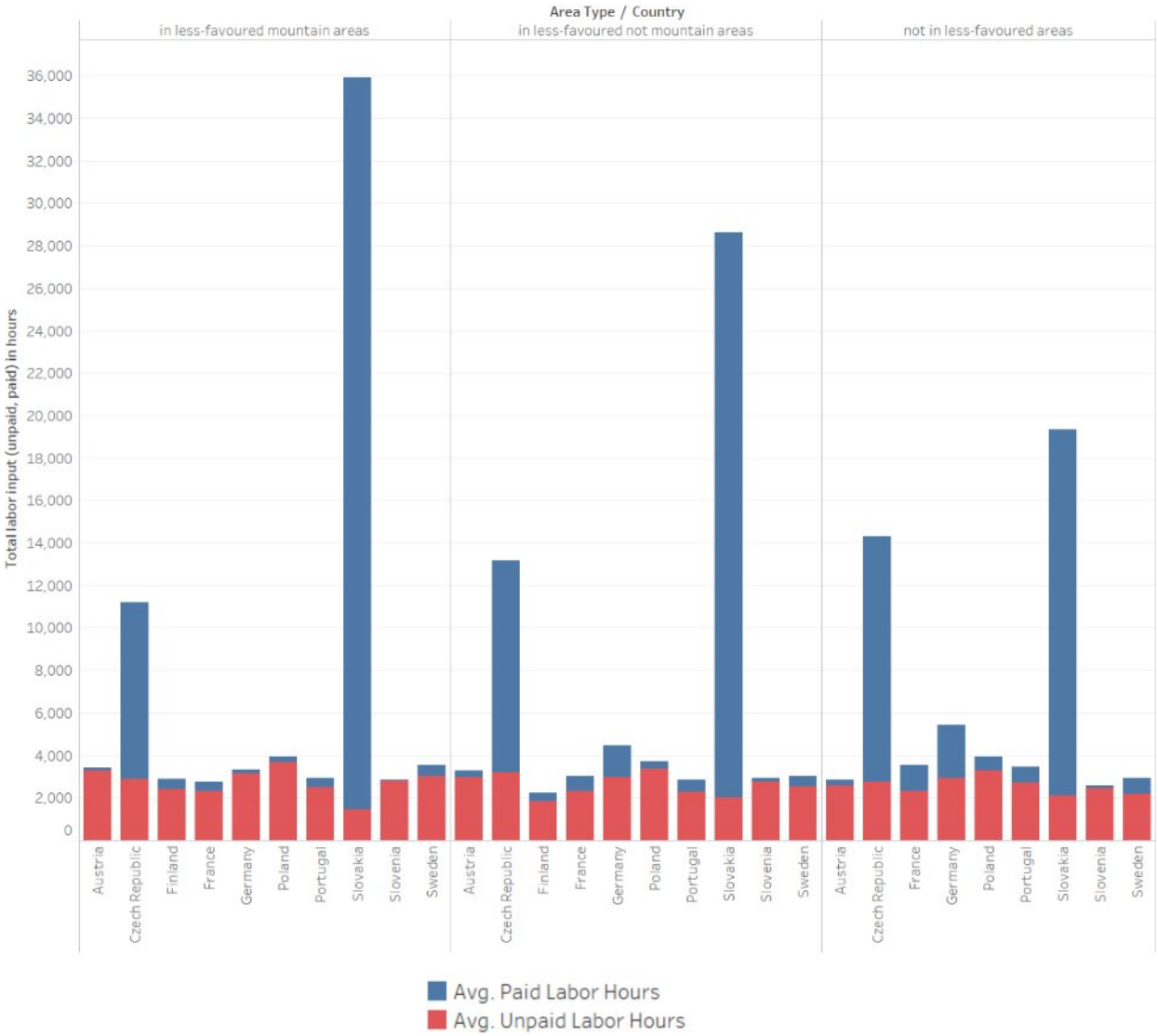

Figure 18: Differences in labor input (paid & unpaid) among countries with respect to area types over five years (2009 - 2013)

In less favored non-mountain areas, its slightly different by Czech Republic (3179.9 hr) with highest shares after Poland (3364.29 hr), followed by Austria (2981.93 hr) and Germany

(2962.29 hr). In non LFA areas its prevalent in Poland (3276.5 hr), Germany (2936.8 hr), Czech Republic (2737.7 hr). In all three areas Poland had the highest share of labor hours for unpaid labors.

Slovakia is the only country where paid labor predominates in all area types, followed by Czech Republic although share of paid labor is also important in Germany and France in non LFA and LFA not mountain areas. Slovenia has the least amount of paid labor input. In all area types, majority of the countries have small shares of paid labor input with exception of Czech Republic and Slovakia.

Distinction in Wages Paid per Paid AWU

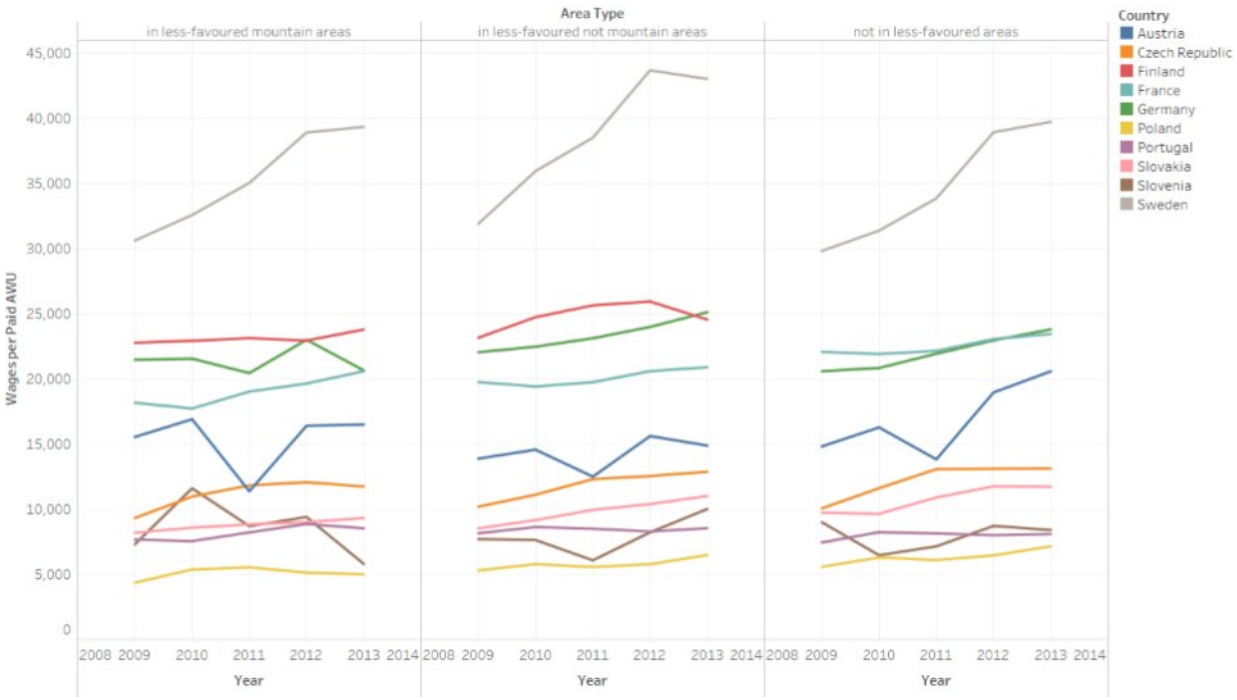

Figure 19: Variation of wages per paid AWU among countries over the years and in different area types.

Although in Czech Republic where large corporate farms play an important role, still has a bit lower wages per AWU. In LFA mountain areas, Czech Republic had wages increased from

2009 to 2011 (26.87%), then it was a bit stable till 2012 and followed by downward shift in 2013 (-2.7%). Sweden showed moderate increase in wages from 2009 to 2013 (28.48%). Germany had fluctuated wages with increase and decrease in alternate year from 2009 to 2013.

In LFA non-mountain areas, Czech Republic had slight increase in wages from 2009 to 2013 (26.3%). Whereas Sweden showed sharp increase in wages from 2009 to 2013 (34.82%) with a slight decline from 2012 to 2013. Austria had fluctuated wages with increase and decrease in alternate year from 2009 to 2013. In case of non LFA areas, countries showed modest growth till 2013 with an exception of Slovenia.

Total Input Cost per hectare

Total input cost has fluctuated over time and differs among area types. However, overall estimates of input cost for all the three areas do not show any drastic changes for the countries Czech Republic, Poland and Slovakia. Portugal and France had more input cost in non LFA areas than in LFA areas, whereas Austria had less input cost in non LFA areas than in non-mountain areas and Finland had greater input cost in mountain areas than in non-mountain areas.

In mountain areas, Finland indicated sharp upward shift from 2010 to 2012 by (26%), then a little increase till 2013. Sweden showed remarkable increase since 2009 till 2013 (64.82%), whereas Czech Republic specified increase input cost per hectare from 2009 to 2012 (32.74%) then slight decrease till 2013 (-5.6%).

In non-mountain areas, Germany showed gradual upward shift in each year from 2009 to 2013, Sweden had sharp increase till 2012 (52.17%) then downward shift till 2013 (-4.6%). Whereas, Czech Republic had stable increase in each year from 2009 to 2013 (31.78%). Portugal had sharp increase of input cost from 2009 to 2010 (40.34%), then declined cost in every year towards 2013 (-14.17%) in non LFA areas.

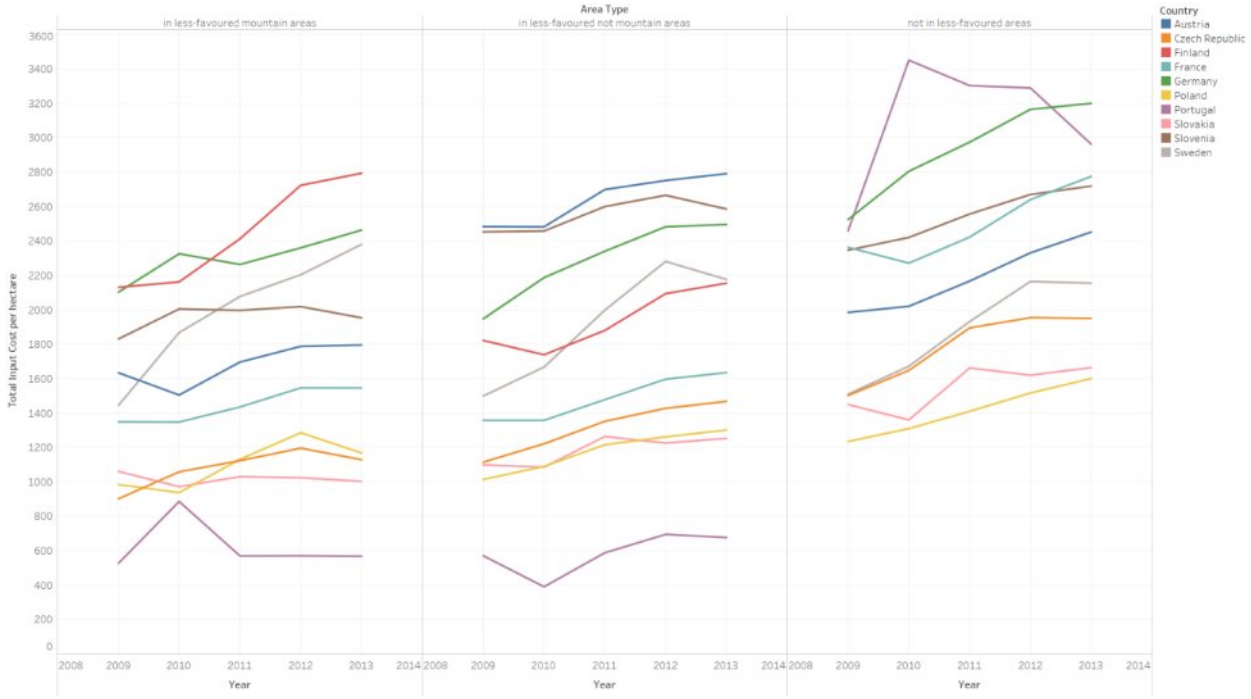

Figure 20: Variation of total input cost per hectare among countries over the years and in different area types.

LFA Subsidies per AWU

Payment of subsidies in mountain areas or in other areas facing natural or other specific constraints (ANCs) aim at compensating farmers in total or partially. Such compensation shall allow farmers to continue agricultural activities in order to prevent land abandonment and maintaining the countryside and sustainable farming systems in the areas concerned. In connection to that, mountain areas had highest shares of LFA subsidies, while it was obvious that non LFA areas had seen lowest share of subsidies.

Most of the countries had greater LFA subsidies per AWU in mountain areas than in non-mountain areas with an exception of Finland and Poland where they had higher LFA subsidies in non-mountain areas compared to mountain areas. In LFA mountain areas, Sweden had remarkable improvements from 2009 to 2012 (28.24%), then slight decline in 2013 (-2.6%),

whereas Czech Republic showed moderate increase and decrease in alternate years from 2009 to 2013. Slovakia indicated downward shift from 2010 to 2013 (-17.89%). Among other countries like Germany, France, Slovenia, Portugal and Austria showed steady scenario in LFA subsidies with no dramatic increase and decrease in each year in both mountain and non-mountain areas.

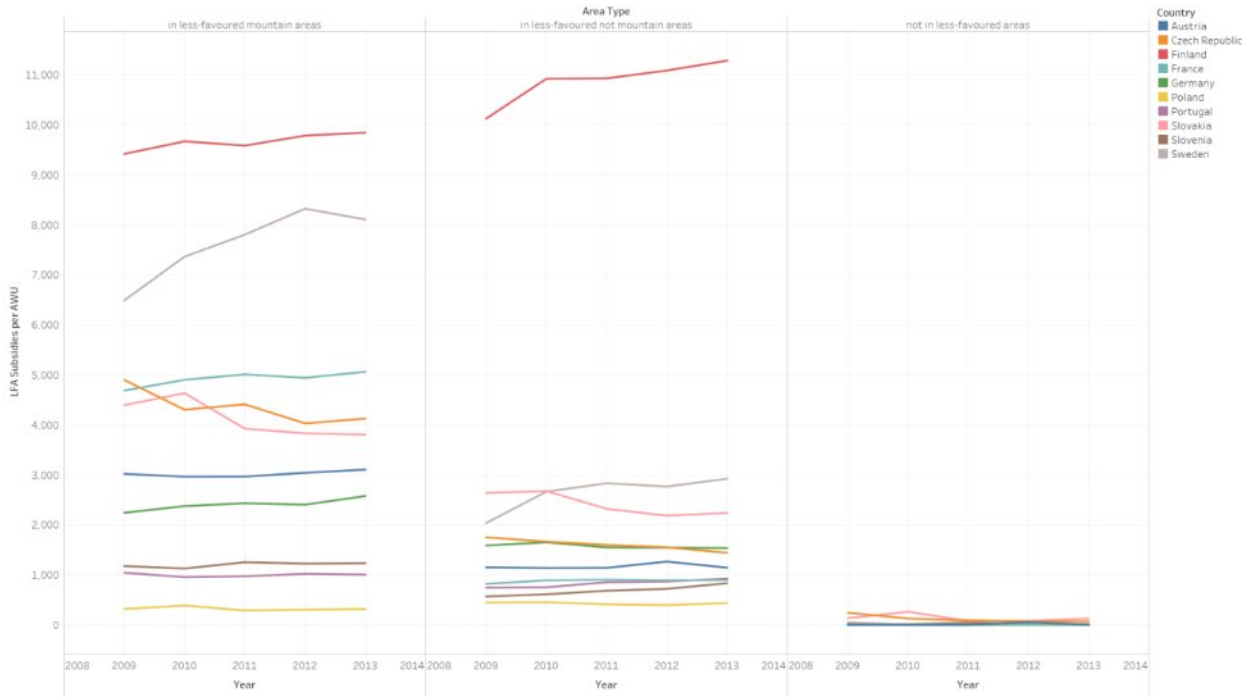

Figure 21: Variation of LFA subsidies per AWU among countries over the years and in different area types.

LFA Subsidies per hectare

In mountain area, LFA subsidies per hectare was highest in Finland (260.1 €/ha), which is more than double of Czech Republic (110.7 €/ha); and almost four times than Poland (54.9 €/ha) which is the lowest amount among the selected countries. It is obvious from the payment of LFA per hectare that payments are higher in mountain areas than in non-mountain areas.

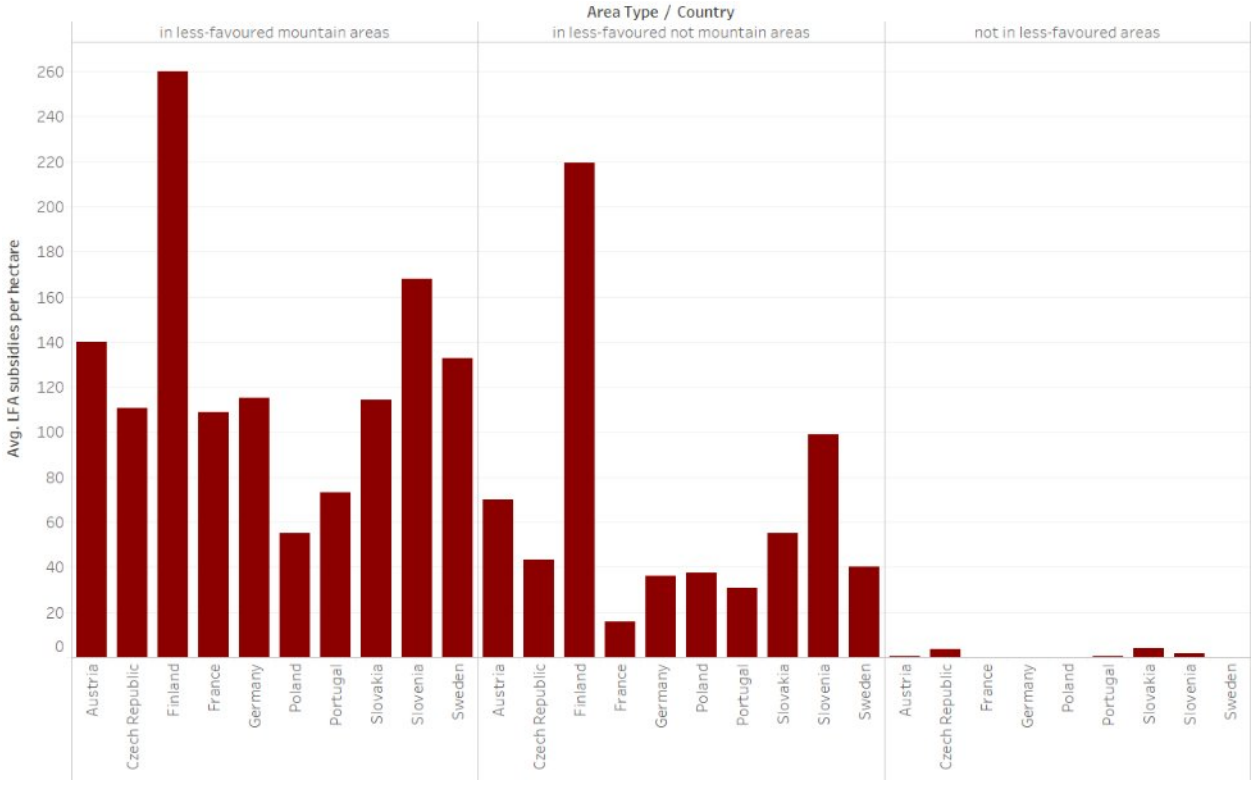

Figure 22: Variation of yearly average LFA subsidies per hectare among countries over the years and in different area types.

Labor Productivity (Total output per AWU)

Labor productivity is important indicator in economy, meaning that it produces more goods or services with the same amount of resource or produces the same level of goods and services with less resources. There are interesting patterns when we examine the breakdown of total output per AWU into the three categories of area types over years 2009 to 2013. Labor productivity varied significantly across the EU in LFA and non LFA areas, whereas more or less every country had higher productivity per AWU in non LFA areas than LFA areas.

In mountain areas, it was highest in Sweden; such as in 2009 at (59681.21 €/AWU). This is more than two times higher than in Czech Republic (23,626.84 €/AWU) and almost nine times

higher than Poland (6726.94 €/AWU), the country with the lowest value. Sweden, France and Finland also had high values with gradual increase in each year.

The figure for non-mountain areas suggest that this has been most meaningful for Sweden with a massive upward trend towards 2013 (64.84%). Germany and France had registered the 2nd and 3rd highest productivity per AWU, however France had notable increase towards 2011 (33.27%), then moderate growth till 2012 (4.18%) and followed by reduction in 2013 (-8.44%). Czech Republic had remarkable upward trend till 2013 (49.84%).

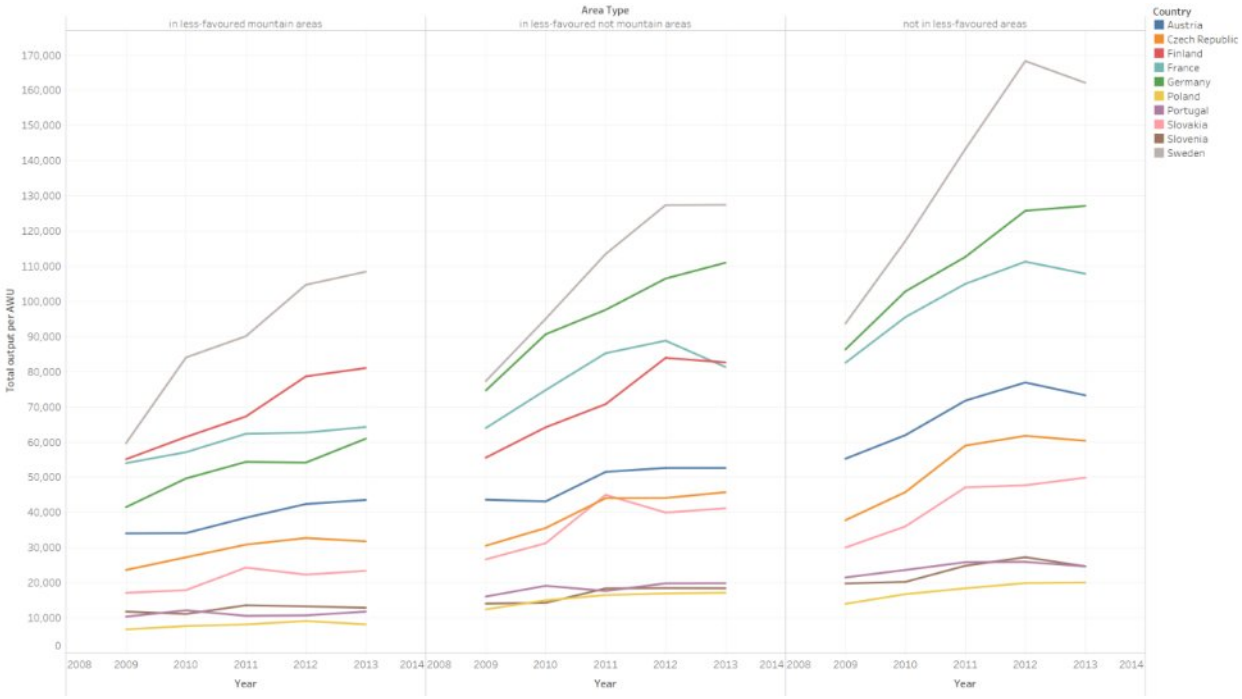

Figure 23: Variation of labor productivity (total output per AWU) among countries over the years and in different area types.

In the figure for non LFA areas, Sweden, Germany and France had the leading positions respectively, with Sweden sharp increase till 2012 (79.63%) followed by decline in 2013 (-3.67%), Germany upward trend in each year and France with the same pattern as LFA non-mountain areas. Czech Republic also showed sharp growth till 2012 (63.49%) followed by decline in 2013 (-2.28%).

Performance similarities in the context of selected EU member state

With the help of Cluster analysis, selected EU countries were divided into three groups based on indicators total output per hectare, total input cost per hectare, environmental subsidies per hectare, family farm income per hectare, farm net value added per AWU, LFA subsidies per hectare, wages paid per paid AWU for mountain and not mountain areas for the year of 2013. In this way countries which have performance similarities with Czech Republic can be pointed out.

In LFA mountain areas the groups are as follows –

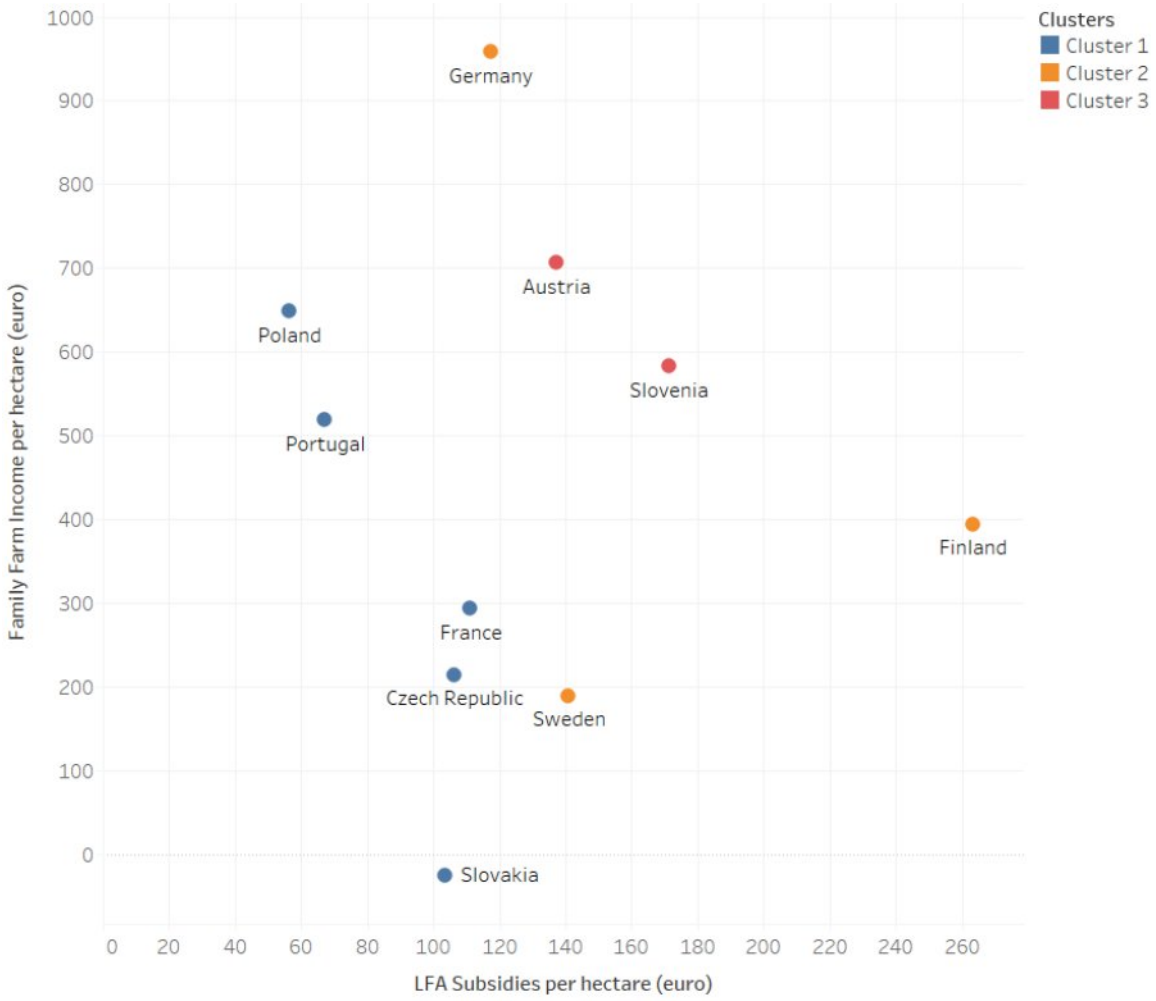

Figure 24: Clustered countries in LFA mountain area

Group 1 – (Poland, Portugal, France, Czech Republic and Slovakia) with average output per hectare 1021.4 €/ha, average input cost per hectare 1082.6 €/ha, average environmental subsidies per hectare 62.68 €/ha, average family farm income per hectare 329.92 €/ha, average farm net value added per AWU 12200 €/AWU, average LFA subsidies per hectare 88.87 €/ha, average wages paid per paid AWU 11036 €/AWU.

Group 2 – (Germany, Finland, Sweden) with average output per hectare 2274.8 €/ha, average input cost per hectare 2545.9 €/ha, average environmental subsidies per hectare 187.04 €/ha, average family farm income per hectare 514.06 €/ha, average farm net value added per AWU 25536 €/AWU, average LFA subsidies per hectare 173.82 €/ha, average wages paid per paid AWU 27919 €/AWU.

Group 3- (Austria and Slovenia) with average output per hectare 1856.9 €/ha, average input cost per hectare 1874.7 €/ha, average environmental subsidies per hectare 161.75 €/ha, average family farm income per hectare 645.19 €/ha, average farm net value added per AWU 10871 €/AWU, average LFA subsidies per hectare 154.28 €/ha, average wages paid per paid AWU 11144 €/AWU.

For LFA not mountain areas the groups are as follows –

Group 1 – (Poland, Portugal, France, Czech Republic and Slovakia) with average output per hectare 1191.5 €/ha, average input cost per hectare 1266.8 €/ha, average environmental subsidies per hectare 29.278 €/ha, average family farm income per hectare 247.27 €/ha, average farm net value added per AWU 14255 €/AWU, average LFA subsidies per hectare 36.466 €/ha, average wages paid per paid AWU 11962 €/AWU.

Group 2 – (Germany, Finland, Sweden) with average output per hectare 2011.4 €/ha, average input cost per hectare 2275.9 €/ha, average environmental subsidies per hectare 127.35 €/ha, average family farm income per hectare 272.86 €/ha, average farm net value added per AWU

29987 €/AWU, average LFA subsidies per hectare 99.756 €/ha, average wages paid per paid AWU 30887 €/AWU.

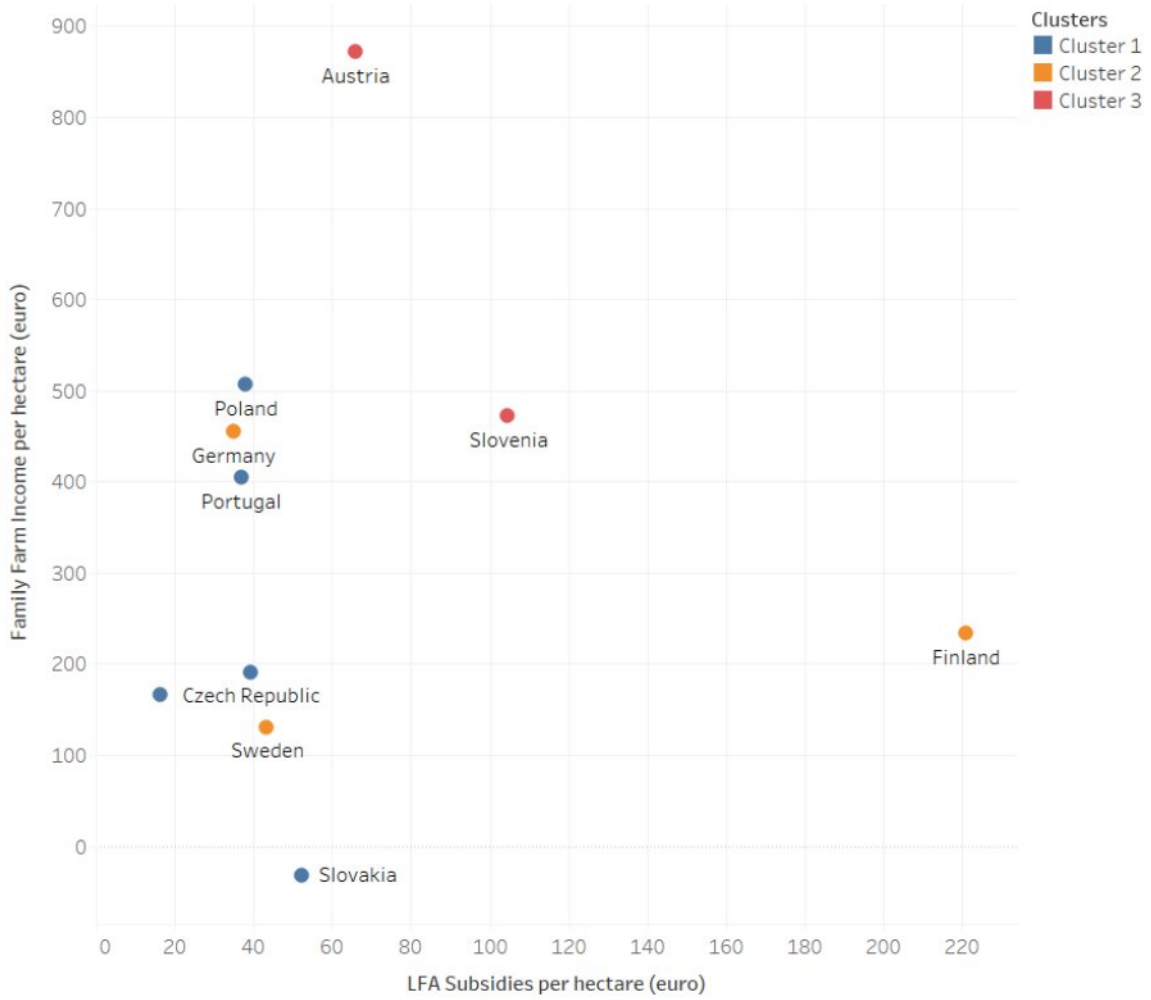

Figure 25: Clustered countries in not mountain area

Group 3- (Austria and Slovenia) with average output per hectare 2672.2 €/ha, average input cost per hectare 2688.7 €/ha, average environmental subsidies per hectare 174.75 €/ha, average family farm income per hectare 671.79 €/ha, average farm net value added per AWU 11470 €/AWU, average LFA subsidies per hectare 85.21 €/ha, average wages paid per paid AWU 12448 €/AWU.

Share of LFA payments and Environmental payments in the Family Farm Income

When LFA scheme was first introduced back in 1975, the payment system was completely different. It was more related to subsidies and production support. Now it has changed, focus have been shifted from production to environmental side of agriculture. LFA policy is serving some specific objectives, partially environmental objectives, defined under rural development program. LFA payments contribute to the income and this portion of income should allow farmers to maintain farming in difficult circumstances and take part in land management and countryside. This is a compensation to the farmers who are working in difficult circumstances than a normal farmer who is operation in a region which is not handicapped.

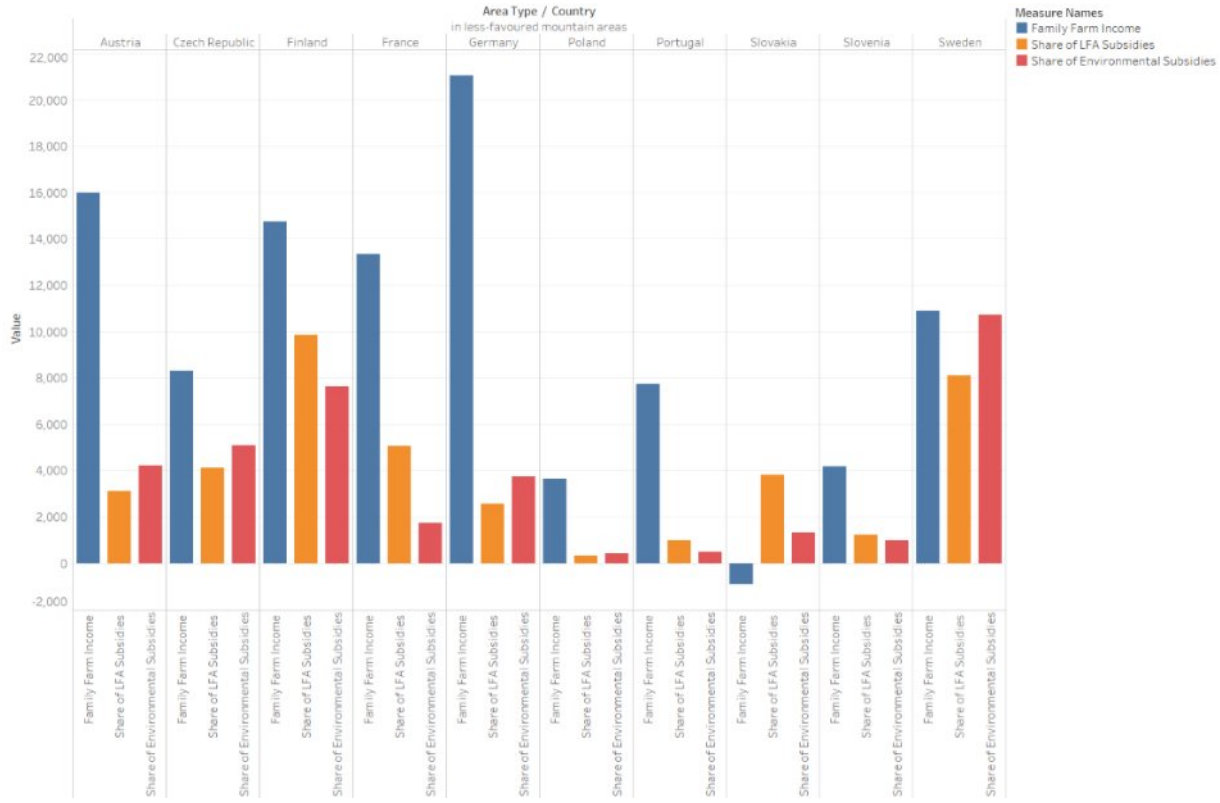

Figure 26: Share of LFA subsidies per AWU and Environmental subsidies per AWU in Family Farm Income per AWU in less favored mountain area

Environmental payments are supposed to compensate farmers because they offer environmental services which is way beyond what farmers normally expect to do. This is remuneration to the farmer who fulfills agriculture land management with undertaking extra activity to produce well-defined environmental benefits to the society. This payment places clear obligation to the farmers to go beyond normal farming activities and payment covers the cost and income losses these farmers suffer because of the activities to ensure proper biodiversity and landscaped in these difficult regions.

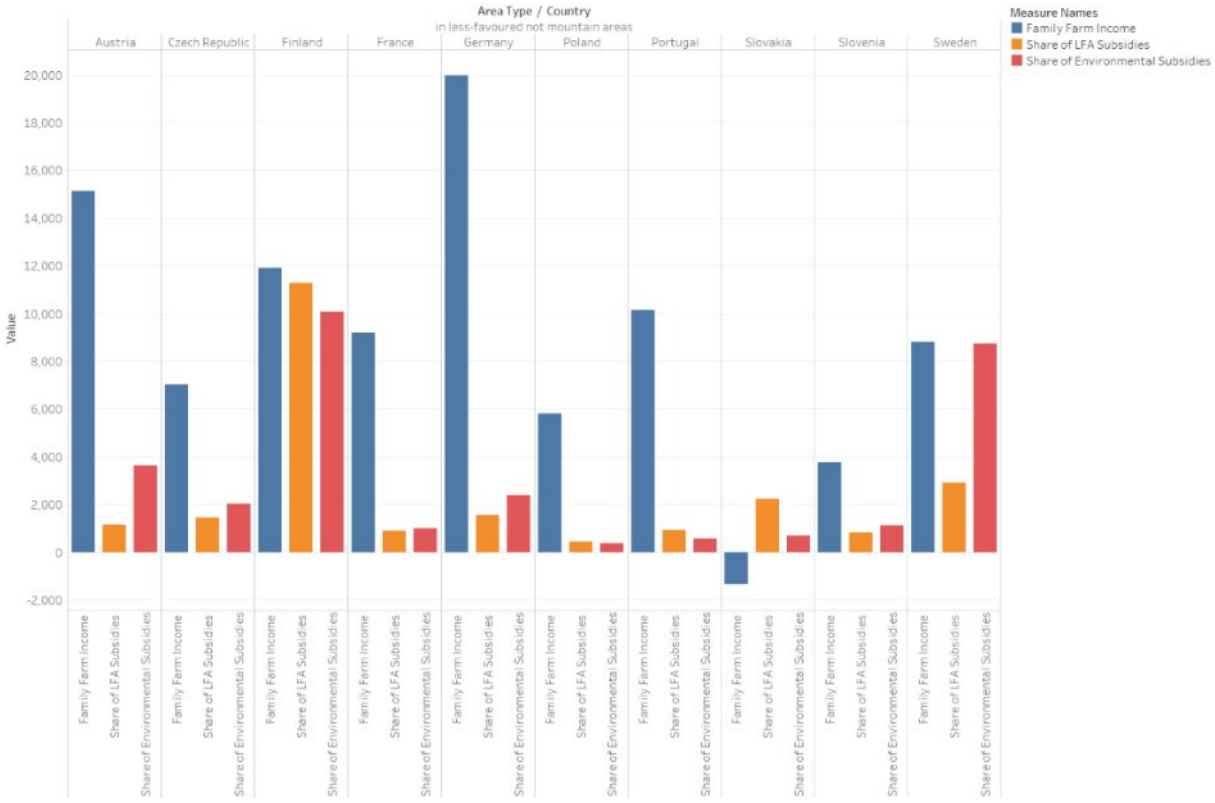

Figure 27: Share of LFA subsidies per AWU and Environmental subsidies per AWU in Family Farm Income per AWU in less favored not mountain area

6 Conclusion

Agriculture in less favored areas in Europe is constrained every year by challenges, such as – soil, slope areas, climatic conditions etc. In LFA areas, farming has a double challenge: to produce food regardless of natural handicap whilst simultaneously protecting nature and safeguarding biodiversity. LFA scheme has been in effect since 1975 and supporting agricultural farming and providing mechanism of maintaining areas with natural handicaps – first of all mountain areas, then intermediate/ other less favored areas, after that areas with specific handicaps. The real objective of LFA policy is to deliver environmental benefits. This policy helps in continuing farming in difficult and specific types of areas where agricultural activity is important for not to threat environmental objectives like water, water management, biodiversity and other things.

The less favored areas in Czech Republic, its constraints for agricultural activities and optimization of productivity represent a steadily current topic both on a theoretical as well as on a practical level. The objective of this article was to realize Czech farm performance based on selected determinants and quantify the effect of LFA policy on the performance. The analysis and calculations were performed with the application of R and Tableau statistical software.

How many hours people work in agriculture farm in less favored areas in EU? Are family workers still predominant in European farms? What is the share of crops, livestock in total output production in different LFAs? How much did the wages, total costs, subsidies change in previous years? And what is the overall picture of farm performance in LFAs at country level? How LFA policy is supporting farming in fragile and difficult areas? This paper has tried to find answers to all these questions using statistical analysis with the most recent data available in FADN databases.

Income, production, subsidies, labor cost, input cost were selected as the main determinants of the performance of agricultural enterprises. The effect of these determinants was quantified by

way of descriptive analysis, cluster analysis, whereby special attention paid to the subsidies. In case of crops output per hectare in mountain areas Portugal (764 €/ha) and Finland (750 €/ha) had better situation in comparison with other countries. Though Czech Republic had almost double and triple crop output per hectare in LFA non-mountain area (527 €/ha) and non-LFA area (992 €/ha) respectively than in LFA mountain areas (276 €/ha); still was not in a good position compared to other leading countries. Total input cost has fluctuated over time and differs among area types. In mountain areas, Czech Republic specified increase input cost per hectare from 2009 to 2012 (32.74%) then slight decrease till 2013 (-5.6%). Czech Republic had stable increase in each year from 2009 to 2013 (31.78%) in not mountain areas.

labor productivity, measured by the total agricultural output per unit of labor, in mountain area, it was highest in Sweden; such as in 2009 at (59681.21 €/AWU). This is more than two times higher than in Czech Republic (23,626.84 €/AWU) and almost nine times higher than Poland (6726.94 €/AWU), the country with the lowest value. Highest shares of unpaid work hours are found in the Poland (3666.38 hr) in mountain areas. Slovakia is the only country where paid labor predominates in all area types, followed by Czech Republic. Although in Czech Republic where large corporate farms play an important role, still has a bit lower wages per AWU. In LFA mountain areas, Czech Republic had wages increased from 2009 to 2011 (26.87%), then it was a bit stable till 2012 and followed by downward shift in 2013 (-2.7%). In LFA non-mountain areas, Czech Republic had slight increase in wages from 2009 to 2013 (26.3%).

Most of the countries had greater LFA subsidies per AWU in mountain areas than in non-mountain areas with an exception of Finland and Poland where they had higher LFA subsidies in non-mountain areas compared to mountain areas. In LFA mountain areas, Sweden had remarkable improvements from 2009 to 2012 (28.24%), then slight decline in 2013 (-2.6%), whereas Czech Republic showed moderate increase and decrease in alternate years from 2009 to 2013. LFA payments and environmental subsidies contribute to the family farm income and this portion of income should allow farmers to maintain farming in environmentally sensitive circumstances and take part in land management and countryside.

Clustering procedure defined the groups of high and low performing countries – high performing countries are Germany, Finland and Sweden for both mountain and not mountain areas. Relation of subsidies to less favored areas are obvious. Czech Republic showed the dependence of farm economic performance on subsidies, and not only for less-favored areas, but even for the farms operating outside the LFA. The impact of LFA policy for each LFA type proved the positive effect of LFA subsidies, environmental subsidies to compensate the difference of income achieved by farms in the LFA and outside the LFA.

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Annex - I

Code	Variable Name	Unit	Description
SE010	Total labor input	AWU (Annual Work Unit)	Total labor input expressed in AWU (annual work unit = full-time person equivalent)
SE011	Labor input	Hours	Total labor input expressed in hours.
SE015	Unpaid labor input	FWU (Family Work Unit)	Total unpaid labor input. Refers generally to family labor and is expressed in FWU = Family work unit = Family AWU.
SE016	Unpaid Labor input	Hours	Total unpaid labor input in hours.
SE020	Paid labor input	AWU	Total paid labor input in AWU. Remuneration in cash or in kind.
SE021	Paid Labor input	Hours	Total paid labor input in hours
SE025	Total Utilized Agricultural Area	Hectare	Total utilized agricultural area of holding. Does not include areas used for mushrooms, land rented for less than one year on an occasional basis, woodland and other farm areas (roads, ponds, non-farmed areas, etc.)
SE131	Total output	Euro	Total of output of crops and crop products, livestock and livestock products and of other output. Sales and use of (crop and livestock) products and livestock + change in stocks of products (crop and livestock) + change in valuation of livestock - purchases of livestock + various non-exceptional products. SE135 + SE206 + SE256
SE135	Total output crops & crop production	Euro	Total of output of crops and crop products = sales + farm use + farmhouse consumption + (closing valuation - opening valuation).
SE206	Total output livestock & livestock products	Euro	= Livestock production + change in livestock value + animal products. Livestock production = Sales + Household consumption - Purchases It is calculated for equines, cattle, sheep, goats, pigs, poultry and other animals. Change in livestock

			valuation = value at closing valuation - value at opening valuation. For animals, which are present on the holding for more than one year, the value corresponding to the increase in volume is estimated. Animal products = Sales + Household consumption + Farm use + (Closing valuation - Opening valuation). The products are: milk and milk products from cows, ewes, goats, wool, hens' eggs, other animal products (stud fees, manure, other eggs, etc.) and receipts from animals reared under a service contract (animals not owned by farmer) and honey.
SE270	Total Inputs	Euro	= Specific costs + Overheads + Depreciation + External factors. Costs linked to the agricultural activity of the holder and related to the output of the accounting year. Included are amounts relating to inputs produced on the holding (farm use) = seeds and seedlings and feed for grazing stock and granivores, but not manure. When calculating FADN standard results, farm taxes and other dues are not included in the total for costs but are taken into account in the balance Subsidies and taxes (subsidies - taxes) on current and non-current operations. The personal taxes of the holder are not to be recorded in the FADN accounts. SE281 + SE336 + SE360 + SE365
SE360	Depreciation	Euro	Entry in the accounts of depreciation of capital assets over the accounting year. It is determined on the basis of the replacement value. Concerns plantations of permanent crops, farm buildings and fixed equipment, land improvements, machinery and equipment and forest plantations. There is no depreciation of land and circulating capital.
SE370	Wages paid	Euro	Wages and social security charges (and insurance) of wage earners. Amounts received by workers considered as unpaid workers (wages lower than a normal wage) are excluded.

SE605	Total subsidies - excluding on investments	Euro	Subsidies on current operations linked to production (not investments). Payments for cessation of farming activities are therefore not included. Entry in the accounts is generally on the basis of entitlement and not receipt of payment, with a view to obtain coherent results (production/costs/subsidies) for a given accounting year. SE610 + SE615 + SE624 + SE625 + SE626 + SE630+SE650 + SE699
SE621	Environmental subsidies	Euro	Environmental subsidies. Including part of the measures of the article 69 of Regulation 1782/2003.
SE622	LFA subsidies	Euro	LFA subsidies.
SE624	Total support for rural development	Euro	Total support for rural development
SE415	Farm Net Value Added	Euro	Remuneration to the fixed factors of production (work, land and capital), whether they be external or family factors. As a result, holdings can be compared irrespective of their family/non-family nature of the factors of production employed. This indicator is sensitive, however, to the production methods employed: the ratio (intermediate consumption + depreciation)/fixed factors may vary and therefore influence the FNVA level. For example, in the livestock sector, if production is mostly without the use of land (purchased feed) or extensive (purchase and renting of forage land). SE410 - SE360
SE420	Farm Net Income	Euro	FNI: Remuneration to fixed factors of production of the farm (work, land and capital) and remuneration to the entrepreneurs' risks (loss/profit) in the accounting year. SE415 - SE365 + SE405