"Agricultural budget" and the competitiveness of the Polish agriculture

INSTITUTE OF AGRICULTURAL
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Budget grounds for improvement of the competitiveness of the Polish agriculture
in the task: *National and the EU "rural budget" versus finance and functioning of the Polish agriculture and the national economy*

The aim of the publication is to assess the impact of public support on the functioning of the Polish agriculture. In order to achieve this aim the publication includes an analysis of the system of direct payments and rural development policy instruments planned to be implemented in Poland within the CAP 2014-2020. The study also presents an analysis of regional diversity of the Polish agriculture and an assessment of the scale of agricultural investment made in recent years in all the Polish FADN regions depending on the farms' production type.

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Introduction

This publication presents the results of research carried out within the task "National and the EU "agricultural budget" versus finance and functioning of the Polish agriculture and the national economy" that is part of the multi-annual programme 2011-2014 conducted by the IAFE-NRI[1]. For the year 2014 within the execution of this task a focus on the topic "Agricultural budget and the competitiveness of Polish agriculture – lessons for science and policy recommendations" was planned, which is why this elaboration is dedicated to this issue.

This report is a collection of analyses focused on different aspects of the research problem and it consists of five chapters. The first one shows the shape of the instruments of the CAP, which will be implemented in Poland in the programming period 2014-2020. New developments in the field of CAP direct payments include the introduction of new entitlements to the payments. The Rural Development Programme 2014-2020 also introduces a number of new instruments and specific arrangements that were not used in previous programming periods. Due to these changes and novelties there is a need of extensive discussion in order to publicize the current rules and the scope of support for agriculture and rural areas. Therefore the first chapter presents a brief description of all instruments included in the Polish RDP 2014-2020.

The second chapter deals with the assessment of the impact of the Common Agricultural Policy on regional diversity of the Polish agriculture. This chapter is an attempt to use grade data analysis (GDA). Application of this method enabled the determination of diversity of agricultural development in each of the Polish regions.

The third chapter is an update of an analysis conducted in 2013 for the previous study written within this research task. This is an assessment of the im-

[1] The other reports written within this research task are:

- A. Czyżewski, A. Matuszczak, B. Wieliczko (2011), *Ocena projekcji budżetowych UE dotyczących kolejnego okresu programowania w kontekście Wspólnej Polityki Rolnej [Assessment of the EU budgetary projections for the next programming period in the context of the Common Agricultural Policy],* Multi-annual programme 2011-2014, no. 11, IAFE-NRI, Warsaw.
- B. Wieliczko (ed.) (2012), *Key conditions of supporting agriculture in the EU in the period 2014-2020*, Multi-annual programme 2011-2014, no. 62.1, IAFE-NRI, Warsaw.
- B. Wieliczko (ed.) (2013), *Assessment of the impact of the EU "agricultural budget" for the period 2014-2020 on the financial condition of the national agriculture and the entire economy*, Multi-annual programme 2011-2014, no. 81.1, IAFE-NRI, Warsaw.

pact of the EU agricultural budget for 2014-2020 on the financial condition of the national agriculture and the entire Polish economy. In the previous year, this analysis was conducted on the basis of the RDP 2007-2013 and different scenarios of the allocation of funds within RDP 2014-2020. In the analysis conducted this year allocations for the RDP 2014-2020 measures presented in its draft were used.

The fourth chapter includes a short review of research on the scale and direction of investment in agriculture. This chapter should be seen as an introduction to the fifth chapter of this report.

The fifth and final chapter includes a presentation and an analysis of the scale and structure of investment in the Polish farms in 2007-2012. The analysis was prepared on the basis of Polish FADN data and includes the study by regions and types of production according to the FADN farm production types.

1. CAP in Poland in the period 2014-2020

In fact, the 2014-2020 period should be referred to as the period 2015-2020, as due to the delay in the process of establishing the principles for the functioning of the CAP in the following years relevant regulations of the EU Council and Parliament were adopted no earlier than in December 2013[2]. Therefore, in 2014, all Member States had to carry out an intensive work on developing their own arrangements and negotiating them with the European Commission.

1.1. Direct payments in Poland in the period 2015-2020

In July 2014 the Ministry of Agriculture and Rural Development notified a draft proposal of a system of direct payments to be implemented in Poland in 2015[3]. In accordance with an earlier decision of the government 25% of the Pillar II funds envisaged for Poland in the period 2014-2020 was shifted to direct payments, which means that more than 23 million, or approx. 3/4 of the total amount of the CAP funds budgeted for Poland for 2014-2020, will be allocated for direct payments. The proposed system also provides for a full utilization of 15% of the national envelope on payments coupled with production. Approximately 2/3 of this amount will be allocated for animal production covered by this support and approx. 1/3 for crop production.

The following types of direct payments will be applied in Poland in the period 2015-2020:

- Single area payment,
- Payment for greening[4],
- Payment for young farmers – rate: approx. 62 EUR/ha,
- Additional payment – rate: approx. 41 EUR/ha for each hectare of the farm's UAA between 3.01 and 30.00,

[2] In 2014 following regulations stipulating detailed rules on the CAP in the programming period 2014-2020 were adopted. A list of all these regulations can be found in the annex.

[3] The EU regulations on which the proposed system of direct payments is based are enlisted in the annex.

[4] Payment for greening is the name of the payment for agricultural practices beneficial for the climate and the environment used in the information materials prepared by the Polish Ministry of Agriculture and Rural Development and the Agency for Restructuring and Modernisation of Agriculture (ARMA).

- Payment coupled with production – payment for cattle, cows, sheep, goats, soft fruit, high-protein crops, hops, sugar beet, potato starch, tomato, flax and hemp,
- Transitional national support for tobacco (decoupled from production).

Single area payment

This is a basic element of the new system of direct payments. The expected rate is approx. 110 EUR/ha[5]. This payment can be obtained for each eligible hectare of UAA. It should be noted that this also applies to the agricultural land, which on 30th June 2003, that is when the area covered by the EU payments was determined prior to the Polish accession to the EU, was not maintained in good agricultural condition. For these payments will also be eligible those areas which were covered by the payments in 2008 and which were later not eligible for them due to the fact that they were protected under the Directive on the conservation of natural habitats and of wild fauna and flora, the Water Framework Directive or the Directive on the conservation of wild birds or due to their afforestation with the support of the RDP 2007-2013 (afforestation since the autumn of 2008) or the RDP 2014-2020 (with the exception of afforestation of non-agricultural land).

So far, the minimum area for which the payment can be granted is 1 ha of UAA that is made up of plots that are not smaller than 0.1 ha. However, this restriction does not apply to farmers who will receive payments for animal production. A minimum amount that may be paid to an individual beneficiary will be introduced amounting to the equivalent of EUR 200.

For beneficiaries receiving a total support exceeding EUR 150,000 a reduction of the support will be applied. The reduction rate will be 100% of the amount exceeding EUR 150,000.

Payment for greening

As a rule, all the farmers eligible to receive SAPS payments will also receive payment for greening and its rate will be approx. 74 EUR/ha. The need to meet the requirements associated with this type of payment is dependent on the

[5] In the case of single area payment and other types of payments the given rates of payment are the estimated rates based on the projections of the number of beneficiaries and area covered by their applications. These rates were presented in the document: Ministerstwo Rolnictwa i Rozwoju Wsi (2014), *Projekt systemu płatności bezpośrednich w Polsce w latach 2015-2020 [Draft of the system of direct payments in Poland in the period 2015-2020*]. These rates are slightly different than the ones presented at the ARMA's website.

size of the arable land, possession of permanent grassland, conducting organic farming and participation in the payment system for small farms. This means that farmers with farms smaller than 10 hectares of arable land or conducting organic farms will not have to make any changes to adjust their holdings to the requirements of greening[6].

However, in other cases it will be necessary to meet the relevant requirements, which include:

- crop diversification,
- maintenance of permanent grassland,
- maintenance of ecological focus areas (EFA).

Crop diversification applies to farms with an area of 10 hectares of arable land. Both the amount and structure of the area of each crop depends on the size of their arable land:

- 10-30 hectares of arable land – at least two different crops[7] and the main crop cannot occupy more than 75% of the land;
- more than 30 hectares of arable land – a minimum of three crops, the main crop cannot occupy more than 75% of the land and two main crops combined cannot occupy more than 95% of the arable land.

Implementing the package "Sustainable agriculture" within the RDP 2014-2020 measure agri-environment-climate is also regarded as meeting the diversification implementation requirement.

Two groups of farms are exempted from the obligation to implement crop diversification:

1. farms, of which more than 75% of the arable land is covered by grass or other herbaceous forage or is a set-aside or a combination of both of these categories, and the remaining area of arable land does not exceed 30 hectares;
2. farms, of which more than 50% of the arable land declared in a given year was not declared by the beneficiary in the previous year and on all arable land in a given year there are cultivated other crops than in the previous calendar year.

It is forecasted that approx. 83% of farms occupying more than 34% of arable land in Poland will be exempted from the obligation to diversify crops[8].

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[6] This applies also to farms that will access the system of direct payments for small farms but due to the level of support within this system it is not to be expected that farms larger than app. 5 ha of UAA are to join it.

[7] Set-aside land is also treated as a kind of crop.

[8] http://www.arimr.gov.pl/pomoc-unijna/platnosci-bezposrednie/platnosc-za-zazielenienie-w-roku-2015/platnosc-za-zazielenienie-dywersyfikacja-upraw.html.

The requirements concerning permanent grassland include a ban on their changing into other types of land and a ban on ploughing if they are located on valuable natural areas and Natura 2000 areas and a requirement to re-transform the area into permanent pasture if it had been changed into other type of land or ploughed.

This reconverting will be required when the so called reference ratio of permanent grassland declines by more than 5% in relation to its level in 2015. This ratio is calculated at a national level as the ratio of the area of permanent grassland declared by the farmers in 2012 and in a given year (which was not declared as such in 2012) to the total agricultural area declared by the farmers under the greening practices in a given year.

The obligation to have ecological focus areas covering at least 5% of the arable land within a farm applies to farms with over 15 hectares of arable land. Exempt from this requirement are farmers with farms where more than 75% of the arable land is grassland, other herbaceous forage, set-aside land, land used for cultivation of legumes, or a combination of these categories, and the remaining area of arable land does not exceed 30 hectares.

The following landscape elements are considered as ecological focus:

- set-aside land,
- elements of the landscape,
- buffer zones,
- strips of land eligible for direct payments along the borders of forests,
- short rotation coppice,
- afforested areas,
- intercrops and green cover,
- nitrogen-fixing crops.

When calculating the ecological focus areas, special conversion factors and weighting are to be used, e.g. a separately standing tree – a conversion factor of 20, the weight: 1.5, which gives the ecological focus area of 30 m^2. In addition, farmers can jointly create ecological focus areas if their farms are located in close proximity (80% of land of all farms participating must be located within a radius of 15 km). Simultaneously up to 10 farmers can create EFA together but only adjacent areas can be accounted for a joint EFA. Moreover, at least 2.5% of the ecological focus areas must be located within the farm participating in a joint creation of the EFA. In addition, farmers participating in such an arrangement must enter into a written agreement defining the penalties for non-compliance in the common EFA and the financial details of the agreement.

Payment for young farmers

This additional payment is designed for young farmers[9] within the first five years of the date of taking up agricultural activities as a head of a farm, and its rate will be approx. 62 EUR/ha. The maximum area of arable land for which this support will be paid is 50 ha UAA.

Additional payment

This payment[10] is aimed at redistributing part of direct payment national envelope to a benefit of medium-sized farms. Eligible to receive it will be the areas eligible for SAPS payments from 3.01 to 30.00 ha of a given farm. This means that a farm with at least 30 ha entitled to receive SAPS payments will receive redistribution payment in the amount of 27 x the rate of this payment, which is estimated at 41 EUR/ha.

Payments coupled with production

In the case of certain sectors of particular importance to environment or society, there will be also payments coupled with production. Approximately EUR 500,000,000, that is 15% of the national envelope, will be allocated to this form of support and it will be received by farmers specialising in: cattle, cows, goats, sugar beet, soft fruit, hops, protein crops, potato starch, tomato, flax and hemp.

Payment for cattle

All farmers whose cattle is registered in the register of marked farm animals that is kept by the ARMA are eligible for this support. However, it applies only to these animals, which at the time of the request for payment are less than 24 months old, and will remain in the possession of the applicant for payment until 30 June of the year for which the payment will be given. In the case of animals younger than 6 months old, the obligation to keep them lasts at least until they reach the age of 24 months. Payment shall be granted for a maximum of 30 animals, and the minimum number of animals in respect of which it can be claimed is three. The expected amount of the support is 70 EUR/animal.

[9] Farmers applying for this payment in the first year when they apply must be not older than 40 years old.

[10] In the regulation no. 1307/2013 this payment is called “redistributive” but in the Polish direct payment system it is referred to as “additional”.

Payment for cows

This payment applies to farmers whose cows are registered in the register of marked farm animals that is kept by the ARMA. The cows at the time of the application for payment must be more than 24 months old and must remain in the possession of the applicant for payment until 30 June of the year for which the payment is to be paid. Payment is to be granted for a maximum of 30 animals, and the minimum number of animals is three. The expected amount of support is 70 EUR/animal.

Payment for sheep

This payment applies to any ewe which is registered in the register of marked farm animals kept by the ARMA. Animals at the time of the farmer's application for payment should be older than 12 months and must remain in the possession of the applicant for payment until 30 June of the year for which the support will be paid. The payment will be granted to applicants with at least ten ewes. The expected amount of support is 25 EUR/animal.

Payment for goats

This payment is eligible to every farmer who owns at least five female goats and each of the animals is listed in the register of marked farm animals kept by the ARMA. The animals at the time of application for payment must be more than 12 months old and must remain in the possession of the applicant for payment to 30 June of the year for which the support will be paid. The expected amount of support is 15 EUR/animal.

Payment for sugar beet cultivation

This payment may be granted to a farmer in respect of the sugar beet cultivation on the land entitled to receive SAPS, but only for the crop that is covered by a delivery contract. The planned payment rate is 400 EUR/ha.

Payment for soft fruit cultivation

The payment applies to the cultivation of strawberries and raspberries grown on the land eligible for SAPS. In relation to this payment it is not required to have a cultivation contract. The expected rate of payment is 250 EUR/ha.

Payment for protein crops

The payment will cover protein crops cultivated as the main crop and grown on the land eligible for the SAPS. However, the maximum acreage covered by this payment is 75 ha UAA. The expected rate of payment is 326 EUR/ha.

Payment for hops cultivation

For this payment eligible are farmers growing hops on the land covered by SAPS in selected counties belonging to the region of Dolnośląskie, Lubelskie and Wielkopolskie[11]. The expected rate of payment is 480 EUR/ha.

Payment for potato starch cultivation

This payment may be granted to a farmer in respect of potato starch cultivated on the land entitled to receive SAPS, if the yield is covered by crop cultivation contract. The planned payment rate is 400 EUR/ha.

Payment for tomato cultivation

This payment applies to tomatoes grown on the land eligible for the SAPS and covered by a cultivation contract. The expected rate of payment is 400 EUR/ha.

Payment for flax cultivation

This payment may be granted to a farmer for flax grown on the land eligible to receive SAPS. A cultivation contract in respect of the area of this crop is not required. The expected rate of payment is 200 EUR/ha.

Payment for hemp cultivation

This payment applies to hemp grown on the land eligible for the SAPS. At the same time, however, it is required to use hemp varieties containing up to 0.2% tetrahydrocannabinol (THC) in the dry matter of plants. An applicant for this support must also be a holder of a license to engage in such cultivation, but the possession of a cultivation contract is not required. The expected rate of payment is 200 EUR/ha.

[11] These regions are not equal to Polish NUTS2 regions but are units specially created for the purpose of this payment.

Due to the fact that the amount of the national envelope assigned to Poland is different in each year, the rates will vary insignificantly (Tab. 1.1). The highest level of rates for all types of payments is projected for the year 2019, and the lowest in the last year of the programming period, i.e. 2020.

Table 1.1. Proposed direct payment rates in Poland in the years 2015-2020 (EUR/ha or in EUR/animal, respectively)

Type of direct payments	2015	2016	2017	2018	2019	2020
Single area payment	107.0	107.5	108.0	108.6	109.3	96.9
Payment for greening	71.8	72.2	72.5	72.9	73.3	65.1
Payment for young farmers	59.8	60.1	60.4	60.8	61.1	54.2
Additional payment	40.4	40.6	40.8	41.0	41.3	36.6
Payment for cattle	69.0	69.3	69.7	70.1	70.5	62.5
Payment for cows	69.2	69.5	69.9	70.2	70.6	62.7
Payment for sheep	25.0	25.1	25.2	25.4	25.5	22.7
Payment for goats	15.0	15.1	15.1	15.2	15.3	13.6
Payment for protein crops	239.6	240.8	242.0	243.3	244.7	217.1
Payment for hops	480.0	482.4	484.7	487.5	490.2	435.0
Payment for potato starch	400.0	402.0	403.9	406.2	408.5	362.5
Payment for sugar beet	400.0	402.0	403.9	406.2	408.5	362.5
Payment for tomato	400.0	402.0	403.9	406.2	408.5	362.5
Payment for soft fruit	250.0	251.2	252.5	253.9	255.3	226.5
Payment for flax	200.0	201.0	202.0	203.1	204.3	181.2
Payment for hemp	200.0	201.0	202.0	203.1	204.3	181.2

Source: http://www.arimr.gov.pl/fileadmin/pliki/PB_2015/Srodki_finansowe.pdf.

When assessing the direct payment system, which will be implemented in Poland for the period 2015-2020, it should be borne in mind that it is an attempt to maintain the philosophy of support provided so far through direct payments in Poland despite significant changes in the rules on direct payments adopted by the EU.

In the years 2004-2014 the amount of direct payments received by Polish farms was steadily increasing and it was a linear function of only the size of arable land eligible for support and payment rate. The total amount of this support during this period increased almost five times.

The new system will result in differences in the average rate of support depending on the total size of the farm. The highest average payment rate per 1 ha of arable land in 2015 will be received by farmers with approx. 30 ha UAA, as the greatest proportion of their farms will be covered by the additional pay-

ment. In the analysed year for a farm with 30 ha UAA the direct payment per 1 ha will be over 215 EUR/ha[12], while for a farm with 100 ha UAA it will be only approx. 190 EUR/ha (Tab. 1.2). This diversity is a result of the introduction of the additional payment that is aimed at redistributing part of the national envelope and intended to support smaller farms.

Table 1.2. Total amount of direct payments received by holders of farms of selected size (in EUR)

Year	10 ha	15 ha	30 ha	50 ha	100 ha
2004	444.6	666.9	1,333.8	2,223.0	4,446.0
2005	574.2	861.3	1,722.6	2,871.0	5,742.0
2006	695.7	1,043.6	2,087.1	3,478.5	6,957.0
2007	799.2	1,198.8	2,397.6	3,996.0	7,992.0
2008	998.9	1,498.3	2,996.7	4,994.5	9,989.0
2009	1,198.7	1,798.0	3,596.1	5,993.5	11,987.0
2010	1,410.6	2,115.9	4,231.8	7,053.0	14,106.0
2011	1,613.1	2,419.6	4,839.3	8,065.5	16,131.0
2012	1,783.9	2,675.8	5,351.6	8,919.3	17,838.6
2013	1,963.4	2,945.2	5,890.3	9,817.2	19,634.4
2014	2,180.4	3,270.6	6,541.1	10,901.8	21,803.7
2015	2,070.8	3,166.8	6,454.8	10,030.8	18,970.8
2020	1,876.2	2,869.2	5,848.2	9,088.2	17,188.2
Average rate per 1 ha UAA in 2015					
	207.1	211.1	215.2	200.6	189.7
Change in the rate of payments					
2015/2014	95.0	96.8	98.7	92.0	87.0
2015/2004	465.8	474.9	483.9	451.2	426.7

Source: Own elaboration based on ARMA's data.

In accordance with the principles laid down in Regulation (EU) no. 1307/2013 redistribution may include payment for the first 30 hectares of arable land of a given farm. It is possible to diversify the payment rate depending on for which hectares the support is payable. However, due to the fact that there will be payment coupled with production, the maximum total amount of support for additional payments could be increased only at the expense of the rate of the SAPS, which would mean an even greater variation of the total average rate of direct payments received by each farm. Excluding the first three hectares from the support under additional payment is an indication that in Poland this support

[12] This calculation does not include two forms of payments: payment for young farmers and payment coupled with production.

is not to serve a purely social purpose, but to be part of the support system for small and medium-sized farms. However, setting the threshold of 3 hectares, is not a sufficient step towards supporting farms with potential for real growth. A better solution would be to set the threshold at a level similar to the average size of farms in each voivodeship and thus create a regional differentiation of the support. Such a solution would allow for a significant increase in the rate of additional payments.

The new system of direct payments will not only remove the previous equality of average rate of direct payments received by farmers within the Polish single area payment, but it will lead to different average rates of payment in individual regions as indicated in the study conducted by J. Kulawik and others[13].

1.2. Rural Development Programme 2014-2020 in Poland

Poland was one of the three countries whose Rural Development Programmes for the current period were approved by the European Commission. Polish RDP 2014-2020 budget is EUR 13.5 billion (including EUR 4.9 billion of national funds). Investment support within this programme is expected to be received by app. 200,000 farms and there are app. 22,000 new jobs to be created. In contrast, support for the implementation of practices beneficial to the environment and climate is to cover app. 19% of agricultural land in Poland.

As part of the SWOT analysis carried out for the elaboration of the Polish RDP 2014-2020, 12 developmental needs linked to the priorities of rural support to be reached at the EU level were identified. They include:

1. Increasing the number of competitive farms.
2. Reorienting small farms towards agricultural or non-agricultural activity.
3. Ensuring sustainability of agriculture in terms of climate change and natural restrictions as well as protection and improvement of the groundwater resources.
4. Improving sales of agricultural products and strengthening the position of farmers in the food chain.
5. Improving quality of agricultural products and foodstuffs.
6. Restoring and conservation of biodiversity, including the Natura 2000 areas and areas with natural handicaps.

[13] J. Kulawik (red. nauk.) (2014), *Dopłaty bezpośrednie i dotacje budżetowe a finanse oraz funkcjonowanie gospodarstw i przedsiębiorstw rolniczych (4) [Direct payments and budget subsidies and finance and functioning of farms and agricultural companies (4)]*, PW 2011-2014 nr 120, IERiGŻ-PIB, Warszawa.

7. Promoting sustainable farming methods: sustainable agriculture and organic farming.
8. Conserving genetic resources of crops and livestock.
9. Creating employment opportunities outside agriculture without changing/without the need to change the place of residence.
10. Developing technical and social infrastructure in rural areas.
11. Activating rural citizens and using endogenous potential for local development.
12. Increasing innovation, modernizing the agri-food sector and raising awareness of agricultural producers.

It was decided that the Polish RDP 2014-2020 will have a number of sub-measures, hence a low level of resources has been allocated for most of them. However, to support investment in physical assets, 27% of the RDP 2014-2020 was allocated in the draft version of the programme. This allocation was reduced to less than 25% of the budget of the programme in the version approved by the European Commission (Tab. 1.3).

In this programming period, for the first time there will be two categories of regions in Poland. Until now, the Polish area was considered as a less developed area, which means that all Polish NUTS2 had GDP per capita of less than 75% of the EU average. During this programming period, one of the regions – Mazowieckie – finds itself in the category of regions with a GDP per capita of more than 75% of the EU average, while the other regions remain below this threshold. Accordingly, in the RDP 2014-2020 the division of funds is also presented for these two types of regions (Tab. 1.4).

In analysing this RDP what is important is not the distribution of funds for specific measures, but for sub-measures, because the actual assessment of the potential impact of support on agriculture and rural development depends on the structure of the planned support for specific purposes, and these correspond to sub-measures. RDP 2014-2020 itself does not determine this division (Tab. 1.5).

Table 1.3. Structure of planned expenditure within the RDP 2014-2020 – project and approved programme

Measure	Total EAFRD (in EUR)		Structure of planned expenditure (in %)	
	Project	RDP	Project	RDP
Knowledge transfer and information actions	27,361,000	36,905,246	0.3	0.4
Advisory services, farm management and farm relief services	413,60,000	47,722,830	0.5	0.6
Quality schemes for agricultural products and foodstuffs	21,000,000	21,000,000	0.2	0.2
Investments in physical assets	2,321,243,154	2,120,177,704	27.0	24.7
Restoring agricultural production potential damaged by natural disasters and catastrophic events and introduction of appropriate prevention actions	264,046,000	264,046,000	3.1	3.1
Farm and business development	1,236,882,153	1,406,133,450	14.4	16.4
Basic services and village renewal in rural areas	683,983,100	683,983,100	8.0	8.0
Investments in forest area development and improvement of the viability of forests	191,519,339	191,519,339	2.2	2.2
Setting-up of producer groups and organisations	224,600,000	256,414,153	2.6	3.0
Agri-environment-climate	674,500,000	753,399,101	7.8	8.8
Organic farming	445,373,661	445,373,661	5.2	5.2
Payments to areas facing natural or other specific constraints	1,482,538,693	1,378,188,270	17.2	16.0
Co-operation	27,360,000	36,904,246	0.3	0.4
LEADER	467,668,000	467,668,000	5.4	5.4
Technical assistance	132,527,195	132,527,195	1.5	1.5
Early retirement	356,318,519	356,318,519	4.1	4.1
Total	8,598,280,814	8,598,280,814	100.0	100.0

Source: Own elaboration based on the Polish draft RDP 2014-2020 and Polish RDP 2014-2020 accepted by the EC.

Table 1.4. RDP 2014-2020 – allocation for less and more developed regions (in EUR)

Measure	Project			Final RDP		
	Less developed regions	Region with >75% of GDP per capita	Share in total spending for a given measure	Less developed regions	Region with >75% of GDP per capita	Share in total spending for a given measure
Knowledge transfer and information actions	23,199,392	4,161,608	15.21	5,613,288	31,291,958	84.79
Advisory services, farm management and farm relief services	35,069,143	6,290,857	15.21	40,464,188	7,258,642	15.21
Quality schemes for agricultural products, and foodstuffs	17,805,900	3,194,100	15.21	17,805,900	3,194,100	15.21
Investments in physical assets	1,979,441,068	341,802,086	14.72	1,810,341,728	309,835,976	14.61
Restoring agricultural production potential damaged by natural disasters and catastrophic events and introduction of appropriate prevention actions	227,462,427	36,583,573	13.85	227,462,427	36,583,573	13.85
Farm and business development	1,060,904,208	175,977,945	14.23	1,207,159,782	198,973,668	14.15
Basic services and village renewal in rural areas	614,923,973	69,059,127	10.10	614,923,973	69,059,127	10.10
Investments in forest area development and improvement of the viability of forests	170,337,300	21,182,039	11.06	170,337,300	21,182,039	11.06
Setting-up of producer groups and organisations	189,427,640	35,172,360	15.66	216,259,697	40,154,456	15.66
Agri-environment-climate	581,048,025	93,451,975	13.86	649,015,656	104,383,445	13.85
Organic farming	383,667,140	61,706,521	13.86	383,667,140	61,706,521	13.86
Payments to areas facing natural or other specific constraints	1,247,852,818	234,685,875	15.83	1,160,021,066	218,167,204	15.83
Co-operation	23,198,544	4,161,456	15.21	31,291,110	5,613,136	15.21
LEADER	434,416,805	33,251,195	7.11	434,416,805	33,251,195	7.11
Total	6,988,754,383	1,120,680,717	13.03	6,968,780,060	1,140,655,040	13.27

Source: Own elaboration based on the Polish draft RDP 2014-2020 and Polish RDP 2014-2020 accepted by the EC.

Table 1.5. RDP 2014-2020 allocation for measures and sub-measures (in EUR)

Measure	Total budget
Knowledge transfer and information actions	58,001,302
Advisory services, farm management and farm relief services	75,002,515
Quality systems for agricultural products and foodstuffs	33,004,179
Investments in physical assets	
Modernisation of agricultural holdings	*2,401,064,486*
Investments in farms located in Natura 2000 areas	*61,500,000*
Investments in farms located in particularly exposed areas	*37,500,000*
Investment in processing/ marketing and development of agricultural products	*693,070,461*
Re-parcelling	*138,994,740*
Restoring agricultural production potential damaged by natural disasters and catastrophic events and introduction of appropriate prevention actions	414,981,968
Farm and business development	
Premiums for young farmers	*717,997,734*
Start-up aid for non-agricultural activities	*413,939,978*
Restructuring small farms	*882,980,666*
Development of entrepreneurship– development of agricultural services	*64,999,372*
Payments to farmers permanently transferring small farms to other farmers	*130,000,317*
Basic services	
Market places – basic services and rural renewal	*74,966,634*
Rural renewal – basic services and rural renewal	*1,000,000,049*
Setting-up of producer groups and organisations	402,987,547
Agri-environment-climate measure	1,184,062,782
Organic farming	699,961,515
Payments to areas facing natural or other specific constraints	2,165,998,652
Afforestation	300,997,069
Co-operation	57,999,730
LEADER	734,999,913
Technical assistance	208,283,391
Early retirement – liabilities	560,000,000
TOTAL RDP 2014-2020	13,513,295,000

Source: Ministry of Agriculture and Rural Development (2014), Rural Development Programme 2014-2020. Information brochure, Warsaw.

Knowledge transfer and information actions

It includes two sub-measures: 1.1. Vocational training and skills development; 1.2. Demonstrations and information, and its objectives are:

- increasing innovation and the knowledge base in rural areas,
- strengthening linkages between agriculture and forestry and research and innovation,

- promoting learning throughout life.

Training is primarily related to: management; technology and organization of production on the farm, including organic production; job security; marketing; accounting; farm insurance; use of financial instruments; environmental protection; use of ICT; cooperatives; creation and functioning of producer groups; shortening the food chain. However, in the case of demonstrations and outreach support will be directed to projects providing for: investment in demonstration projects in the field of agricultural and forestry production and food processing to promote innovation; good practice dissemination activities and innovative solutions for the agricultural, forestry and food processing.

Advisory services, farm management and farm relief services

Measure is to enable the strengthening of mechanisms for knowledge transfer and innovation and for promoting learning throughout life. Because of such divergent objectives measure involves two sub-measures: 1. Support for the training of advisors; 2. Provision of comprehensive advice to farmers; 3. Provision of comprehensive advice to forest owners. For training support the limit is EUR 200,000 for a period of three years for a single entity providing training to agricultural advisors (up to 100% of eligible costs). However, with regard to advisory services the limit is EUR 1,500 for the development and completion of a 3-year advisory programme for a farmer, or EUR 1050 for the development and realization of a 2-year advisory programme. In contrast, as to support for forest owners for the development and implementation of an advisory programme, there is a maximum of EUR 500, but the forest owner can use this instrument up to two times during RDP's implementation period.

Quality systems for agricultural products and foodstuffs

This measure is intended to support the development of high-quality production by promoting participation in quality systems and the same products covered by these systems.

The "Support for new entrants into quality systems" sub-measure takes the form of a refund granted for 3 years from the accession into a quality system and includes expenditure incurred by acceding to the quality system and the annual contribution for participating in it. The criteria for selection will include, among others, the size of the surface of the land on which a high quality production is conducted, and preference will be given to holdings of up to 5 ha. The maximum amount of support will depend on the quality system which the bene-

ficiary joined, with a maximum limit of EUR 2,000 per year per farm. The second sub-measure is the "Support to carry out information and promotion activities". Selection of applications will be made on the basis of the expected effectiveness of the planned activities, and preference will be given to applicants who did not receive this kind of support under the measure "Information and promotion" within the RDP 2007-2013.

Investments in physical assets

The objectives of this measure relate to the three priorities of the EU support for rural areas under the second pillar of the CAP: Priority 2 "Increasing the profitability and competitiveness of farms of all types of agriculture in all regions, and promote innovative technologies in the farms and sustainable forest management"; Priority 3 "Support the organization of the food supply chain, including the processing and marketing of agricultural products, promoting animal welfare and risk management in agriculture" and Priority 4 "Restoration, protection and enhancement of ecosystems related to agriculture and forestry".

It includes three sub-measures. The sub-measure "Support for investment in agricultural holdings" is aimed at supporting investments, both tangible and intangible, which are to improve the performance of these farms. This sub-measure includes three types of support:

1. Modernisation of agricultural holdings. This type of support is aimed at improving the overall performance of farms that is considered to improve their competitiveness and profitability. This improvement is to be expressed in an increase in gross value added of at least 10% compared to the base year within five years of receiving the support. However, as an improvement in a farm's performance are also seen:
   - increase of the efficiency of using water resources on the farm,
   - improvement in the efficiency of energy use on the farm,
   - increase in the use of renewable energy on the farm,
   - reduction of greenhouse gas emissions and ammonia emissions from agriculture.

This type of support should be targeted at projects in four areas:

- rationalization of production technology, increase in the scale of production, improvement of product quality, implementation of innovations, changes in production or increase of the production's added value;
- development of production of piglets;
- development of beef cattle production;

- development of milk production.

Calls for applications will be organised for each of these areas separately. This support can be directed not only to individual farmers, but also to groups of them. Purchase of animals or simple replacement investments cannot be supported within this instrument. Eligible for the support are farms with economic size of EUR 10,000 to 200,000 and in the case of groups of farms applying for support lower limit of the total economic size is EUR 15,000[14]. The upper limit is also determined in the form of farm's arable land and it is 300 hectares[15]. The farmers receiving this support are to commit themselves to conduct a simplified accounting from the moment they are granted this support. Preference in choosing the applications to be granted aid should relate to: organic production, differentiation of production, increasing market participation, construction or modernization of livestock buildings and feed warehouses and investments aimed at improving the efficiency of resource use or at reducing emissions of greenhouse gases and ammonia. The rate of support is up to 50% (60% for young farmers), and the minimum rate is 30%. While the maximum amount of support is PLN 500,000 for the project involving renovation and construction, and PLN 200,000 in relation to another types of investment, with a minimum amount of support PLN 50,000[16].

2. Investments on farms located in Natura 2000 areas. This support is intended to allow for supplying farms with machinery and equipment that enable conducting agricultural activities in accordance with the principles of the Natura 2000 areas, which are characterized by higher environmental requirements. In the case of this support instrument the eligible costs relate to expenditure incurred for equipment used on pastures, used for production and harvesting of plants on permanent grassland, including equipment for the removal of trees and shrubs and the selective removal of weeds and invasive plants, for construction of livestock buildings and equipment for the production of herbivorous animals. Preferences in access to the support relate to young farmers; farms having a large area of permanent pasture in the Natura 2000 sites; investments strictly connected with the requirements of the protection plan in

[14] For comparison – an average farm in the FADN population in 2012 had an economic size of slightly more than EUR 19,000 and 19.6 ha of UAA.

[15] Not eligible for this support are poultry farms with the exception of the ones that conduct an organic production and the ones that will start an organic production as a result of supported investment project.

[16] In the case of investment related to developing piglets production the maximum limit is EUR 900,000. For the beneficiaries of sub-measure „Restructuring of small farms" the limits are lowered by the amount of a received premium.

the areas of Natura 2000. The support rate is 50% (60% for young farmers) and the amount of PLN 200,000 for investments other than construction and up to PLN 500,000 for investments in construction and renovation.

3. Investments on farms located in particularly exposed areas (areas exposed to pollution by nitrates from agricultural sources). The purpose of this instrument is to support farms located in the PEA in making investments intended to fulfil the requirements for the storage of natural fertilizers[17]. This kind of support cannot be received by large farms, i.e. those for which an integrated permit is required[18]. Preference should relate to young farmers and farms with a large number of animals. The maximum grant is PLN 50,000 at a rate of 50% (60% for young farmers). It should be noted that the use of this instrument is only possible in the implementation of the plan for the PEA and within 12 months from the date the standard enters into force. In the case of young farmers, it is also possible to benefit from this measure within 24 months from the acquisition of the farm.

The second sub-measure is the "Support for investment in processing/ marketing and development of agricultural products". It is an instrument aimed at very small, small and medium-sized enterprises, which is a continuation of the support for processing sector implemented in the programming period 2007--2013. Under this instrument, it is also possible to obtain support for setting up processing activity. In this case, only farmers and their household members subject to social insurance of farmers are eligible.

In addition to support for the sectors covered so far with it, the aid is to be granted also for the development of the processing of organic products. It is also envisaged that the selection criteria will include preferences for entities that purchase agricultural products directly from organic farms. The rate of support is 50%, and the maximum amount of aid granted is PLN 3,000,000 in respect of the individual beneficiary (it means the total amount of aid granted to the beneficiary during the whole period of implementation of the RDP 2014-2020), and in the case of collective beneficiaries it is PLN 15,000,000. While the minimum amount of aid for a single project is PLN 100,000. A much lower level of support is intended to assist in the start of the processing operations. In this case the maximum aid amount is PLN 300,000 and the minimum one is PLN 10,000.

[17] Farms operating on these areas will be obliged to possess equipment to collect and store natural fertilizers of the size enabling the storage for at least 6 months.

[18] It applies to poultry farms with over 40,000 places for animals and farms specialised in pig breeding with over 2,000 places for pigs of over 30 kg or 750 places for sows.

The last of the sub-measures is “Re-parcelling”. This instrument is designed to rationalize the use of land, which also contributes to the process of restructuring and modernization of the Polish agriculture. Its beneficiaries may be local authorities, who can get support to cover the development and management of the re-parcelling program and management of land after re-parcelling. Preference is to be given to projects which will contribute to improving the environment and landscape values. A differentiated support rate depending on the region is applied. In the case of preparing re-parcelling projects in Dolnośląskie, Lubelskie, Małopolskie, Podkarpackie, Śląskie and Świętokrzyskie, a maximum amount of support per 1 ha is EUR 800, and in the remaining ten regions it is EUR 600. In the case of land management after re-parcelling it is EUR 2000 and EUR 1900 per 1 ha, respectively.

Restoring agricultural production potential damaged by natural disasters and catastrophic events and introduction of appropriate prevention actions

The measure includes two categories of investment: prevention of destruction of agricultural production potential and restoring agricultural production potential. The support for restoring production potential may be granted to farms on which at least 30% of this potential was destroyed by a natural disaster. Preference is given to farms that are covered by the voluntary insurance or suffered damage to buildings used for agricultural purposes, and the farmer is not obliged to insure them. In respect of the damages incurred in connection with animal diseases that require the cessation of breeding of these animals a preference is to be given based on the size of the herd. The rate of support is 80% of eligible costs and the maximum amount of support is PLN 300,000, with a minimum amount of aid being PLN 20,000. In the case of investments for the prevention of damage associated with disaster, aid is granted for equipment used to maintain water facilities for the protection of farms from flooding. In the case of this type of support beneficiaries may be water companies or their associations. Preferences are applicable to applicants from repeatedly flooded areas. The rate of support is 80%, its maximum amount is PLN 500,000 and the minimum support is PLN 20,000.

Farm and business development

This measure includes a number of very different sub-measures of various nature and aim of support. The first of them is "Premiums for young farmers". This is a support instrument in the form of a premium to be paid in two instalments – 80% and 20% of the total amount of PLN 100,000. The first instalment is to be paid 9 months from granting the aid and the second one after the implementation of the business plan, the result of which is to be an increase in economic size by at least 10% of its former value. A farmer applying for support must not only be a young farmer[19], but also must have a farm that meets the following requirements:

- economic size in the range of EUR 13,000-150,000;
- UAA of at least the national average to the maximum of 300 ha[20];
- at least 70% of the minimum size of arable land is owned by the applying person or leased from Agricultural Property Stock of the State Treasury or local government;
- does not specialise in one of the following types of farming: rearing poultry (except for organic production), perennial plantations for energy purposes, laboratory animals, aquarium fish and purebred dogs and cats.

The second sub-measure is “Start-up aid for non-agricultural activities”. This support instrument has the form of a premium and it will be paid in two instalments – 80% and 20% of PLN 100,000. For this support can apply the beneficiaries of the measure “Payments to farmers permanently transferring small farms to other farmers” or those who submit a business plan for undertaking non-agricultural activities, which will lead to the creation of one workplace and work on a farm of an economic size of less than EUR 15,000, for which direct payment was granted the previous year. It is possible to give preference to projects that are: innovative; implemented in areas with the highest rate of unemployment[21]; to be implemented by the beneficiaries of the instrument “Payments to farmers permanently transferring small farms to other farmers”; to be carried out by persons with qualifications for non-agricultural activities covered by the project.

Another sub-measure is called “Payments to farmers permanently transferring small farms to other farmers”. The beneficiaries of this support may be farmers benefiting from the system of payments for small farms, who decide to

[19] The definition of young farmer is the same as in the RDP 2007-2013.
[20] In voivodeships with the average farm UAA lower than national average, the minimum farm UAA for farmers applying for this sub-measure is the average for a given voivodeship.
[21] Measured at a county (powiat) level.

pass on their farms to another farmer[22]. In addition, it is required that the farm taking over the land, following the acquisition of UAA has the size at least equivalent to the national average[23]. Within the selection criteria preference is to be given to:

- larger farms to be passed to another farmer;
- smaller farms that are to gain UAA;
- applicants transferring farms to young farmers.

The support has a form of a one-time payment calculated as multiplication of the number of years from the year of the transfer until 2020 and 120% of the direct payments to which the beneficiary is entitled under a scheme for small farms.

The fourth sub-measure is the "Restructuring small farms". Its aim is to support the restructuring of activity conducted on a farm or supporting the preparation of products for sale. An aid has a form of a premium of PLN 60,000 paid in two instalments: 80% and 20% of the premium. Beneficiaries of this sub-measure may be farmers with farms of economic size of less than EUR 10,000. The implementation of the business plan, that is a part of an application, must lead to an increase of the economic size of the farm by approx. 20%[24].

The last of the sub-measures is called “Development of entrepreneurship – development of agricultural services” and it is aimed at supporting the development of agricultural services. Support is to be granted to those enterprises that have been conducting a commercial activity of providing agricultural services as micro or small enterprises for at least two years. Eligible costs include purchase of machinery, equipment and hardware, while the cost of buying a tractor cannot exceed 50% of the remaining eligible costs[25]. Preference in the allocation of support shall be given to, inter alia, innovative projects and those implemented in districts with high fragmentation of the agrarian structure. Support rate is 50% and PLN 500,000 is the maximum amount of payment.

Basic services and village renewal in rural areas

This measure is aimed at the development and renewal of rural infrastructure and includes three sub-measures, for each of which a separate call for applications will be announced. The first sub-measure is “Investment in the creation,

[22] Transfer can take the form a donation as well as a sale.
[23] In the case of voivodeships with an average UAA lower than the national one, applicable if the average for this voivodeship.
[24] But not lower than EUR 10,000.
[25] Only new equipment can be purchased or leased in the form of leasing ending with the transfer of property rights to the lease.

improvement or expansion of all types of small scale infrastructure, including investments in renewable energy and energy conservation". The investment projects should be aimed at:

- water and sewage systems;
- construction or modernization of local roads.

With respect to investments in water and sewage systems, the selection criteria include[26]:

- investment combining both water and sewage systems,
- location of the project in the area with the largest scale of needs for improvement of the state of waters according to the national water and sewage programme,
- amount of per capita tax income gminas[27],
- unemployment rate in the county[28],
- linking a project with investments for creating a broadband infrastructure,
- specificity of the region.
- In the case of road investment selection criteria include:
- amount of per capita tax income in gminas,
- unemployment rate in the county,
- linking a project with investments for creating a broadband infrastructure,
- specificity of the region.

For both types of investments the amount of eligible costs must not exceed PLN 1,000,000, and in the whole programming period, support for the beneficiary shall not be higher than PLN 2,000,000 (water investments) or PLN 3,000,000 (road construction). For these projects, the member state co-financing input is not to come from the state budget, but from the budgets of local governments implementing supported investment projects.

The second sub-measure is the "Research and investments associated with maintenance, restoration and enhancement of the cultural and natural heritage of the village, countryside and places of high natural value, including the associated socio-economic aspects and measures in the field of environmental awareness", designed to protect the monuments and traditional construction. This support can be used both by municipalities and institutions dealing with culture, and

[26] Selection of applications is to be based on a total number of points received by a given project and the points are attached to each of the criteria (RDP 2014-2020 does not present the number of points for each of the criteria). In the case of project with the same number of points a project ensuring cleaning a larger volume of sewage will be chosen.
[27] Higher number of points is to be given to gminas with lower tax income per capita.
[28] Preferred are to be projects for implementation in the areas with higher unemployment rate.

national contribution must come from own funds of the supported entity. Support is to apply both to renovation projects, as well as to purchase of historic buildings. Maximum eligible cost for the investment is EUR 1,000,000 and the total support granted throughout the programming cannot exceed PLN 500,000.

The third sub-measure is "Investing into creation, improvement or development of local basic services for the rural population, including leisure, cultural and related infrastructure", which includes three types of investments that are related to:

- objects fulfilling cultural purposes;
- shaping public space;
- markets or buildings intended for the promotion of local products.

With regard to cultural objects, the selection criteria include only the level of tax income of the applying municipality, unemployment and specificity of the region. In the case of shaping public space, beyond the specifics of the region also other characteristics are to be taken into account. These include: historical value, complementarity with other investments in the area and whether the project is located in an area with tourism potential[29].

For both types of investments the amount of eligible costs must not exceed PLN 1,000,000 and in the whole programming period, support for a given location cannot be higher than PLN 500,000. However, in the case of markets preferred will be projects with the highest proportion of retail space dedicated for farmers across the surface of the marketplace. Maximum eligible cost of the type of investment is EUR 1,000,000 and the total support granted throughout the programming period to one beneficiary may not exceed PLN 1,000,000. For all the projects supported within this sub-measure, the national financial input should also come from the local government.

Investments in the development of forest areas and improving the vitality of forests

Within this measure support for afforestation and creation of woodland will be offered. Its beneficiaries may be both farmers and local governments possessing land for afforestation[30]. Support takes the form of a lump sum and

[29] Choice of applications in both cases will be based on a total number of points received by a given project. The points are prescribed to each of the criteria (the criteria are not stipulated in the RDP 2014-2020). In the case of projects with the same amount of points, the project to be implemented in a gmina with the lower per capita tax income will be chosen.

[30] However, in the case of local governments the support will be limited to support for afforestation.

includes three elements: support for afforestation (one-off assistance), maintenance premium (to be received for 5 years) and afforestation premium (12 years). The maximum area of afforestation per beneficiary over the duration of the programme is 20 ha.

Setting-up of producer groups and organisations

This support is to be granted to new groups and producer organizations during the first five years of their operation. It will have the form of a lump sum calculated as a percentage of the value of the net revenue from the sale of products produced on farms of group's members[31]. In the first year it will be 10% and in following 8%, 6%, 5% and 4%, respectively, with a maximum annual amount of EUR 100,000. The applicant must submit a business plan to be completed within five years.

The preference is to be given to the following categories of applicants:

- the ones who have the status of cooperatives,
- bringing together the largest number of members in a given product category,
- bringing together members whose production is covered by voluntary insurance,
- dealing with: high quality products (including organic farming), swine, cattle, sheep, goats, bee products, energy crops and crops used for technical purposes or production of hops.

Agri-environment-climate

This measure concerns the implementation of pro-environmental commitments during the period of 5 years and it covers 7 packages grouped in two sub-measures:

- Payments under agri-environment-climate commitments
  1. Sustainable farming;
  2. Protection of soil and water;
  3. Conservation of orchards with traditional varieties of fruit trees;
  4. Valuable habitats and endangered species of birds in Natura 2000 areas;
  5. Valuable habitats outside Natura 2000 areas.
- Support for the protection, sustainable use and development of genetic resources in agriculture
  6. Preservation of endangered plant genetic resources in agriculture;

[31] In order to be taken into account, the sale must be concluded with clients other than the group's members.

7. Preservation of endangered animal genetic resources in agriculture.

Packages 1 and 2 are directed to intensive agricultural production, package 3 is designed to preserve traditional varieties of fruit trees in orchards, packages 4 and 5 relate to Natura 2000 and other packages serve to preserve the genetic resources of plants (package 6) and animals (package 7)[32].

Organic farming

This measure consists of two sub-measures: 1. Payments for farms in conversion to organic farming; 2. Payments for farms to maintain farming. For each of these sub-measures there are 6 packages related to the type of farm production. These are: agricultural crops, vegetables, herbs cultivation, growing fruit, forage and grassland.

In the case of this measure, payments depend on the type and size of UAA covered by organic production under the same conditions as in the case of agri-environment-climate measure. Rates for the organic farms are on average approx. 15-20% lower than those for farms that are in the process. An exception is herbs cultivation, in which case the rate is the same for both sub-measures. Payments to farms in conversion may be paid for a maximum of three years, and those for farms already certified for organic production for up to 5 years.

Payments to areas facing natural or other specific constraints

This measure is designed not only to help farmers to continue farming activity in areas characterised by difficult farming conditions, but also to provide for the maintenance of rural landscape and the maintenance and promotion of sustainable systems of farming in these areas. The annual payments as so far will be applied to four types of areas: mountainous areas (rate of payment: 450 PLN/ha), lowland zone I (179 PLN/ha), lowland zone II (264 PLN/ha) and specific areas (264 PLN/ha). Full payment will be granted to farms with up to 25 ha of UAA. For the area in the range 25.01-50 ha UAA the payment per hectare will be reduced to 50% of the basic rate and for the area in the range of 50.01-75 ha UAA only 25% of the basic rate will be paid.

Co-operation

This measure is aimed at supporting the creation and operation of operational groups for innovation. Apart from farmers and forest owners such groups must have also other members. These can be other entities involved in the agri-

[32] Payment rates are presented in the table A.1 in the annex.

cultural sector, including scientists and agri-food processors. In the case of overheads related to the group's operation the support rate is 100%, and in respect of the research related to the project it amounts to 90%. Overhead costs must be proportionate to the rest of the costs and can reach up to PLN 2,000,000 (20% of total eligible costs), and the maximum amount of support is PLN 10,000,000. It should be emphasized that the purpose of measure is not to support research, but only the process of its implementation.

Support for local development within LEADER

The aim of this measure is to support the local development led by the local community. The development strategy based on the diagnosis of local needs will be carried out in an area inhabited by at least 30,000 people from rural areas and a maximum of 150,000 inhabitants, and it will cover an area of at least 2 gminas. Support initiatives may include a wide range of activities both related to human capital and investment in infrastructure (including roads and tourism) and the establishment and diversification of sources of income. This measure consists of four sub-measures for different types of support and directions of assistance:

- support for implementation of operations under local development strategies driven by local communities. The limits of support and its intensity vary widely depending on the type of beneficiary and type of supported project;
- preparation and implementation of co-operation with the local action group. Assistance will be given in the form of a refund and the minimum project cost is PLN 50,000;
- support for the running costs and activation. Support takes the form of a lump sum. The level of support is not specified in the RDP 2014-2020;
- preparatory support. Aid takes the form of a lump sum.

When assessing the adopted Polish RDP 2014-2020 it should be noted that it is much more complicated than the previous programme. Moreover, the level of complexity increased significantly at the stage of negotiations with the EC as the project submitted to the European Commission was much less complex. This means that it is not only a consequence of decisions taken at national level. This does not change the fact that so multi-layered and diverse programme makes a comprehensive evaluation and determination of the programme's impact on rural development and agriculture completely impossible. The only solution will be to analyse separately various elements of the programme. It will be

followed by an attempt to determine the relationships and dependencies between these elements and by an assessment of potential synergies.

The trend towards the increasing complexity of programmes aimed at supporting agriculture and rural areas is alarming. Despite the development of evaluation methods and supporting them with information and communication tools, it is not yet possible to prepare a comprehensive and reliable evaluation of such complex aid schemes pursuing a number of objectives for the various areas and structures of social and economic life.

Although undoubtedly a holistic view of the development processes is justified and necessary, when undertaking an examination and monitoring of the programme its complexity should be borne in mind and these activities should be concentrated on programme's individual components, as they determine the actual overall effect of the programme.

It is worth noting that the RDP 2014-2020 clearly focuses on investment in animal production, which is a response to the trend of a decreasing interest in livestock production among Polish farmers. Moreover, in the case of investment in fixed assets it is excluded to support investment involving simple replacement of existing fixed assets. This arrangement seems to be a response to a criticism of the arrangements adopted in previous programming periods, when most investment involved only a purchase of newer models of machines and equipment than those previously held by the beneficiary. It seems, however, that this restriction will apply only to beneficiaries of RDP 2007-2013 who purchased one of the assets listed in the current programme[33].

Another fact also worth noting is that farmers receiving support under the measures "Modernization of agricultural holdings", "Premiums for young farmers" and "Restructuring of small farms" will be obliged to maintain simplified accounting. The economic results of these farms should be regularly examined, as this will be a new population of the agricultural sector entities whose economic situation will be possible to determine based not on estimations, but actual accounting data. Although it will be the population not fully representative of the whole Polish agriculture, if only because of the criteria for the granting of support, it will be a good representative group of medium-sized and large farms seeking to obtain and maintain competitiveness.

[33] This limitation applies to the purchase of fixed assets of the same kind and includes the purchase of: tractors, combine-harvesters, spraying machines, mineral fertilizer spreaders, liquid manure spreaders, loaders, trailers, telescopic loaders, forklifts and other machines.

It should also be noted that in the case of an instrument "Modernization of agricultural holdings" it is possible to introduce selection criteria preferring farms of a certain economic size or volume of production. It is also possible to introduce regional calls for applications with the criteria supplemented by criteria consistent with the needs of agriculture in a given region. Keeping such an option will enable a more flexible management of the implementation of this instrument throughout the period of implementation of the RDP 2014-2020 and the introduction of preferences for specific groups of entities depending on the interest in making use of this instrument and the situation of individual regions and types of farms.

Analysing the support instruments and selection criteria, it seems that the programme was supposed to be intended for the widest possible group of farms, which are now on the verge of a size small-medium, and the effect of the support to be received is to shift them to a group of medium-sized farms, with the potential to compete in the market and a clear concept of their further development. However, this concept for the Polish RDP 2014-2020 was not fully translated into the approved version of this programme. A good example is the intention of preference in the selection of applications for the instrument of "Payments to farmers permanently transferring small farms to other farmers" for the applicants with larger farms. Perhaps the aim of this provision was to increase the size of the total area of arable land transferred, while believing that the smallest holdings do not require such a degree of support for the decision to withdraw completely from agricultural activities and sell their land. In this case, the smallest farms transferred in the slightest degree would influence the situation of farms acquiring them, and thus the overall contribution to the changes in the level of competitiveness of Polish agriculture would be the smallest. It seems, however, that from the point of view of agricultural resources it would be most reasonable to reduce the number of the smallest farms, where agricultural land is the most vulnerable to losing its value for agricultural use. Therefore, it seems that this type of preference criterion should not be introduced. Moreover, two other criteria fully ensure the maximization of the effects of the implementation of this instrument.

However, first of all one should assess the rationale for introducing this instrument. The planned payment is extremely low. Assuming that someone with 2 ha UAA benefits from this support in the first year, when it is possible, probably in 2016, the payment received is 3600 euro. Thus, the incentive to give up agricultural activity.

In the case of "Basic services and rural renewal" it is surprising that among the criteria for selection of applications the specificity of a region can be found, since it seems that the other criteria have been properly matched and cover a set of key elements that should be taken into account in the selection process. Moreover, it is not indicated which aspects are part of this specificity.

With regard to the instrument of "Agri-environment-climate measure" it should be noted that in comparison with the project in the adopted version of the programme the eligibility for benefiting from this measure was greatly expanded. In the project for a number of packages eligible were only plots of several dozen of hectares, while in the current version of the RDP the size of the plot covered with a specific package is not stipulated.

Evaluation of the impact of the second pillar of the CAP also referred to as rural development policy is a very complex problem[34]. This is due to many factors, but primarily to a large number of very diverse policy instruments.

As noted by J. Buysse, A. Verspecht and G. van Huylenbroeck, the issue of the impact of the instruments of rural development policy implemented within the CAP is rarely the subject of scientific research[35]. Probably this is due to the very limited availability of the data that would allow for an in-depth analysis giving reliable results based on the appropriate size of the sampling. The lack of sufficient length of time series also makes it impossible to analyse the impact of support in the long term.

According to the research conducted by L.A. Schroeder, A. Gocht and W. Britz[36], support from the CAP's second pillar had little impact on all sectors of the economy, with the largest, but also small impact experienced by the agriculture. The researchers undertook an ex-post analysis of the support implemented in Germany in 2006, using CAPRI-RD model[37] and the results of an ex-post evaluation carried out in relation to this support. As regards agriculture,

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[34] These issues are extensively presented in the book: B. Wieliczko (2010), *System oceny polityki Unii Europejskiej wobec obszarów wiejskich a zasady dobrego rządzenia*, „Studia i monografie" nr 149, IERiGŻ-PIB, Warszawa

[35] Buysse, A. Verspecht and G. Van Huylenbroeck (2011), *Assessing the impact of the EU Common Agricultural Policy pillar II support using micro-economic data*, Paper prepared for the 122nd EAAE Seminar "Evidence-based agricultural and rural policy making: Methodological and empirical challenges of policy evaluation" Ancona, February 17-18, 2011, p. 11.

[36] L.A. Schroeder, A. Gocht, W. Britz (2014), *The Impact of Pillar II Funding: Validation from a Modelling and Evaluation Perspective*, "Journal of Agricultural Economics", p. 1-27.

[37] More information about CAPRI-RD model can be found on the website of the project Common Agricultural Policy Regionalised Impact – The Rural Development Dimension co-financed within the 7 Framework Programme and conducted in the years 2009-2013: http://www.ilr.uni-bonn.de/agpo/rsrch/capri-rd/caprird_e.htm.

there was observed a small positive impact of rural development policy instruments on land use, income and total volume of production. However, when analysing the impact per 1 ha of UAA a decrease in yields and nutrient levels in the soil was found.

2. Impact of the Common Agricultural Policy on regional differences in Polish agriculture. Attempt to use the Grade Data Analysis

Grade Data Analysis.[38] Brief presentation

The Grade Data Analysis (GDA) was developed at the Institute of Computer Science of the Polish Academy of Sciences[39]. It is one of the data mining methods – a family of algorithms and heuristics to extract knowledge from large data sets. It examines the relationship of objects and their properties, allowing for both verifying conjecture as to the specifics of an analysed phenomenon and identifying relationships not grasped by intuition on or even being in conflict with it. As the main advantage, the GDA allows for a twofold presentation of research results: in numerical form and clear graphic form. The so-called **overrepresentation map** – a square area with rows corresponding to the objects examined, columns – to properties of these objects, and cell colours being a measure of the similarity or diversity of objects and their properties, is a visualisation tool used by the GDA.

Using a square table to explore relationships between the elements examined is not a new idea.[40] Already in the first half of the twentieth century, a Polish anthropologist, Jan Czekanowski, used an array of coloured cells[41] to look for similarities in the structure of skulls discovered during excavations. Moving rows and columns so as to make the darkest cells form relatively consistent areas near the diagonal, Czekanowski discovered such similarities be-

[38] Reasonable description of the method along with examples of its applications is included in the book [Jarochowska et al. 2005]. Grade methods are comprehensively addressed in the publication [Kowalczyk et al. 2004].
[39] http://www2.ipipan.waw.pl.
[40] Cf. e.g. Czekanowski J. (1913): *An outline of statistical methods used in anthropology*; "Proceedings of the Warsaw Scientific Society", Vol. 5, Warsaw Scientific Society, Department of Mathematical and Natural Sciences. This is one of the first Polish statistics textbooks.
[41] It is the so-called Czekanowski's diagram (or matrix). This diagram is a square, whose rows and columns correspond to the analysed objects (specifically, excavated skulls). The colour of each cell represents the similarity of a pair of elements: the darker, the greater the similarity of a pair of objects. The overrepresentation map differs from the Czekanowski's matrix, as its rows correspond only to objects, while columns – to properties of these objects.

tween individuals, whose discovery without this approach would require the use of advanced morphology research methods or would not be possible at all[42,43].

The method of developing overrepresentation maps will be illustrated with an example.[44] Table 1 presents three objects with four properties. It can be noted that each p_{ij} value (j-th property, i-th object) can be described as follows:

$$p_{ij} = p_{i\cdot} \times p_{\cdot j} \qquad (2.1)$$

where $p_{i\cdot}$ and $p_{\cdot j}$ are the sum of i-th row and j-th column, respectively. This is the so-called proportional distribution.

Table 2.1. Example of proportional distribution

	$j = 1$	$j = 2$	$j = 3$	$j = 4$	Total ($p_{i\cdot}$)
$i = 1$	0.12	0.10	0.14	0.04	0.40
$i = 2$	0.06	0.05	0.07	0.02	0.20
$i = 3$	0.12	0.10	0.14	0.04	0.40
Total ($p_{\cdot j}$)	0.30	0.25	0.35	0.10	1.00

Source: Own elaboration.

The **overrepresentation index** is a quotient, i.e.:

$$c_{ij} = \frac{p_{ij}}{p_{i\cdot} \times p_{\cdot j}} \qquad (2.2)$$

[42] *One must wonder that using such a primitive measure, which is indisputably average difference, obtained by comparing differences as diverse as millimetres, angle degrees and index units, led to a result corresponding to the finest achievements of the best morphologists, such as Georg Schwalbe. Can we explain this by a nasty coincidence? Obviously, we cannot. The result is too complex and harmonious in its entirety to consider it a coincidence. Presumably, this may be because the procedure applied is in fact a projection onto the plane of points of n--dimensional space. Without this, realising the mutual relationship that occurs between the points of n-dimensional space is beyond our normal mental capacity*. Czekanowski J. (1948): *Issues of anthropology (outline of theoretical anthropology)*, "T. Szczęsny i S-ka" Academic Bookstore, Toruń, p. 66.

[43] In 1951, Wrocław mathematicians developed – based on the Czekanowski's method – the so-called "Wrocław taxonomy". Cf. Florek K., Łukasiewicz J., Perkal J., Steinhaus H., Zubrzycki S. (1951): *Sur la liaison et la division des pointes d'un ensemble fini*; "Colloquium Mathematicum", Issue 2, Warsaw; pp. 282-285; Florek K., Łukasiewicz J., Perkal J., Steinhaus H., Zubrzycki S. (1951): *Wrocław taxonomy*; "Anthropological Review", Vol. XVII, Polish Scientific Publishers, Warsaw-Poznań; pp. 193-211.

[44] The example comes from the article: St. Lenkiewicz (2012), *Grade Data Analysis – the concept and an instance of application*; "Contemporary Management Issues", Issue 1/2012, Warsaw; pp. 63-98.

In the case of proportional distribution, all overrepresentation indices are obviously equal to 1. Table 2.2 shows non-proportional distribution, i.e. equation (1) is not complied by at least some p_{ij}. Table 2.3 includes overrepresentation indices for this distribution.

Table 2.2. Example of non-proportional distribution

	$j = 1$	$j = 2$	$j = 3$	$j = 4$	Total ($p_{i\cdot}$)
$i = 1$	0.25	0.05	0.04	0.06	0.40
$i = 2$	0.10	0.20	0.03	0.02	0.35
$i = 3$	0.10	0.05	0.03	0.07	0.25
Total ($p_{\cdot j}$)	0.45	0.30	0.10	0.15	1.00

Source: Own elaboration.

Table 2.3. Overrepresentation indices for distribution in Table 2.2

	$j = 1$	$j = 2$	$j = 3$	$j = 4$
$i = 1$	1.39	0.42	1.00	1.00
$i = 2$	0.63	1.90	0.86	0.38
$i = 3$	0.89	0.67	1.20	1.87

Note: Values in the table are rounded; index for $i = 3$ and $j = 2$ is precisely 2/3.
Source: Own elaboration.

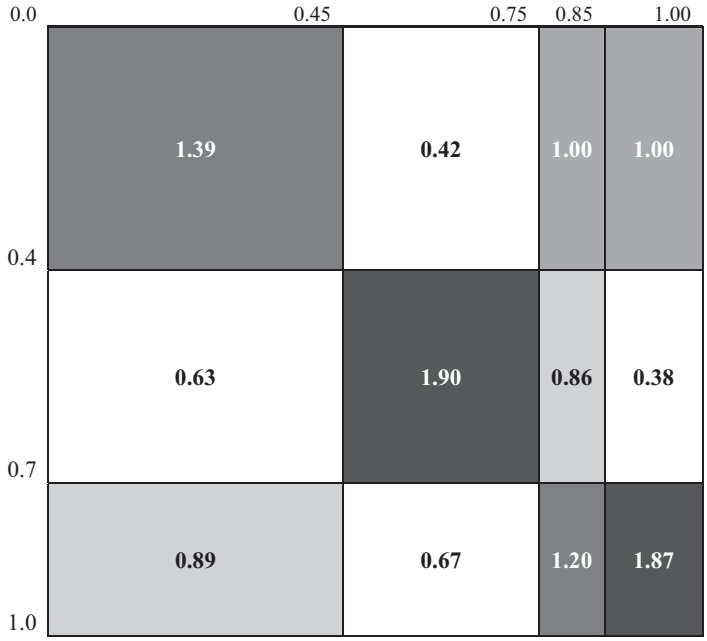
To create an overrepresentation map, we divide a unit square into columns of widths proportional to the sums of the columns of Table 2.2 and into rows of heights proportional to the sums of the rows of Table 2.2. We shade cells in accordance with the values of Table 2.3, using the following colour code:[45]

Obviously, an overrepresentation map for proportional distribution is uniformly grey (all overrepresentation indices are equal to 1). Figure 2.1 presents an overrepresentation map for non-proportional distribution in Table 2.2.

[45] You can create maps in any colour, but the author notes that maps using the shades of grey are the easiest to analyse.

Colour	Value of c_{ij} index	Specification
	$3/2 < c_{ij}$	Strong overrepresentation
	$1 / 0.99 < c_{ij} \leq 3/2$	Slight overrepresentation
	$0.99 < c_{ij} \leq 1 / 0.99$	Perfect representation
	$2/3 < c_{ij} \leq 0.99$	Slight underrepresentation
	$c_{ij} \leq 2/3$	Strong underrepresentation

Figure 2.1. Overrepresentation map for distribution in Table 2



Source: Own elaboration.

Being the essence of the Grade Data Analysis, the GCA algorithm changes the arrangement of rows and columns of an overrepresentation map, so as to make cells of the same colour form consistent areas and the darkest areas – situated near the diagonal of the map. To this end, the algorithm seeks to maximise the Spearman's rank correlation coefficient ρ^*:

$$\rho^* = 3\sum_{i=1}^{m}\sum_{j=1}^{n}\left(p_{ij}\left(2S_{row}(i)-1\right)\left(2S_{col}(j)-1\right)\right) \tag{2.3}$$

where:

$$S_{row}(i) = \left(\sum_{s=1}^{i-1} p_{s\cdot}\right) + \frac{1}{2}p_{i\cdot} \tag{2.4}$$

$$S_{col}(j) = \left(\sum_{t=1}^{j-1} p_{\cdot t}\right) + \frac{1}{2}p_{\cdot j} \tag{2.5}$$

$$p_{s\cdot} = \sum_{j=1}^{n} p_{sj} \text{ – sum of } s\text{-th row,} \tag{2.6}$$

$$p_{\cdot t} = \sum_{i=1}^{m} p_{it} \text{ – sum of } t\text{-th column,} \tag{2.7}$$

p_{ij} is a value in i-th row and j-th column, m – number of rows in the table, n – number of its columns.

Having obtained an overrepresentation map, in which similar elements are in adjacent rows (objects) and columns (properties), we can perform a cluster analysis. As a result, the sample examined is divided into subsets (clusters) of similar elements (objects or properties). Each element in a specific cluster is "close" to other elements of the cluster concerned, and at the same time "distant" from elements of other clusters. The GDA distinguishes clusters based on the distance of each pair of table rows (columns) arranged by the GCA.

Following the GCA, it often turns out that an overrepresentation map is insufficiently regular. This is due to the large heterogeneity of the examined objects or their properties, i.e. the presence of **outliers** (referring to the GDA terminology). To identify them, we calculate the "average distance" of each row (each column) from others. This distance is referred to as $AvgDistA_{row}$ for rows and $AvgDistA_{col}$ for columns (due to the limited space of this article, formulae to calculate them are not provided)[46]. Rows or columns of the greatest *AvgDistA* values are outliers.

Generally, having found outliers, we remove them from the sample examined and the GCA is repeated. This procedure allows us to identify such data relationships, which are hard or even impossible to note in research involving outliers. If a sample is very large, it can be divided into two parts: FIT (elements of *AvgDistA* below the limit value) and OUT (elements of *AvgDistA* above the limit value), and then subjected to the GCA carried out separately for each part.

[46] You can find them e.g. in the paper [Kowalczyk et al. 2004].

The GCA algorithm cannot be applied to raw data. Results obtained from such an analysis would have no value. Raw data are measured on different scales, expressed in different units and their value ranges vary considerably. Let us look at exemplary data provided in Table 2.4. In order to obtain overrepresentation indices, we should calculate the sums of individual rows. However, summing up the values of the rows of Table 2.4 makes no sense.

Table 2.4. Example of raw data

Voivodeship	Agricultural land in total	AHS[47]	Employment in agriculture	GVA[48] per capita in agriculture
	ha	ha	person	PLN
Dolnośląskie	1,209,396	9.59	70,343	13,707
Kujawsko-Pomorskie	1,188,145	12.32	115,986	11,728
Lubelskie	1,790,145	6.57	276,305	5,473
Lubuskie	574,384	9.84	24,147	10,403
Łódzkie	1,313,137	6.73	190,700	6,116
Małopolskie	942,072	3.20	182,120	4,395
Mazowieckie	2,485,953	7.40	318,129	11,228
Opolskie	608,610	9.31	48,661	12,485
Podkarpackie	983,581	3.46	155,487	3,083
Podlaskie	1,239,701	11.07	136,953	7,890
Pomorskie	942,562	12.90	57,026	13,978
Śląskie	659,047	3.93	68,930	10,168
Świętokrzyskie	765,204	4.74	142,661	7,426
Warmińsko-Mazurskie	1,338,935	17.07	62,622	12,990
Wielkopolskie	1,963,623	10.81	205,730	14,556
Zachodniopomorskie	1,143,722	16.22	38,926	21,655
Total	19,148,217	145.00	2,094,726	167,281

Source: Own elaboration based on CSO data.

Value ranges in the individual columns of the table vary considerably. The highest values are in the first column (hundreds of thousands and millions), the lowest – in the second column (under 20). The GCA performed based on such data would distort results, because the values of the first column would completely dominate our research[49]. Therefore, data are normalised prior to the GCA. As a result, we obtain values indicating the degree of diversity of each property in the objects forming the population being examined. Normalisation involves dividing each value in the table by the sum of its column, or – if several

[47] Average size of an individual holding with over 1 ha of agricultural land.
[48] Gross value added.
[49] It suffices to note what the ratio of the width of the first column of the overrepresentation map and its other columns would be.

properties were grouped – by the sum of the columns of this group. Properties of similar nature and measured in the same units can be grouped. For example, one group can include the areas of specific crops; however, it would make no sense to group the areas of crops and the quantities harvested.

If the importance of individual properties is not the same while assessing the examined phenomenon, they may be assigned weights. If properties were previously grouped, the weight would be assigned to the whole group.

Thus, data pre-processing includes: grouping the properties, normalising groups, and assigning weights to groups. Normalised properties are multiplied by weights assigned to their groups. Having prepared the table, overrepresentation indices, which are the input data for the GCA algorithm, are then calculated.

The practical implementation of the GDA is GradeStat.[50] It was used to carry out all calculations presented later herein and prepare most figures.

The GDA is a convenient tool for comprehensive data analysis. Nevertheless, like any research method, it has also some limitations. Let us take a closer look at the most important of them all.

Firstly, the GDA is not a tool that answers questions raised by a researcher. The programme helps formulate these answers, but it does not replace an analyst in this respect. Furthermore, the GDA helps you identify such data relationships, which are impossible or hard to note without this method. Thus, using the GDA often raises new questions. Consequently, the GDA cannot clearly answer the question whether the Common Agricultural Policy has an impact on regional differences in Polish agriculture. The GDA aims at such a data presentation, so as to allow for assessing the impact ourselves.

Secondly, the GDA is not a tool for "objective analysis". As a matter of fact, it is a method based on mathematical tools, which involves "automatic" (i.e. "unbiased") data processing; however, research using it is not completely objective. There are numerous factors limiting the objectivity of the results obtained; let us look at the two most important of them right now. The selection of elements to be analysed, i.e. the examined objects and their properties, is the first one. Even the use of advanced methods for the selection of variables[51] does not completely eliminate the influence of researcher's preferences. In this analysis, the examined elements were selected objectively, as we analyse all Polish

[50] The programme can be purchased along with the book: Jarochowska et al. (2005). To unlock some of its functions, the software should be registered at the dedicated website: http://gradestat.ipipan.waw.pl/download.html.

[51] Cf. e.g. J. Korzeniewski (2012): *Methods for the selection of variables in a cluster analysis. New procedures*; Scientific Publishing House of the University of Łódź, Łódź.

voivodeships, unlike their properties and properties of CAP support instruments.[52] Data pre-processing, i.e. grouping the properties of objects and assigning weights to groups, is the second factor limiting the objectivity of the results obtained from the GDA. Although these operations are carried out based on a thorough analysis of the examined properties and their interrelationships, drawing on the knowledge of experts, it is never possible to completely eliminate the influence of researchers' personal beliefs. It should be noted, however, that any assessment – regardless of the method used – is subjective to some extent; the GDA is no exception to this.

Thus, being aware of both the limitations of the research method used and our own limitations, we have no ambition to make a completely objective assessment of the impact of the Common Agricultural Policy on regional differences in Polish agriculture. We aim at taking another way of looking at this issue, presenting it differently than it has been done in the literature, indicating the patterns observed and trying to describe the relationship between the amount of EU funding received and the structure of Polish agriculture.

Scope of research. Input data

Bridging gaps in the level of agricultural development in individual EU regions is one of the main objectives of the Common Agricultural Policy. This includes both gaps between EU Member States (especially between "old" and "new" Member States) and their regions[53]. Obviously, the CAP does not seek to completely eliminate regional differences – this is in fact impossible – but rather it aims at eliminating gross disparities and providing the rural population with similar working and living conditions. This calls for measures taken by the European Union under the so-called two pillars of the CAP. The first one is

[52] For example, you can reflect on reasons for including the share of people employed in agriculture, Average size of an individual holding and the area of agricultural land per capita employed in agriculture in our research. Beyond doubt, these properties are interrelated. The large share of people employed in agriculture and the small average size of an individual holding imply the small area of agricultural land per capita employed in agriculture. Whether all of these properties can be included in research, or one (and which) of them should be excluded, can be assessed by analysing their correlation. This, however, is beyond the scope of this study.

[53] *The main objective of the common regional policy is to reduce the existing regional problems in the EU, in both traditionally less developed regions and regions undergoing industrial and agrarian transformations, as well as to prevent further regional disparities, in other words: reduction of economic and social disparities between the EU's poorest and richest regions*. Witkowska J., Wysokińska Z. (2002): *European integration. Development of markets*; Polish Scientific Publishers, Warsaw – Łódź; p. 241.

a scheme of direct payments for agricultural production, while the second one is a set of instruments to stimulate structural changes in agriculture. Since its accession to the European Union in 2004, Poland has benefited from CAP funds in the two programming periods, i.e. 2004-2006 and 2007-2013, securing nearly PLN 120 billion. The scope of our research covers their distribution among specific voivodeships and impact on changes therein during the period concerned.

During our research, the following properties of individual voivodeships, which may be a measure of their sustainable development,[54] were taken into account:

1. Share of agricultural land in total area (%) – code: AgrLand_%.
2. Share of arable land in agricultural land (%) – code: AraLand_%.
3. Average size of an individual holding with over 1 ha of agricultural land (ha) – code: AHS.
4. Share of people employed in agriculture in the total number of the employed (%) – code: Employment.
5. Area of agricultural land per capita employed in agriculture (ha) – code: AgrLand_cap.
6. Share of agriculture in the gross value added (%) – code: GVA_%.
7. Gross value added per capita employed in agriculture (PLN) – code: GVA_cap.

The values of properties were calculated based on data derived from the *Statistical Yearbooks of Voivodeships*[55] published annually by the Central Statistical Office. It was assumed that they should be analysed independently, so each of them was placed in a separate group. The gross value added per capita employed in agriculture (GVA_cap) was considered the most important property, therefore it was assigned the highest weight: 1.5, while other properties were given weights equal to 1.

[54] Cf. Adamowicz M., Smarzewska A. (2009): *Model and indicators of sustainable development in rural areas from the local perspective*; "Scientific Journal of Warsaw University of Life Sciences. European Policies, Finance and Marketing", Issue 1(50); p. 260; Borys T. (ed., 2005): *Sustainable development indicators*; "Ekonomia i Środowisko" Publishing House, Warsaw – Białystok; p. 300 et seq.

[55] Unfortunately, due to the lack of availability of complete time series, some data come from periods similar to those analysed, as indicated in table descriptions.

Our research covered the following CAP support instruments (PLN):

1. Pillar I instruments:

1.1. Single Area Payment[56] per 1 ha of agricultural land as of 2013 – code: SAP.

2. Pillar II instruments:

2.1. Transfers per 1 ha of agricultural land as of 2013 – code: Transfers.

2.2. Investments per 1 ha of agricultural land as of 2013 – code: Investments.

2.3. Support of human resources per capita employed in agriculture as of 2013 – code: People.

The data used come from the Agency for Restructuring and Modernisation of Agriculture (author obtained these data thanks to the courtesy of Barbara Wieliczko, PhD, Institute of Agricultural and Food Economics). Properties were divided into two groups: the first one included the Single Area Payment, while the second one – Pillar II instruments. Both groups were assigned the same weights equal to 1.

Polish agriculture in 2004

Table 2.5 summarises the examined properties of Polish voivodeships in 2004. Values were entered in GradeStat. Each property was placed in a separate group, giving one of them, i.e. the gross value added per capita (GVA_cap), the weight of 1.5, while other properties were assigned weights equal to 1. They were prioritised then using the GCA algorithm. Finally, clusters were identified: three for voivodeships and two for properties.[57] Figure 2.2 presents the received overrepresentation map (Figure 2.3 explains the colour code).

Carrying out the GCA changed the arrangement of columns (representing the properties of voivodeships). Columns corresponding to the share of people employed in agriculture in the total number of the employed (Employment) and the area of agricultural land per capita employed in agriculture and the area of arable land per capita employed in agriculture (AgrLand_cap) were on the opposite ends of the map, which means that these two properties of voivodeships differ the most from each other out of all of them. It seems logical – the higher the number of people employed in agriculture, the smaller the area of agricultural land per capita.

[56] Payment available for any farmer, whose holding covers at least 1 ha of agricultural land.

[57] There is no clear rule stating how many clusters the examined objects or their properties should be divided into. A lot depends on the analysed problem, the number of objects/properties and researcher's preferences. Cf. e.g. A. Ciok A. (2004): *On the number of clusters – a grade approach*; Institute of Computer Science of the Polish Academy of Sciences, Warsaw.

Table 2.5. Agriculture in Polish voivodeships in 2004

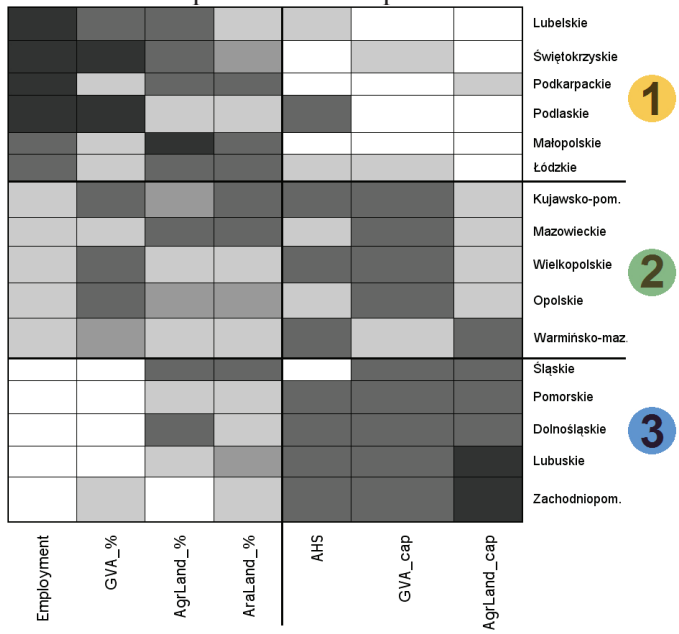
Voivodeship	AgrLand_%	AraLand_%	AHS*	Employment	AgrLand_cap	GVA_%	GVA_cap
Dolnośląskie	60.63	72.05	9.59	8.03	17.19	2.10	13 707
Kujawsko-Pomorskie	66.11	83.65	12.32	18.12	10.24	4.10	11 728
Lubelskie	71.26	75.30	6.57	38.11	6.48	5.30	5 473
Lubuskie	41.06	70.94	9.84	8.55	23.79	2.00	10 403
Łódzkie	72.08	78.25	6.73	21.48	6.89	2.70	6 116
Małopolskie	62.05	70.92	3.20	18.00	5.17	2.10	4 395
Mazowieckie	69.91	70.98	7.40	15.71	7.81	2.50	11 228
Opolskie	64.66	79.03	9.31	16.74	12.51	4.20	12 485
Podkarpackie	55.12	65.50	3.46	24.46	6.33	2.30	3 083
Podlaskie	61.41	63.96	11.07	35.23	9.05	6.20	7 890
Pomorskie	51.48	75.12	12.90	8.69	16.53	2.30	13 978
Śląskie	53.44	71.10	3.93	4.62	9.56	1.00	10 168
Świętokrzyskie	65.34	74.71	4.74	33.21	5.36	5.80	7 426
Warmińsko-Mazurskie	55.39	66.41	17.07	16.20	21.38	4.40	12 990
Wielkopolskie	65.83	79.81	10.81	17.00	9.54	4.80	14 556
Zachodniopomorskie	49.96	76.11	16.22	8.17	29.38	3.50	21 655

*Based on information obtained under the General Agricultural Census 2002. Source: CSO.

Source: Own elaboration based on CSO data.

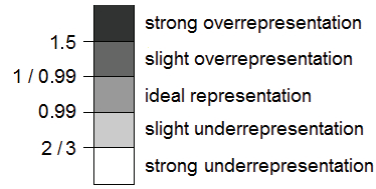
Figure 2.2. Agricultural differences in Polish voivodeships in 2004

Overrepresentation map after the GCA



Source: Own elaboration based on CSO data.

Figure 2.3. Colour codes for overrepresentation maps



Source: Own elaboration based on GradeStat graphs.

The properties of voivodeships were divided into two clusters. The first one comprises:

- share of people employed in agriculture in the total number of the employed (Employment),
- share of agriculture in the gross value added (GVA_%),
- share of agricultural land in total area (AgrLand_%),
- share of arable land in agricultural land (AraLand_%),

i.e. measures of significance of agriculture in the economy of a specific voivodeship.

The second cluster includes:

- average size of an individual holding with over 1 ha of agricultural land (AHS),
- gross value added per capita employed in agriculture (GVA_cap),
- area of agricultural land per capita employed in agriculture (AgrLand_cap),

i.e. properties, which can be considered as measures of farming intensity in agriculture.

Voivodeships were divided into three clusters. The first one includes the following voivodeships:

- Lubelskie,
- Świętokrzyskie,
- Podkarpackie,
- Podlaskie,
- Małopolskie,
- Łódzkie.

Compared to other voivodeships, the foregoing ones are characterised by:

- very high or high share of people employed in agriculture in the total number of the employed,
- very high or high share of agriculture in the gross value added (except for: Podkarpackie, Małopolskie and Łódzkie),

- high or very high share of agricultural land in total area (except for Podlaskie),
- high share of arable land in agricultural land (except for: Lubelskie and Podlaskie),
- large fragmentation of holdings (except for the Podlaskie),
- low or very low gross value added per capita employed in agriculture,
- small or very small area of agricultural land per capita employed in agriculture.

The cluster concerned includes voivodeships, for which agriculture is an important sector of the economy. Agricultural land covers a large part of their area and agriculture provides employment to a large number of people and produces a large share of the gross value added. However, agricultural production is provided by those employed in small holdings, resulting in not very high performance.

Particular attention in this cluster should be paid to Podkarpackie. It is characterised by a strong overrepresentation of employment in agriculture and a slight overrepresentation of the share of both agricultural land in total area and arable land in agricultural land. At the same time, however, its share of agriculture in the gross value added is low (slight underrepresentation). Thus, despite the efforts of a significant group of large holdings, it turns out that agriculture has no major contribution to the economy of the voivodeship.

Although the Grade Data Analysis is based on an advanced algorithm, it will not explain this phenomenon. Despite being a very useful research tool, it serves to formulate questions, rather than answer them – examined problems often require a more thorough analysis. It is highly plausible that the "paradox of Podkarpackie agriculture" can be explained by the topography of land used by local farmers. Its largest share is mountainous areas, thus making agriculture much harder.

Mountainous topography may also explain the low share of agriculture in the gross value added in Małopolskie. However, as for Łódzkie, the reason for this phenomenon is probably low-quality soils (especially luvisols, rusty and podsolic soils).

The second cluster includes the following voivodeships:

- Kujawsko-Pomorskie,
- Mazowieckie,
- Wielkopolskie,
- Opolskie,

- Warmińsko-Mazurskie,

which are mainly characterised by:

- high gross value added per capita employed in agriculture (except for Warmińsko-Mazurskie),
- large average size of holdings (except for: Mazowieckie and Opolskie),
- medium area of agricultural land per capita employed in agriculture (greater than in the first cluster, but much less than in the third one),[58]
- not very high employment in agriculture (much lower than in the first cluster, but higher than in the third one),
- major share of agriculture in the gross value added,
- share of both agricultural land in total area and arable land in agricultural land – lower than in the first cluster, but significant.

The cluster concerned includes voivodeships, for which agriculture – similarly to the first cluster – is an important sector of the economy. However, in contrast to the first cluster, the second one brings together voivodeships, in which much less people are employed in agriculture and their work is more efficient.

The third cluster is the most homogeneous. It includes the following voivodeships:

- Śląskie,
- Pomorskie,
- Dolnośląskie,
- Lubuskie,
- Zachodniopomorskie.

It is noticeable that all voivodeships are characterised by:

- high gross value added per capita employed in agriculture,
- large or very large area of agricultural land per capita employed in agriculture,
- large holdings in general (except for Śląskie and Lubuskie),
- small share of agriculture both in employment and the gross value added.

Besides:

- share of arable land in agricultural land is medium (except for Śląskie and Lubuskie),

[58] The cluster concerned is characterised by a slight underrepresentation of this property, while the first one – by a strong underrepresentation, and the third one – by a slight or strong overrepresentation.

- share of agricultural land in the total area of the voivodeships of the third cluster is comparable to the voivodeships of the second cluster (except for Zachodniopomorskie).

The third cluster comprises voivodeships, for which agriculture is a far less significant area of business activity. The share of people employed in agriculture in the total number of the employed is much lower, just as the share of agriculture in the gross value added. However, those engaged in agriculture work much more efficiently on larger areas.

Figure 2.4. Polish voivodeships coloured by clusters in 2004

Source: Own elaboration based on CSO data.

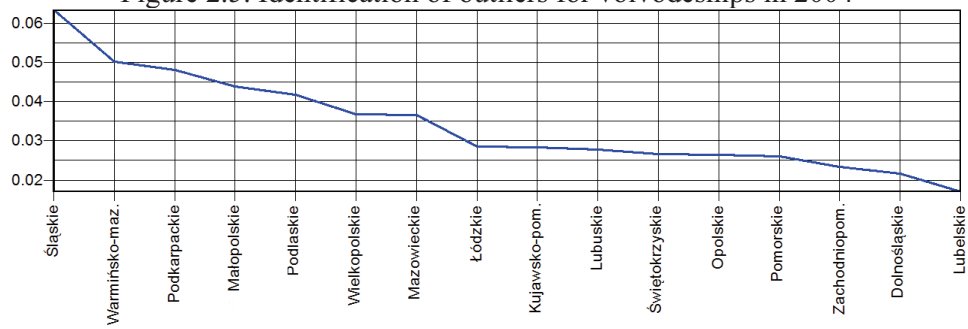
Agriculture in the voivodeships of the first cluster is more common, but less specialised. The situation in the third cluster is quite the opposite. The second cluster brings together voivodeships being "in between". It is worth noting that the first cluster includes mainly eastern and southern voivodeships (except for Łódzkie), the second one – northern and central voivodeships (except for Opolskie), while the third one – northern and western voivodeships (except for Śląskie). This is illustrated in Figure 2.4.

An outlier analysis carried out for voivodeships reveals that Śląskie is the largest "outlier from the trend". This is due to the medium size of holdings in

this voivodeship, which makes it stand out (significantly) among the other voivodeships of the third cluster. Śląskie is characterised by a strong underrepresentation of this property, while the remainder – by a slight overrepresentation. This is illustrated in Figure 2.5.

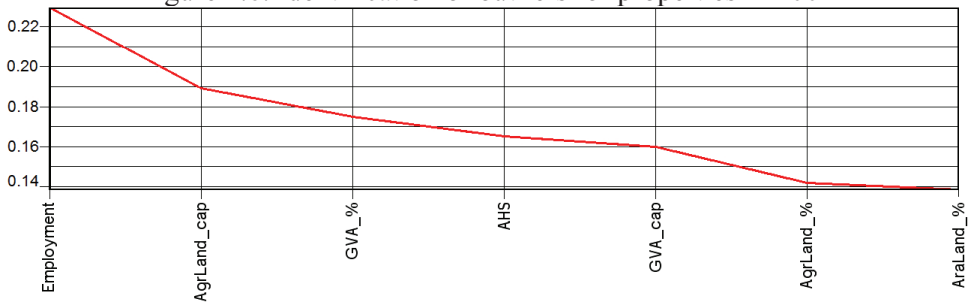
Among the analysed properties of voivodeships, the share of agriculture in employment is the biggest outlier (Figure 2.6). The reason for this is clearly visible on our overrepresentation map (Figure 2.2). This property, located in the leftmost column, contains three distinct blocks of uniform or nearly uniform colour in particular clusters.

Figure 2.5. Identification of outliers for voivodeships in 2004



Source: Own elaboration based on CSO data.

Figure 2.6. Identification of outliers for properties in 2004



Source: Own elaboration based on CSO data.

Polish agriculture in 2013

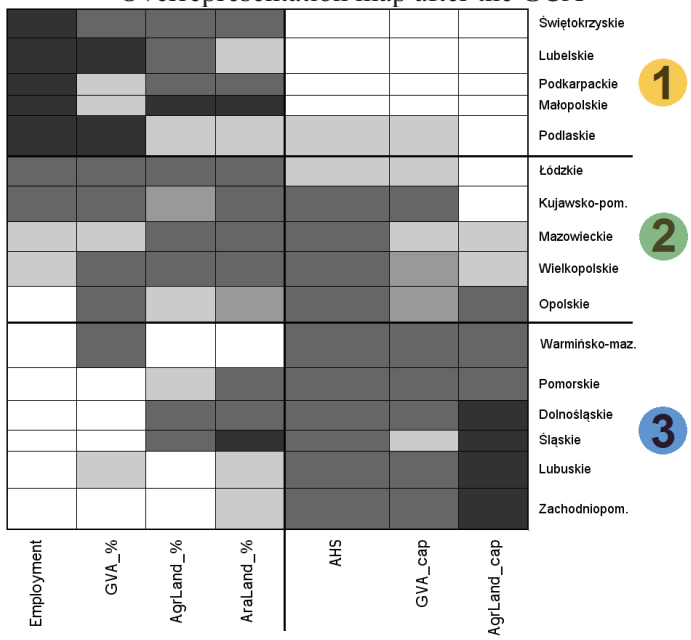
Table 2.6 summarises the examined properties of Polish voivodeships in 2013. Values were entered in GradeStat and then prioritised using the GCA algorithm. Once again, three clusters were identified for voivodeships and two – for properties. Figure 2.7 presents the received overrepresentation map.

Table 2.6. Agriculture in Polish voivodeships in 2013

Voivodeship	AgrLand_%	AraLand_%	AHS	Employment	AgrLand_cap	GVA_%[59]	GVA_cap[60]
Dolnośląskie	59.69	73.39	14.40	5.33	20.53	2.10	28 258
Kujawsko-Pomorskie	65.25	84.77	15.90	15.55	9.53	5.80	32 352
Lubelskie	70.18	74.88	8.90	27.03	6.89	8.70	17 195
Lubuskie	40.49	71.12	19.20	5.17	26.97	4.90	42 839
Łódzkie	70.83	77.75	8.50	12.49	8.66	5.20	24 521
Małopolskie	61.05	71.17	4.50	12.79	5.58	2.20	9 749
Mazowieckie	68.03	70.50	9.80	10.61	9.30	3.60	35 566
Opolskie	63.93	81.67	14.70	8.59	19.41	5.70	35 834
Podkarpackie	52.85	64.70	5.20	18.96	6.16	2.50	6 338
Podlaskie	60.23	63.29	15.80	23.97	11.05	10.90	27 950
Pomorskie	50.39	76.17	18.40	6.52	16.48	3.00	35 351
Śląskie	51.33	72.18	6.40	2.10	15.83	1.00	19 905
Świętokrzyskie	64.14	72.43	6.30	23.46	5.48	5.90	14 215
Warmińsko-Mazurskie	54.31	67.12	22.70	9.68	26.79	8.90	47 330
Wielkopolskie	65.02	81.21	14.00	11.65	12.12	5.60	34 755
Zachodniopomorskie	49.00	76.77	24.80	6.23	32.05	4.10	42 583

Source: Own elaboration based on CSO data.

Figure 2.7. Agricultural differences in Polish voivodeships in 2013. Overrepresentation map after the GCA



Source: Own elaboration based on CSO data.

[59] As of 2011.
[60] As of 2011.

The comparison of 2004 and 2013 overrepresentation maps reveals that:

- Clusters of properties of voivodeships are the same. The only change is the order of two of them, i.e. the gross value added per capita and average holding size.
- Clusters of voivodeships slightly changed. Łódzkie moved from the first cluster to the second one, while Warmińsko-Mazurskie – from the second one to the third one. The second cluster became more "geographically consistent", as illustrated in Figure 2.8.
- Properties of clusters of voivodeships became more apparent. In the first cluster, the area of properties grouped on the right side is almost entirely white or light grey (strong or slight underrepresentation).
- "Polarisation" was also observed in the third cluster of voivodeships, although it was not so strong. The area of properties grouped on the left side is almost entirely white or light grey, but with some exceptions. The main exception is Śląskie, which is still characterised by an overrepresentation of two properties of the "left cluster", i.e. the share of agricultural land in total area and the share of arable land in agricultural land.
- Śląskie (as the only one in its cluster) is still characterised by an underrepresentation of average holding size, which is, however, lower than in 2004 (light grey instead of white).
- Changes observed in the second cluster of voivodeships are relatively the slightest. It still brings together voivodeships, for whom agriculture is an important sector of the economy, but operating more efficiently than in the voivodeships of the first cluster.

Changes observed in specific voivodeships in the period considered, should be analysed as a whole. One cluster cannot be analysed separately from the other two. For example, it is easy to notice that the last column of 2004 and 2013 maps differs. The column corresponds to the area of agricultural land per capita employed in agriculture. In 2013, the first cluster had it entirely white, while the second one – partly white and partly light grey (except for Opolskie). This proves that the difference of the AgrLand_cap value between the voivodeships of the first two clusters and the voivodeships of the third cluster in 2004-2013 increased significantly. However, this may be due to both its decrease in the first two clusters and increase in the third cluster.

Tables 2.5 and 2.6 indicate that the share of agriculture in employment decreased in all voivodeships during the period concerned, while the gross value added increased per capita employed in agriculture. The colour analysis of col-

umns corresponding to these two properties on the overrepresentation maps reveals that these changes did not take place in a uniform manner throughout voivodeships.

Figure 2.8. Polish voivodeships coloured by clusters in 2013

Source: Own elaboration based on CSO data.

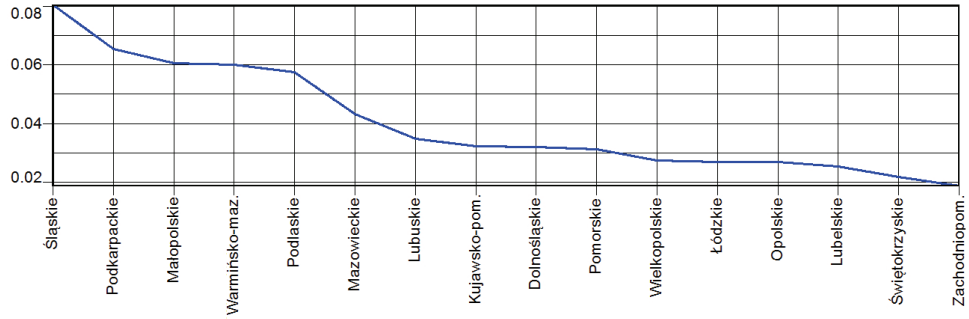
It should also be borne in mind that the GDA analyses voivodeships as a whole. An overrepresentation value of one property is associated with overrepresentation values of other ones. For example, the share of agricultural land in total area (AgrLand_%) in Wielkopolskie in 2004-2013 decreased from 65.83% to 65.02%. However, the maps indicate that its overrepresentation increased, as the other properties of the voivodeship changed at the same time.

An outlier analysis carried out for voivodeships reveals that Śląskie remains the largest "outlier from the trend" (Figure 2.9). However, it turns out that the distance between it and other voivodeships increased: *AvgDistA*[61] in 2004 was 0.063351 and increased to 0.080447 in 2013.

[61] *AvgDistA* values were calculated by GradeStat (it would be difficult to read them so accurately from graphs).

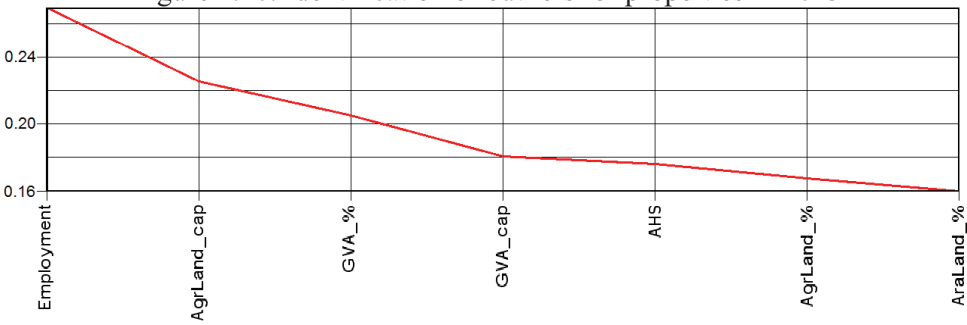
Among the properties of voivodeships, the share of agriculture in employment remains the biggest outlier (Figure 2.10). Compared to 2004, the distance between it and other properties (measured as an *AvgDistA* value) increased: from 0.229477 to 0.269557.

Figure 2.9. Identification of outliers for voivodeships in 2013



Source: Own elaboration based on CSO data.

Figure 2.10. Identification of outliers for properties in 2013



Source: Own elaboration based on CSO data.

Funds raised by Poland in 2004-2013

Table 2.7 summarises the level of funds raised by Poland in 2004-2013.

Values were entered in GradeStat. Properties were divided into two groups; the first one comprised the Single Area Payment per 1 ha of agricultural land (SAP), while the second one – the remaining three properties:

- transfers per 1 ha of agricultural land (Transfers),
- investments per 1 ha of agricultural land (Investments),
- support of human resources per capita employed in agriculture (People).

Such a division of properties into groups is due to the fact that the first group is related to the Pillar I instrument, while the other three – to the Pillar II instruments. Both groups were given weights equal to 1.

They were prioritised using the GCA algorithm, and then three clusters were identified for voivodeships and two – for properties. Figure 2.11 presents the received overrepresentation map.

Table 2.7. Funds raised by Poland under the CAP in 2004-2013

Voivodeship	SAP	Transfers	Investments	People
Dolnośląskie	2,921.18	1,429.80	1,001.42	355.10
Kujawsko-Pomorskie	3,503.52	1,846.19	1,869.53	208.21
Lubelskie	3,000.05	1,992.70	1,543.98	107.18
Lubuskie	2,776.25	1,975.88	1,036.86	661.89
Łódzkie	2,943.30	2,081.79	1,536.18	133.48
Małopolskie	2,122.50	1,750.19	1,405.50	218.36
Mazowieckie	3,068.90	2,095.41	1,689.50	242.20
Opolskie	3,285.34	1,260.76	1,112.60	418.76
Podkarpackie	2,213.95	1,828.89	1,146.43	209.67
Podlaskie	3,377.83	2,387.24	1,683.43	278.77
Pomorskie	3,060.15	1,811.66	1,331.98	385.10
Śląskie	2,103.79	1,208.10	1,488.91	451.63
Świętokrzyskie	2,555.71	2,515.32	1,474.64	161.93
Warmińsko-Mazurskie	2,923.69	1,702.51	1,194.25	527.87
Wielkopolskie	3,497.32	1,868.38	2,105.59	386.84
Zachodniopomorskie	2,902.84	1,816.44	794.87	385.21

Source: ARMA data.

It turns out that the GCA algorithm separated properties representing Pillar II funds, including the support of human resources along with the Single Area Payment belonging to Pillar I in the first cluster, while investments and transfers – in the second cluster.

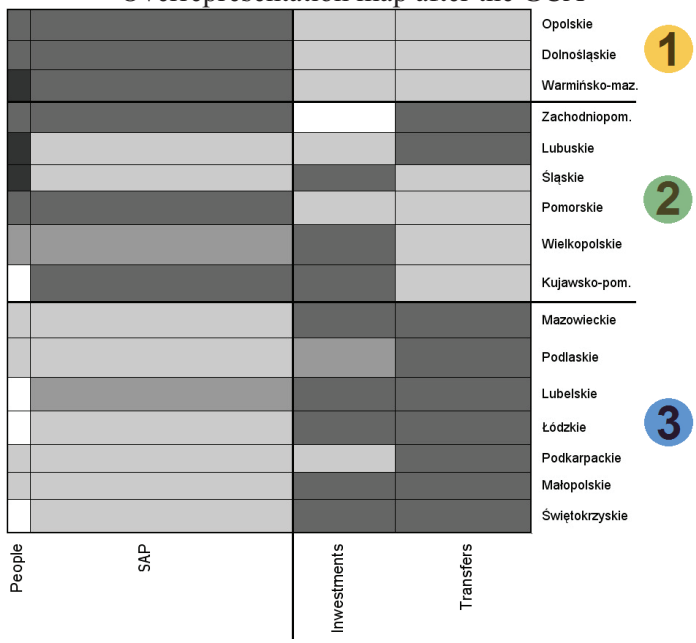
The clusters of voivodeships are as follows:

- the first cluster characterised by a slight overrepresentation of the Single Area Payment and a slight underrepresentation of investments and transfers, including: Opolskie, Dolnośląskie and Warmińsko-Mazurskie,
- the second cluster, in which payments (of both Pillar I and II) are distributed rather equally, but not as uniformly as in the first cluster; it includes: Zachodniopomorskie, Lubuskie, Śląskie, Pomorskie, Wielkopolskie and Kujawsko-Pomorskie,

- the third cluster characterised by a slight overrepresentation of investments[62] and transfers and a slight underrepresentation of the Single Area Payment;[63] it includes: Mazowieckie, Podlaskie, Lubelskie, Łódzkie, Podkarpackie, Małopolskie and Świętokrzyskie.

Furthermore, the first and second cluster is characterised by a slight or strong overrepresentation of the support of human resources,[64] while the third cluster – by its underrepresentation (slight or strong).

Figure 2.11. Funds raised by Poland under the CAP in 2004-2013. Overrepresentation map after the GCA



Source: Own elaboration based on ARMA data.

It emerges that voivodeships assigned to particular clusters are relatively consistent geographical areas, as shown in Figure 2.12 (except for: Śląskie and Warmińsko-Mazurskie). It can be noted that:

- the third cluster (overrepresentation of investments and transfers) covers central and eastern Poland,
- the second cluster (relatively equal use of funds) covers north-western Poland and Śląskie,

[62] Except for: Podlaskie and Podkarpackie.
[63] Except for Lubelskie characterised by a perfect representation.
[64] Except for: Wielkopolskie and Kujawsko-Pomorskie voivodeships.

- the first cluster (overrepresentation of the Single Area Payment) covers southern Poland and Warmińsko-Mazurskie in the north.

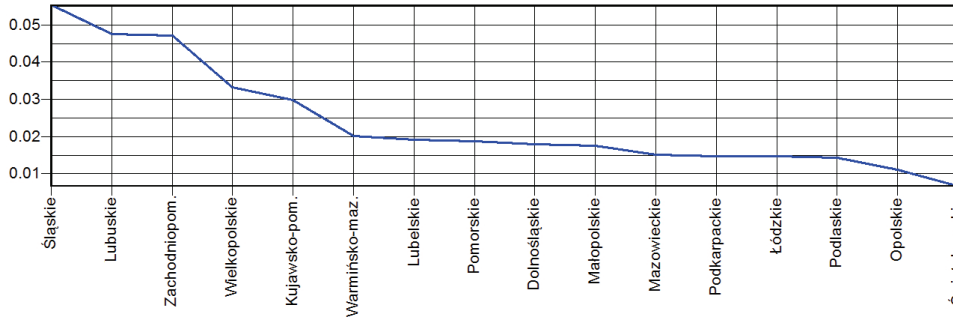
An outlier analysis carried out for voivodeships (Figure 2.13) reveals that Śląskie is also the largest "outlier from the trend" when it comes to EU fundraising. However, the term "outlier voivodeship" does not have to be interpreted negatively. The uniqueness of the voivodeship in the use of payments may be due to the uniqueness of its agriculture, as indicated by previous analyses. Separate research would be necessary to verify whether this is so which, however, is beyond the scope of this study.

What is more, an "outlier group" of Śląskie, Lubuskie, Zachodniopomorskie, Wielkopolskie, Kujawsko-Pomorskie and Warmińsko-Mazurskie can be clearly noticed. For each of them, an AvgDistA value is at least 0.02. Interestingly, outlier voivodeships do not include voivodeships from the third cluster.

Figure 2.12. Polish voivodeships coloured by clusters.
Use of EU funds in 2004-2013

Source: Own elaboration based on ARMA data.

Figure 2.13. Identification of outliers for voivodeships.
Use of EU funds in 2004-2013



Source: Own elaboration based on ARMA data.

Having compared clusters identified in particular analyses, the following observations can be made:

- In the 2004 analysis, the first cluster included Lubelskie, Świętokrzyskie, Podkarpackie, Podlaskie, Małopolskie and Łódzkie (Figures 2.2 and 2.4). They were characterised by:
  - significant share of agricultural land in their area,
  - agriculture providing employment to many people and producing a large share of the gross value added,
  - agricultural production provided by those employed in small holdings,
  - not very high performance of agricultural holdings.

  In the analysis of the use of EU funds, all of these voivodeships were included in the third cluster (Figures 2.11 and 2.12), which is characterised by an overrepresentation of investments and transfers, i.e. development-oriented payments. After ten years, we can expect that the gap between these voivodeships and those with more efficient agriculture will narrow. However, the 2013 analysis showed that Łódzkie is the only one, which moved to the second cluster (Figures 2.7 and 2.8). Moreover, despite being in the second cluster, the voivodeship is still close to the first cluster on the overrepresentation map (Figure 2.7), indicating that its properties are still similar to the properties of the first cluster.
- Besides those mentioned above, also Mazowieckie was included in the third ("development") cluster in the analysis of the use of EU funds (Figures 2.11 and 2.12). However, both in 2004 and 2013 analyses, this voivodeship was included in the second cluster (Figures 2.2, 2.4, 2.7 and 2.8). It brings together voivodeships, for whom agriculture is an important sector of the economy, but employing fewer people, whose work is more efficient than in the voi-

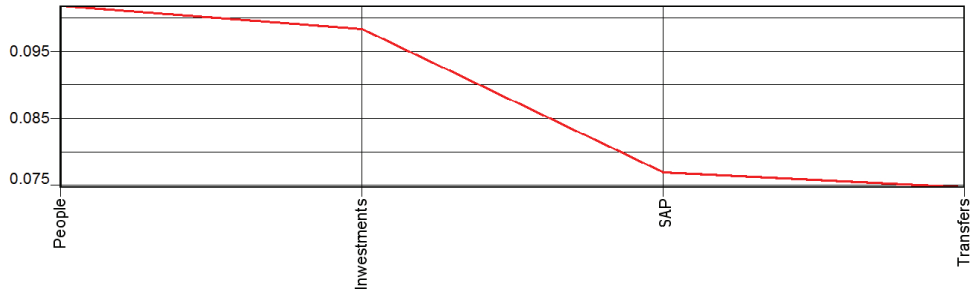
vodeships of the first cluster. Nevertheless, this is not the "cluster of leaders". Thus, the position of Mazowieckie among Polish voivodeships remains unchanged, despite the significant use of development-oriented funds.

- In the analysis of the use of EU funds, the second cluster included Zachodniopomorskie, Lubuskie, Śląskie, Pomorskie, Wielkopolskie and Kujawsko-Pomorskie (Figures 2.11 and 2.12). In the 2004 analysis, the first four were in the third cluster ("cluster of leaders"), while the last two – in the second cluster (Figures 2.2 and 2.4). Therefore, it turns out that the equal use of EU funds characterised voivodeships in a relatively good or very good (compared to others) agricultural condition. In accordance with the 2013 analysis, none of these voivodeships changed their cluster in the period concerned (Figures 2.7 and 2.8).
- The other three voivodeships, i.e. Opolskie, Dolnośląskie and Warmińsko-Mazurskie, raised proportionally the highest funds under the Single Area Payment (Figures 2.11 and 2.12). In the 2004 analysis, Opolskie and Warmińsko-Mazurskie were included in the second cluster, while Dolnośląskie – in the third cluster (Figures 2.2 and 2.4). In 2013, Opolskie and Dolnośląskie retained their positions; however, Warmińsko-Mazurskie moved to the third cluster (Figures 2.7 and 2.8), thereby joining the "cluster of leaders", although being on its verge (as seen on the overrepresentation map). Interestingly, this is not thanks to development-oriented funds, but rather direct payments.

The results obtained are surprising, hence the need to consider whether they have not been distorted by the influence of one of the properties examined. Figure 2.11 suggests that the support of human resources per capita employed in agriculture (People) could be such a property, because the corresponding column was placed on the left edge of the overrepresentation map and its cells are highly diverse in colour, which indicates that their values vary considerably. In order to verify this hypothesis, it is necessary to identify outliers for the properties examined in the last analysis, i.e. funds raised by voivodeships under the Common Agricultural Policy.

Identification results are shown in Figure 2.14. It turns out that the support of human resources is indeed the largest outlier, but it differs from other properties just a little more than investments. Notwithstanding the above, the support of human resources should be excluded from the list of the properties examined and the GCA should be performed once again.

Figure 2.14. Identification of outliers among EU funds provided to Poland in 2004-2013



Source: Own elaboration based on ARMA data.

GCA results excluding the support of human resources are illustrated in Figure 2.15. This time, voivodeships assigned to particular clusters formed completely consistent geographical areas, as shown in Figure 2.16. It can be noted that:

- The clusters of properties remained the same, but their arrangement changed. The Single Area Payment and Pillar II payments are separate clusters.
- The first cluster of voivodeships, which is characterised by an overrepresentation of the Single Area Payment, significantly enlarged. Besides Opolskie, Dolnośląskie and Warmińsko-Mazurskie, it now includes Zachodniopomorskie, Lubuskie and Pomorskie. In the 2004 analysis, two of them, i.e. Opolskie and Warmińsko-Mazurskie, were in the second cluster, while four, i.e. Pomorskie, Dolnośląskie, Lubuskie and Zachodniopomorskie – in the third cluster (Figures 2.2 and 2.4). In 2013, the situation remained almost the same; only Warmińsko-Mazurskie moved to the third cluster (Figures 2.7 and 2.8).
- The second and third clusters of voivodeships are clearly distinguished from the first one by an underrepresentation of the SAP (except for: Kujawsko-Pomorskie and Wielkopolskie) and an overrepresentation of at least one of Pillar II payments[65].
- The second cluster of voivodeships included: Kujawsko-Pomorskie, Podlaskie, Lubelskie, Łódzkie, Mazowieckie and Wielkopolskie. In the 2004 analysis, three of them, i.e. Kujawsko-Pomorskie, Mazowieckie and Wielkopolskie, were in the second cluster, while the other three voivodeships, i.e. Podlaskie, Lubelskie and Łódzkie – in the first cluster (Figures 2.2 and 2.4). In

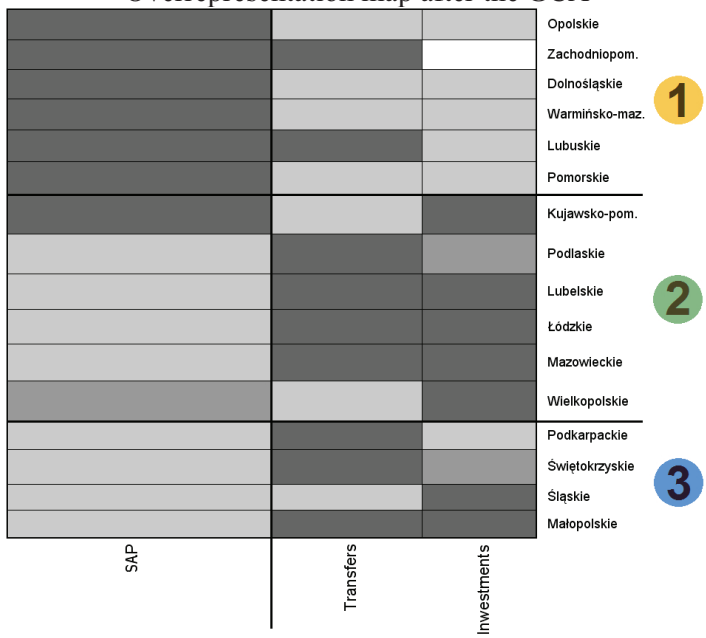
[65] As a result of dividing voivodeships into two clusters by GradeStat, the clusters mentioned above, i.e. the second and third one, are merged. The first cluster remains unchanged.

2013, Łódzkie was the only one which moved to the second cluster, while the others remained in their original clusters (Figures 2.7 and 2.8).

- The third cluster of voivodeships included: Podkarpackie, Świętokrzyskie, Śląskie and Małopolskie. In the 2004 analysis, Śląskie was in the third cluster, while the others – in the first cluster (Figures 2.2 and 2.4). In 2013, the situation remained the same (Figures 2.7 and 2.8).

Thus, it seems that although development-oriented funds reached primarily voivodeships with weaker agricultural performance, they have not contributed to bridging the gap between them and those with the strongest agricultural performance.

Figure 2.15. Funds raised by Poland under the CAP in 2004-2013. Overrepresentation map after the GCA



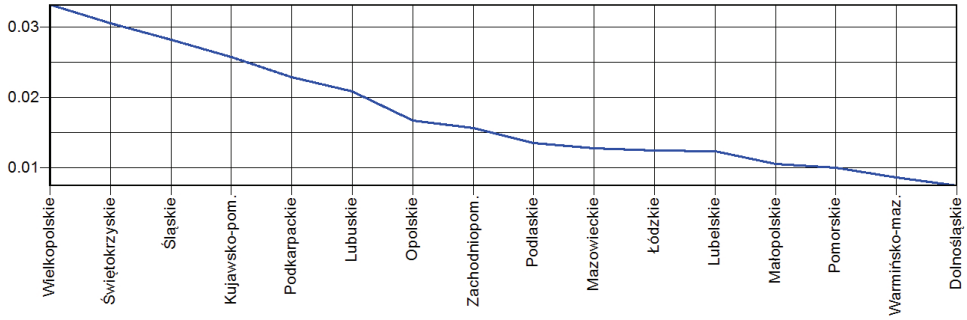
Source: Own elaboration based on ARMA data.

Figure 2.16. Polish voivodeships by clusters. Use of EU funds in 2004-2013

Source: Own elaboration based on ARMA data.

As shown in Figure 2.17, there are currently no clear outliers among voivodeships. The *AvgDistA* graph is smoothed and the maximum value of this parameter is 0.033198 (for Wielkopolskie).

Figure 2.17. Identification of outliers for voivodeships.
Use of EU funds in 2004-2013



Source: Own elaboration based on ARMA data.

Conclusion

Funds raised by Poland in 2004-2013 under the Common Agricultural Policy have contributed to the better agricultural performance of Poland. In all voivodeships, the gross value added per capita employed in agriculture has significantly increased, while at the same time, the share of agriculture in employment has decreased. This means that fewer people produce a higher value, which was possible only thanks to performance gains. In all voivodeships, average size of a holding has increased, and so has the area of agricultural land per capita in nearly all of them. Therefore, the fragmentation of holdings, so typical of Poland, has decreased.

Agriculture has strengthened its position in the economies of individual voivodeships. Dolnośląskie and Śląskie are the only voivodeships in which the share of the agricultural gross value added in the gross value added generated in the economy as a whole has not changed; in the remaining fourteen voivodeships, this share has increased.

Unfortunately, as evidenced by the research presented, the EU assistance has not reduced regional differences in Polish agriculture. The division of voivodeships into groups (clusters) by the properties of their agriculture in 2004 and 2013, i.e. at the beginning and end of the two programming periods, under which Poland benefited, leads to almost identical results. Strong voivodeships remain strong, weak voivodeships remain weak. It also appears that primarily voivodeships with the strongest agricultural performance have received direct payments, which helps them maintain their current position. Development-oriented funds, though provided to weaker voivodeships in accordance with their intended purpose, do not contribute to bridging the gap between these voivodeships and the leaders. The difference between eastern voivodeships and the rest of Poland is particularly noticeable.

In light of the above, it seems reasonable to consider modifying the EU support scheme, which would allow for the genuine sustainable development of agriculture in Poland. The conclusions of the past ten years should provide guidance in developing plans for further periods.

3. Assessment of the impact of the EU "agricultural budget" for 2014-2020 on the financial condition of national agriculture and the entire Polish economy – update

Aim and methodological assumptions of the analysis

The present paper seeks to update the results of research on the assessment of the impact of the EU agricultural budget on national agriculture and the entire economy [Rokicki 2013]. For the purpose hereof, "update" shall be understood as repeating the simulation based on statistical data available at the end of October 2014 (needed for the econometric analysis in the first stage of research) and new data on expenditure under the EU Common Agricultural Policy in Poland (used in the second stage of research).

The research methodology is exactly the same as in the case of research in Rokicki (2013). Thus, it is based on a supply-side approach and comprises two stages. The first stage involves estimating the production function and the labour demand function in the agricultural sector in Poland. In the second stage, elasticities resulting from the econometric analysis are used to estimate the impact of financial interventions under the agricultural policy on the level of production and employment.

Estimation results in the first stage of the analysis

To estimate the theoretical model, a 2003-2011 annual panel data set for 16 voivodeships (corresponding to the NUTS Level 2 classification) referring to the section of agriculture, in accordance with the classification of 2-digit NACE sections, was used. Statistical data are mostly derived from sources of the Central Statistical Office (gross value added, employment, wages, investments), the Labour Force Survey (education). The period considered, i.e. 2003-2010, was selected as a result of changes that occurred in the Polish agricultural sector after Poland's accession to the EU. We assume that the parameters of the production function should differ significantly compared to the period before 2003 (this year serves as a reference point for the analysis of dynamics).

Table 3.1 shows the estimation results of the system of equations described above. These results indicate a positive correlation between production in the agricultural sector and employment, fixed assets in the private sector and staff education. In contrast to results presented in Rokicki (2013), a correlation between employment and the level of production is statistically insignificant. Furthermore, the elasticities of education and fixed assets in the private sector

are slightly lower than previously. At the same time, however, an increase in capital stock in the public sector, which is negatively correlated with the level of production, is also lower compared to previous research. As for the labour market equation, estimation results indicate a positive and statistically significant correlation between an increase in employment and capital stock in both private and public sector, with a negative correlation with an increase in wages and the level of wages and employment in the previous year (as also envisaged). The coefficient of the education variable is negative, but this variable is statistically insignificant.

Table 3.1. Estimation results for the production function and the labour demand equation in 2003-2011

Item	All regions in total	
Dependent variable	Production	Employment
Employment	0.140 (0.46)	-
Wages	-	-0.258*** (-3.60)
Fixed assets (public sector)	-0.107*** (-4.82)	0.019** (2.07)
Fixed assets (private sector)	0.067** (2.17)	0.059** (2.53)
Human capital	0.865** (2.30)	-0.128 (-0.84)
Observations	144	144

*Source: own calculations. Levels of significance: .01 – ***; .05 – **; .1 – *; z-statistics in parentheses. R^2 not reported as it has no explanatory value in the 3sls estimation.*

Estimation results indicate that funds allocated for investments in the private sector should result in an increase in both agricultural employment and production. Thus, we can observe indirect and direct effects. At the same time, measures to increase the human capital of the employed in agriculture should bring a positive direct effect. Estimates of the impact of EU funds on production and employment in the agricultural sector are carried out in the next stage of the analysis.

Estimates in the second stage of the analysis

In the second stage of the analysis of production factor elasticities, estimates from the first stage were respectively multiplied by increases in the loga-

rithm of stock of each production factor. These increases should result from measures financed from the agricultural budget for 2014-2020. As already mentioned, the analysis takes into account both direct and indirect intervention effects. The former result from a change in the stock of a given factor, while the latter – from a change in the stock of employment. It should be noted, however, that the results of the first stage of the analysis indicate no statistically significant impact of a change in employment on a change in production.

In contrast to the forecast presented in Rokicki (2013), data on the distribution of the agricultural budget between various measures were derived from the draft RDP of 7 April 2014. However, since these data are not detailed enough, certain necessary assumptions were made. Thus, based on the planned allocation of funds for investments in 2007-2013, the share of funds to be spent on investments in public and private sectors was calculated. It turns out that total funds intended for investments in the private sector account for nearly 81% of the total investment, while in the public sector – for less than 19%. Consequently, it is assumed that investments in the private sector will take about EUR 3,790.6 million, while in the public sector – EUR 907.1 million, out of EUR 4,697.7 million in total earmarked for investment measures under the RDP 2014-2020. In this context, it is worth noting that the funds allocated for investments in the public sector do not reach directly the agricultural sector, since – in accordance with the RDP – they are intended for investments in the creation, improvement or expansion of all types of small scale infrastructure, i.e. investments in the maintenance, restoration and enhancement of the cultural and natural heritage of rural areas. Thus, such investments have no negative impact on the level of agricultural production (as indicated by the coefficient, estimated in the first stage of the analysis, when the value of fixed assets in the public sector changes).

As regards human capital-enhancing expenditures, they were assumed to be equal to expenditures intended for measure: Knowledge transfer and information actions, i.e. EUR 27.4 million. As in the previous paper, estimates in the second stage of the analysis also covered the potential impact of direct payments. The foregoing was based on Czubak and Jędrzejak (2011), stating that 25% of funds received by farmers under direct payments are intended for investments. This means that we assume that, given EUR 18,739 million of planned expenditures for subsidies in 2014-2020, investments in the private sector should amount to EUR 4684.7 million. To guarantee comparability of results with those of the previous paper, in order to assess the impact of the agricultural

budget, the aforesaid values were converted into PLN at the exchange rate of 4.3 PLN/EUR.

Table 3.2 presents the estimates of the impact of the EU agricultural budget for 2014-2020 on production and employment in the agricultural sector. For this purpose, a change in the stock of a given production factor due to funds obtained from the EU budget had to be calculated. These estimates were based on data on the stock of a given factor in 2012 (latest data available). It must therefore be assumed that the actual change in stock due to private investments financed from direct payments and RDP measures will be slightly smaller. Yet, this difference should not substantially affect the results of the analysis.

As indicated in Table 3.2, a direct increase in production due to the higher stock of human capital and physical capital should amount to about 2%. Since the variable describing the change in employment is statistically insignificant, no indirect production increase due to higher employment is observed in this case. Thus, production in the agricultural sector should increase as a result of the agricultural budget for 2014-2020 by about 2%, which will be caused by a direct effect. Employment in the sector is estimated to increase slightly less, i.e. by about 1.71%.

Given that the value added generated in the agricultural sector in 2012 amounted to just over 4%, it must be assumed that the impact of the agricultural budget on production and employment will be minimal across the economy as a whole – at least, as regards the supply-side approach to the macroeconomic analysis. In the short term, it is evident that an inflow of substantial external funds should result in positive demand effects. These, however, were not the subject of this analysis.

Nevertheless, in order to estimate potential production and employment increases in the agricultural sector, alternative scenarios that involve increasing private investments without any reduction in human capital or public investment expenditures at the same time were analysed once again. In contrast to Rokicki (2013), the number of scenarios is lower, as those involving an increase in expenditures on private investments under the RDP (their level is already known) were eliminated. Furthermore, we already know the share of funds originally earmarked for the RDP, but finally designated for direct payments. Therefore, also scenarios involving different transfer options for RDP were eliminated.

Table 3.2. Impact of funds under the Community Support Framework 2004-2006 on production and employment in the agricultural sector

Production factor	Change in the stock of a factor due to the EU agricultural budget	Production elasticity	Direct production increase	Employment elasticity	Employment increase	Indirect production increase	Total production increase
Human capital	0.001	0.865	0.001	statistically insignificant	0	0	0.001
Private physical capital	0.257	0.067	0.019	0.059	0.015	0	0.019
Public physical capital	No RDP measures	-0.107	0.000	0.019	0	0	0.000
Employment	-	statistically insignificant	-	-	-	-	-
In total			2.00%		1.71%	0%	2.00%

Source: Own calculations.

The first scenario involves increasing the share of investments in funds obtained under direct payments from 25%, as determined in the baseline scenario, to 50%. The second scenario provides for 50% of funds paid under the LFA scheme to be earmarked for investments. The third scenario assumes the accumulation of effects determined in scenarios 1-2.

As clearly indicated in Table 3.3, all scenarios aimed at stimulating investments in the private sector should increase both production and employment compared to the baseline scenario. The assumption on increasing the share of investments in funds received by farmers under direct payments from 25% to 50% is of particular impact. In this case, the total increase in production in the sector should amount to about 3% (scenarios 1 and 3).

Table 3.3. Impact of funds under the Community Support Framework 2004-2006 on production and employment in the agricultural sector – alternative scenarios

Specification	Scenario 1	Scenario 2	Scenario 3
Employment increase	2.55%	1.81%	2.64%
Direct production increase	2.96%	2.12%	3.06%
Indirect production increase	0%	0%	0%
Total production increase	2.96%	2.12%	3.06%

Source: Own calculations.

4. Scale and type of investment in agricultural holdings

Investment in agriculture can be classified in different ways. In the EU, the most widely used classification is that adopted by the FADN. It includes the following categories depending on the subject of investment:

- land;
- buildings;
- machines and equipment;
- means of transport;
- others.

A decision to undertake an investment depends on a number of factors related to both the state of the given economic entity, its financial condition and development stage and with the market situation and the activities of the state. In the case of agriculture the issues related to the development phase of the family also play important role as most of the economic entities active in this sector are family farms. Thus, the state and the financial needs of the family are strongly related to the financial soundness of the farm.

There are significant differences between the scale of the actually realized investment and existing investment needs. Previous studies on the explanation of the causes of this phenomenon can be divided into two basic categories. These are the studies based on:

1. adjustment costs;
2. asset fixity[66].

In the case of the theory of adjustment costs, the scale of the actual investment is a function of the level of depreciation and capital in the previous period, as shown by the formula:

$$I_t = ß[K_t^* + (ð - 1)K_{t-1}] \qquad (4.1)$$

where:
I_t – investment at time t,
ß – share of optimal change in capital stock,
K_t^* – optimal level of capital stock,
ð – depreciation rate,
K_{t-1} – capital stock at time t-1.

[66] C. Gardebroek , A.G.J.M. Oude Lansink (2004), *Farm-specific Adjustment Costs in Dutch Pig Farming*, "Journal of Agricultural Economics", vol. 55 (1), p. 3-24.

Adjustment costs are a very complex issue, because they are associated with such phenomena as currently/recently undertaken investment, financial structure of the company or transaction costs. While in the case of asset fixity determinants of investment are the cost of obtaining capital and its replacement price, which means that the farmer decides to invest, if the value of a given asset on the farm is higher than its price of purchase.

Regarding the role of the state in making investment decisions, it is expressed mainly in two ways. The first is the existing set of regulations or any kind of norms and standards directly defining principles of conducting a particular type of business. The second one is the policy of the state towards a given sector, including policies relating to the support of investment in this sector.

It is worth noting that the support under the agricultural policy not directly related to investment also influences the propensity to invest. A good example of this is the study conducted by V. Gallerani et al.[67], which concerned the impact of decoupling direct payments from production on the investment level. This study showed that the change in the nature of direct payments can affect the scale of investment. It also enabled the distinction of different types of farms in the EU according to their dependence on the CAP and the farm development phase (Tab. 4.1).

Table 4.1. Categories of farms depending on their dependence of the CAP and the impact of decoupling direct payments from production

Type of farm/system	Farms/systems	Main role of decoupling
CAP-indifferent	Very small farms, fruit farms	None
Income-CAP-dependent	Eastern Europe, disadvantaged areas	Income-CAP-dependent
Farming-CAP-dependent retiring	Old farmers, high labour opportunities	Encourages land retention, but with extensification
Farming-CAP-dependent expanding	Livestock, large arable crops, young farmers	Encourages investment

Source: V. Gallerani et al. (2008), op. cit., table 28.

[67] V. Gallerani, S. Gomez-y-Paloma, M. Raggi, D. Viaggi (2008), *Investment Behaviour in Conventional and Emerging Farming Systems under Different Policy Scenarios*, JRC Scientific and Technical Report Institute for Prospective and Technological Studies, Luxembourg.

An example of a model of an optimal level of farm investment, which takes into account the system of direct payments implemented within the CAP is the model applied by P. Sckokai and D. Moro[68]. It takes into account the uncertainty regarding the level of prices and assumes non-linear distribution of average variance of the level of risk preferences and the farm aims to choose such an investment path that maximizes the discounted flow of current utility of its assets:

$$J = max_I \int_t^{\infty} e^{-rv} \mathrm{U}(\mathrm{p^e}, \mathrm{w}, \mathrm{a}, \mathrm{b}, \mathrm{c}, \mathrm{q}, \mathrm{K(v)}, \mathrm{I(v)}, \mathrm{z}, \mathrm{v}, \mathrm{W_0}, \mathrm{V_p}) dv \qquad (4.2)$$

s. t. $\dot{K} = \mathrm{I} - \eth\mathrm{K}$, $\mathrm{K(t)} = \mathrm{k}$

where:
t – starting time of the planning horizon,
p^e – vector of expected output prices,
w – vector of variable input prices,
a – vector of CAP crop specific area payments,
b – set-aside payment,
c – set-aside percentage,
q – vector of quasi-fixed input user-prices,
W_0 – initial wealth,
V_p – variance–covariance matrix of expected output prices,
I – level of gross investment,
k – equilibrium vector of quasi-fixed inputs in each period (once investment decisions have been made),
r – constant rate of discount,
d – vector of constant rates of depreciation.

As studies conducted by P. Sckokai and D. Moro relating to the period 1994-2002 and the ones by G. Guastella et al.[69] covering the period 2001-2008 indicate, the impact of direct payments on the level of investment is very small. Similar conclusions can be drawn from studies conducted using the Polish FADN database for the years 2008-2011 presented in the study conducted by

[68] P. Sckokai, D. Moro (2009), *Modelling the impact of the CAP Single Farm Payment on farm investment and output*, "European Review of Agricultural Economics", vol. 36 (3), pp. 395-423.
[69] G. Guastella, D. Moro, P. Sckokai, M. Veneziani (2013), *CAP Effects on Agricultural Investment Demand in Europe*, Selected Poster prepared for presentation at the Agricultural & Applied Economics Association's, 2013 AAEA & CAES Joint Annual Meeting, Washington, DC, August 4-6, 2013.

Sz. Figiel, M. Hamulczuk and Wł. Rembisz, who showed that the impact of the so-called political rent, represented by the amount of received subsidies, on the level of investment is negligible[70].

The support for investment in agricultural holdings is aimed not only at the development of the agricultural sector as a whole. It also seeks to reduce the differences and disparities within the sector, as evidenced by the specific arrangements having the character of preferences for some sectors or groups of farms. This is also visible in the EU agricultural policy. The expected result of such a character of support is an increase in the convergence among farms. However, as shown by the results of B.N. Poudela, K.P. Paudela and D. Zilberman on the example of the American agriculture, such a process at the national level does not occur[71].

Raising productivity and maintaining the capacity to continue farming activity requires systematic investment. Investment can not only ensure the continuance of economic activity, but it also can increase the competitiveness of entities undertaking investment projects. Therefore an assessment of the scale and types of investment enables determination of the competitive potential of the agricultural sector.

As indicated by studies carried out in France, Germany, United Kingdom, Italy and Hungary concerning farms specializing in field crops, the role of support and its impact on investment decisions varies depending on the country and type of farm and it is specific to particular types of investment[72].

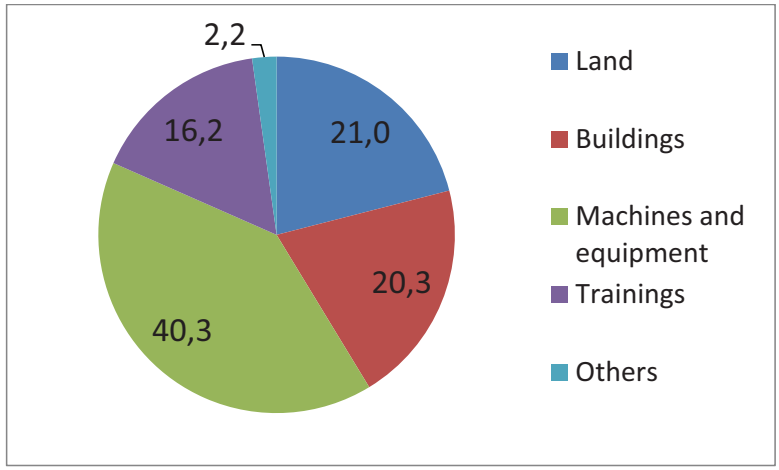
M. Lefebvre et al. prepared a study on farmers' investment plans for the years 2014-2020. This study included a total of 780 farms from the Czech Republic, France, Spain, Germany, Poland and Italy. It should be noted that the study population did not reflect the structure of agricultural holdings in the EU or in the countries studied in terms of the size of arable land. For example, in Poland the studied group of farms had the following structure: 5% – holdings with <10 ha of agricultural land; 65% – farms with UAA in the range of

[70] Sz. Figiel, M. Hamulczuk, Wł. Rembisz (2014), *Wybrane zastosowania modelowania ekonomicznego w analizie przesłanek konkurencyjnego rozwoju sektora rolno-spożywczego*, PW 2011-2014 no. 145, IERiGŻ-PIB, Warszawa, p. 78.
[71] B.N. Poudel, K.P. Paudel, D. Zilberman (2011*), Agricultural Productivity Convergence: Myth or Reality?*, "Journal of Agricultural and Applied Economics" vol. 43(1), p. 143-156.
[72] G. Guastella, D. Moro, P. Sckokai, M. Veneziani (2013), *op. cit*.

<10.50); 21% – holdings with an area of UAA in the range of <50,100) and 9% – holdings with ≥ 100 ha UAA[73].

In the countries surveyed, 56.5% of farmers is willing to invest during the period 2014-2020. When it comes to the structure of the planned investment, it is dominated by investment in machinery and equipment – 40.3% (Fig. 4.1).

Figure 4.1. Structure of investment planned by farmers declaring undertaking investment in the years 2014-2020 (in percent)

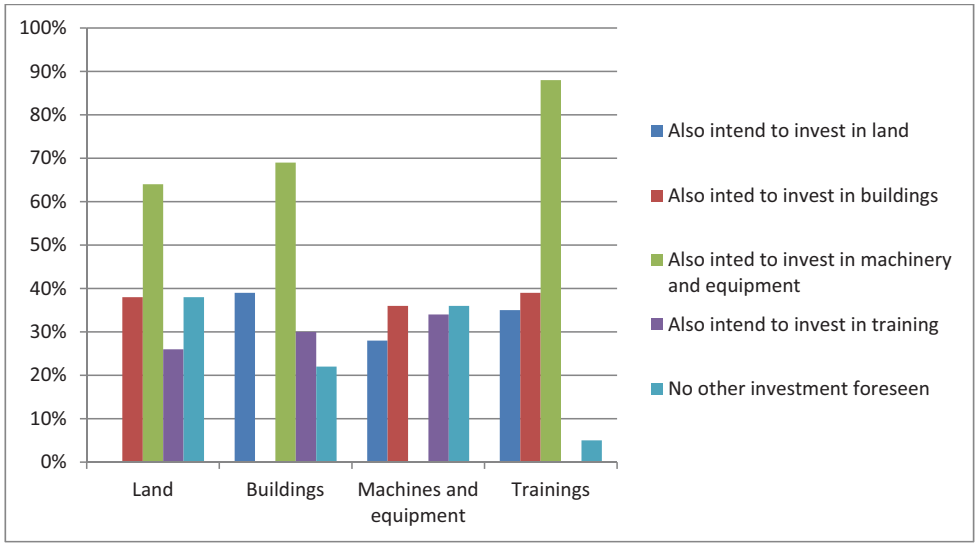


Source: Own elaboration based on M. Lefebvre et al. (2014), fig. 8.

At the same time, most farmers also plans to conduct another kind of investment in this period (Fig. 4.2). Most often, this additional investment will involve a purchase of machinery and equipment.

[73] M. Lefebvre, K. de Cuyper, E. Loix, D. Viaggi, S. Gomez-y-Paloma (2014), *European farmers' intentions to invest in 2014-2020: survey results*, JRC Science and Policy Reports, Luxembourg, fig. 2.

Figure 4.2. Planned additional investment among farmers assuming that in the period 2014-2020 they will undertake different types of investment

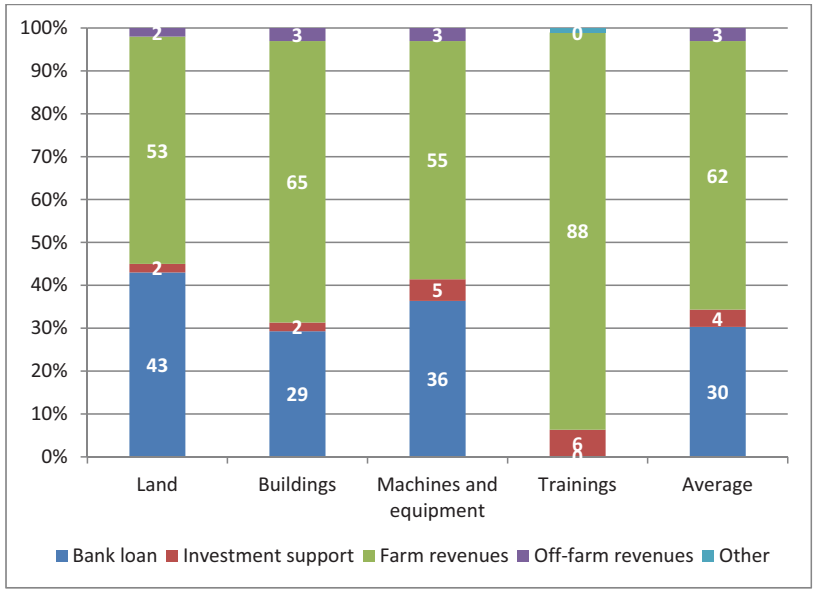


Source: Own elaboration based on M. Lefebvre et al. (2014), fig. 8.

The role of investment support in investment plans of EU farmers is worth mentioning. Public support as a major source of funds for planned investment is mentioned only by a few percent of farmers planning a given type of investment. In the case of investment in training public funds will be most commonly used as the main source of investments. This indicates first and foremost to the fact that the budget allocated to investment measures is so limited that they are not treated as potentially important source of investment capital.

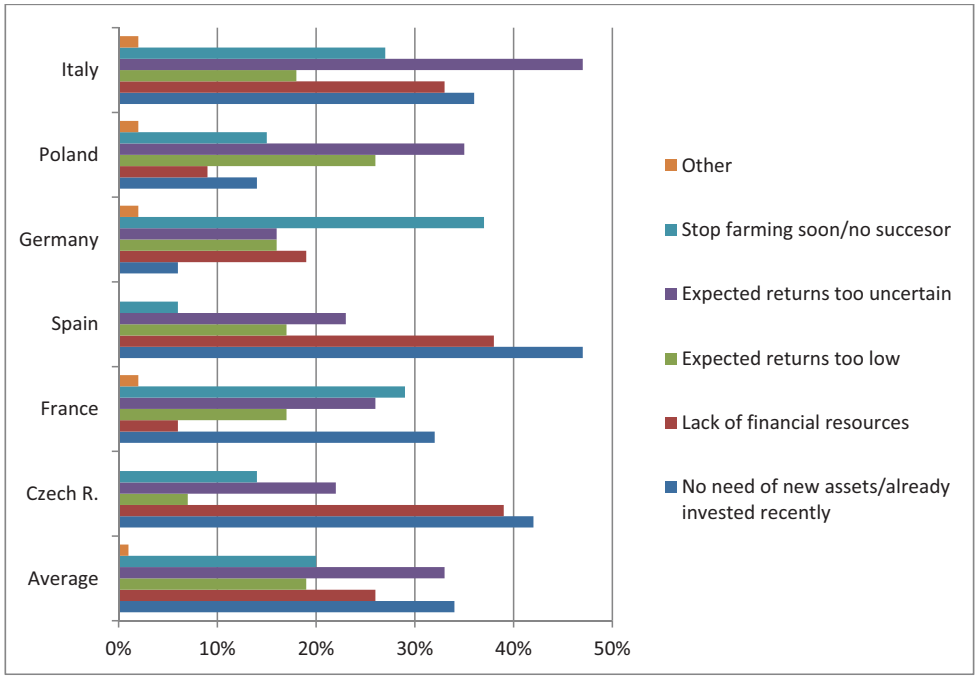
Therefore, it is important to look at the reasons for the lack of investment plans. These reasons vary in different EU countries (Fig. 4.4). On average, the main reason for the lack of investment plans is the fact that in recent years the farmer has implemented investment projects. However, an almost equally important cause of lack of investment plans is the uncertainty about the return on investment. Another reason is the lack of funds for investment, which may indicate limited access to external sources of capital, especially credit, as well as the need to increase the scale of investment support.

Figure 4.3. Percentage of planned investment financed mainly with a particular source of financing



Source: Own elaboration based on M. Lefebvre et al. (2014), fig. 15.

Figure 4.4. Reasons for the lack of investment plans among the EU farmers



Source: Lefebvre et al. 2014, fig. 14.

5. Scale and structure of investment in the Polish farms in 2007-2012

This part of the study presents the results of the analysis of the scale and structure of the investment made in the Polish farms in 2007-2012. The purpose of this analysis, prepared on the basis of Polish FADN data, was to determine the shape and scope of investment in Polish agriculture in recent years and whether it varied depending on the region and type of production[74].

In the analysed period in all regions more than half of farms reported spending on investment (Tab. 5.1). Only in 2010 in two regions the observed percentage of investing farms was lower than 50%. The highest share of investing farms occurred in 2007 and the lowest in 2010. Looking at the dynamics of the implementation of the subsequent programmes co-financed by the second pillar of the CAP, the share of investing farms can be linked with the large number of beneficiaries of pro-investment support in 2007 and a their small number in 2010, but the share of farms receiving such support in relation to their total number is very low. Therefore, it seems more probable that the investment scale is related to the economic situation in agriculture and the whole economy.

When it comes to comparing the prevalence of investing in each of the regions these were the farmers in the region Mazowsze i Podlasie, who most often undertook investment project, which was reflected in the activity of farmers in the region in reaching for the support offered by the rural development programmes.

Table 5.1. Share of farms that reported expenditure in a given year in the various regions of the Polish FADN

Year	Pomorze i Mazury	Wielkopolska i Śląsk	Mazowsze i Podlasie	Małopolska i Pogórze
2007	61.2	59.4	67.6	60.0
2008	50.7	51.3	64.7	58.2
2009	51.1	51.2	60.8	54.4
2010	48.7	50.9	58.4	49.9
2011	52.7	54.5	60.3	54.4
2012	52.5	53.6	62.0	57.7

Source: Own elaboration based on the Polish FADN data.

[74] The analysis of investment conducted in the years 2004-2007 by the Polish farms depending on their production type is presented in an article: J. Mikołajczyk (2010), *Wyniki ekonomiczne a nakłady inwestycyjne w indywidualnych gospodarstwach rolnych uczestniczących w polskim FADN w zależności od ich typu rolniczego*, „Problemy Rolnictwa Światowego" tom XV, zeszyt 1, s. 91-100.

Given the fact that in the case of some farms the amount of expenditure was very low the further analysis includes only those farms, for which total investment expenditure in a given year amounted to at least PLN 2,000. The introduction of the minimum limit of expenditures resulted in a lower share of investing farms. This applied to each region and to each year of the study as the share of farms investing declined by several p.p. (Tab. 5.2)[75].

Table 5.2. Share of farms that reported expenditure at least PLN 2,000 in a given year in different regions of Polish FADN

Year	Pomorze i Mazury	Wielkopolska i Śląsk	Mazowsze i Podlasie	Małopolska i Pogórze
2007	57.1	55.5	57.8	52.3
2008	49.3	46.9	52.1	50.9
2009	47.3	47.6	49.6	47.9
2010	45.0	48.4	48.5	44.1
2011	49.6	51.3	52.4	49.0
2012	49.7	51.1	55.1	52.8

Source: Own elaboration based on the Polish FADN data.

Investment in the region Pomorze i Mazury

Among the farmers in the region Pomorze i Mazury, whose total investment expenditure amounted to at least PLN 2,000 mostly carried out projects involving the purchase of new machinery and equipment (Tab. 5.3). Twice less popular was investing in means of transport and an even smaller share of investing farmers decided to purchase agricultural land. The smallest share of farmers undertook construction investment. Such a structure of popularity of expenditure on different types of investment remained stable throughout the period under consideration.

The popularity of each category of investment is also reflected in the level of investment expenditure (Tab. 5.4). Only in relation to expenditure incurred for equipment and machines the median of expenditure was different from zero. In contrast, the median total investment spending changed in each analysed year. The lowest median was observed in 2008 – PLN 38,377 and the highest in 2012 – PLN 49,000.

[75] All the results presented in the further text related to investment in the Polish agriculture applies only to farms whose total investment exceeded PLN 2,000 in a given year, unless indicated otherwise.

Table 5.3. Share of farms that incurred expenditure for each category of investment in the region Pomorze i Mazury

Year	Land	Buildings	Machines	Means of transport	Other
2007	15.9	11.2	65.0	29.8	36.8
2008	16.6	5.9	64.8	30.1	25.6
2009	16.1	3.8	66.6	33.5	27.5
2010	17.1	4.4	66.1	33.1	26.1
2011	13.9	5.0	65.0	32.6	32.8
2012	19.5	4.7	62.7	30.6	34.8

Source: Own elaboration based on the Polish FADN data.

Table 5.4. Median amount of investment expenditures in the region Pomorze i Mazury

Year	Land	Buildings	Machines	Means of transport	Other	Sum
2007	0	0	5,703	0	0	38,377
2008	0	0	6,000	0	0	28,500
2009	0	0	7,000	0	0	33,000
2010	0	0	6,800	0	0	36,000
2011	0	0	7,000	0	0	34,384
2012	0	0	5,900	0	0	49,000

Source: Own elaboration based on the Polish FADN data.

On average the highest expenses were connected with the purchase of land (Tab. 5.5). In 2008 they were the lowest and amounted to PLN 103,651 and in 2012 they reached PLN 249,324. In the analysed period also in other categories an average expenditure underwent significant changes. They were not related to the level of change in spending on other categories. When it comes to the total amount of investment expenditure, it also underwent various fluctuations and in 2012 it peaked reaching PLN 159,000.

Table 5.5. Average amount of expenditure on different categories of investment (min. PLN 2,000 spent on a given category) in the region Pomorze i Mazury

Year	Land	Buildings	Machines	Means of transport	Other	Sum
2007	125,233	62,984	42,107	78,800	59,657	100,027
2008	103,651	67,350	48,254	78,926	37,463	85,927
2009	155,668	56,649	67,070	129,107	33,871	124,525
2010	167,240	106,920	59,993	111,319	55,384	124,306
2011	142,608	66,146	67,736	111,786	37,477	115,891
2012	249,324	124,963	77,310	129,043	47,411	159,000

Source: Own elaboration based on the Polish FADN data.

Further analysis concerns the comparison of investment scale depending on the type of agricultural production. The share of farms investing in individual years is related to the type of production (Tab. 5.6). However, it is impossible to speak of investment leaders in the whole period considered. The share of investing farms of a given type compared to the total number of farms investing in the region Pomorze i Mazury underwent significant changes. But it is clear that farms specializing in horticulture implemented investment projects less often than other types of farms.

In 2007, i.e. in the first year of the analysed period, three types of farms recorded a share of investing farms reaching 70%. In subsequent years such a share was not observed. This suggests an accumulation of investment in this year. It was a year in which the first post-accession programmes of support for rural development and agriculture were still being implemented. Such a high percentage of investing farms suggests that at that time there were still being implemented measures to adapt the production capacity of farms to compete on the EU single market.

Table 5.6. Share of farms that incurred investment expenditure in the region Pomorze i Mazury in 2007-2012 by type of production

Farm type	2007	2008	2009	2010	2011	2012
Field crops	53.8	53.6	49.9	49.3	50.9	53.3
Horticulture	24.3	29.4	20.0	14.7	28.1	31.4
Permanent crops	70.8	63.2	43.8	50.0	54.5	35.7
Milk cows	70.0	60.7	55.2	53.5	61.2	63.6
Other grazing livestock	75.3	52.0	49.4	41.1	43.6	36.6
Granivores	54.8	42.8	52.6	48.2	45.5	45.7
Mixed	53.1	42.8	40.9	37.0	44.1	42.3
Average	57.1	49.3	47.3	45.0	49.6	49.7

Source: Own elaboration based on the Polish FADN data.

The level of investment expenditure in the period was different in different years and depending on the type of investment. In the case of farms specializing in field crops, average investment expenditure exceeded PLN 100,000 (Tab. 5.7). Typically, the highest investment expenditures related to investment in land and means of transport.

Average level of investment spending in farms specializing in horticulture in the region Pomorze i Mazury for different types of investment is difficult to assess, since in many cases the number of farms within the FADN database investing in a given year is too small to allow for any conclusion about the entire population (Tab. 5.8).

Table 5.7. Average amount of investment expenditure incurred by farms specializing in field crops in region Pomorze i Mazury in 2007-2012 (in PLN)

Type of investment	2007	2008	2009	2010	2011	2012
Land	156,090	12,742	178,816	62,026	39,382	88,146
Buildings	50,889	32,249	20,864	5,868	2,135	5,022
Machines	60,417	72,117	106,601	53,958	53,509	71,186
Means of transport	98,843	103,473	166,972	58,090	50,300	54,161
Other	43,913	48,341	27,968	17,579	14,247	13,572
Sum	123,101	119,607	179,828	197,520	159,573	232,087

Source: Own elaboration based on the Polish FADN data.

Table 5.8. Average amount of investment expenditure incurred by farms specializing in horticulture in region Pomorze i Mazury in years 2007-2012

Type of investment	2007	2008	2009	2010	2011	2012
Land	-	56,597	29,250	244,509	0	0
Buildings	-	0	0	12,060	36,108	9,540
Machines	-	21,443	11,418	560	4,611	28,949
Means of transport	-	16,825	18,500	30,000	16,383	20,764
Other	-	6,975		41,355	7,772	68,796
Sum	63,312	41,634	28,025	328,484	64,875	128,049

Source: Own elaboration based on the Polish FADN data.

In the case of farms specializing in permanent crops in half of the studied years the average level of expenditure on land investments was PLN 0 (Tab. 5.9). However, in 2008-2009 farms realized too few investment projects related to buildings to justify calculating a mean amount of investment expenditure.

Table 5.9. Average amount of investment expenditure incurred by farms specializing in permanent crops in the region Pomorze i Mazury in 2007-2012 (in PLN)

Type of investment	2007	2008	2009	2010	2011	2012
Land	195,225	97,712	0	0	0	91,400
Buildings	333,950	-	-	3,326	4,823	0
Machines	86,262	20,970	48,849	24,724	22,440	46,025
Means of transport	122,832	69,827	213,433	90,833	5,333	52,900
Other	50,386	93,338	29,074	15,417	9,498	16,539
Sum	211,884	119,327	153,487	134,301	84,420	206,864

Source: Own elaboration based on the Polish FADN data.

In the case of milk cow farms, the average level of investment spending was steadily increasing starting from the year 2008 (Tab. 5.10). A particularly large variation was observed in the case of expenditure on construction projects,

due to the fact that investment in this category, as well as investment in land, belong to the most rarely performed.

Table 5.10. Average amount of investment expenditure incurred by milk cows farms in the region Pomorze i Mazury in 2007-2012 (in PLN)

Type of investment	2007	2008	2009	2010	2011	2012
Land	69,487	79,506	92,446	13,667	5,278	14,478
Buildings	67,042	0	287,225	2,947	608	1,264
Machines	30,424	16,439	30,494	24,030	40,171	43,724
Means of transport	65,630	53,318	65,958	23,028	32,106	36,634
Other	31,020	21,521	17,452	15,237	10,937	13,228
Sum	63,931	49,320	54,977	78,909	89,100	109,327

Source: Own elaboration based on the Polish FADN data.

As for the farms specialising in other grazing livestock, the lowest level of an average investment expenditure was recorded in 2010 (Tab. 5.11). The level of expenditure on individual types of investment was diverse and characterised by fluctuations. Only in the case of expenditure on construction, it was significantly higher in the first half of the period analysed than in the second one.

Table 5.11. Average amount of investment expenditure incurred by farms specialising in other grazing livestock in the region Pomorze i Mazury in 2007-2012 (in PLN)

Type of investment	2007	2008	2009	2010	2011	2012
Land	70,002	88,587	117,459	4,604	38,006	31,779
Buildings	62,313	67,711	20,461	9,057	5,258	2,898
Machines	35,134	29,692	40,953	10,145	41,128	25,426
Means of transport	69,855	77,499	93,139	17,082	39,282	20,003
Other	62,301	26,982	37,865	4,537	3,953	12,962
Sum	92,902	61,970	89,132	45,425	127,628	93,068

Source: Own elaboration based on the Polish FADN data.

In the case of farms specializing in granivores, an average level of investment spending was much higher than in farms with pasture animals (Tab. 5.12). Again, the expenditure on construction investment was on average significantly higher in the first half of the analysed period than in the second one.

The investment expenditure incurred by mixed farms was on average considerably lower than the expenses of farms specializing in granivores (Tab. 5.13). The lowest level of investment spending was observed in 2008.

Table 5.12. Average amount of investment expenditure incurred by farms specialising in granivores in the region Pomorze i Mazury in 2007-2012 (in PLN)

Type of investment	2007	2008	2009	2010	2011	2012
Land	98,983	55,860	129,013	7,718	34,061	63,530
Buildings	51,504	319,101	65,285	10,190	13,887	15,311
Machines	49,226	43,821	63,284	58,461	80,210	54,633
Means of transport	102,674	75,472	135,446	35,896	46,121	29,648
Other	187,976	71,275	45,525	16,385	16,007	22,834
Sum	157,260	107,114	137,980	128,649	190,286	185,956

Source: Own elaboration based on the Polish FADN data.

Table 5.13. Average amount of investment expenditure incurred by mixed farms in the region Pomorze i Mazury in 2007-2012 (in PLN)

Type of investment	2007	2008	2009	2010	2011	2012
Land	121,724	83,731	174,709	18,431	5,589	39,067
Buildings	52,277	27,742	48,193	1,243	1,801	9,399
Machines	27,580	37,377	49,450	39,912	28,354	30,616
Means of transport	58,813	60,556	106,947	31,636	23,664	33,220
Other	39,493	30,981	47,547	11,442	12,778	19,715
Sum	72,555	62,163	95,184	102,665	72,186	132,017

Source: Own elaboration based on the Polish FADN data.

The next stage of the study was a description of typical farms of the analysed production types depending on whether they implemented or not investment projects. The case of farms specializing in field crops, clearly confirms the widely known regularity pointing to the fact that generally more likely to invest are larger farms. In the analysed period investing farms of this type were by approx. 1/3 larger in terms of their UAA than the ones with no investment activity (Tab. 5.14). This difference was even more pronounced in the case of total production value. On average, investing farms registered twice higher production value than those not investing. The difference was even greater in relation to the level of total sales. However, in the case of income level, this difference was not that significant in most of the analysed years.

Table 5.14. Characteristics of investing and non-investing farms specializing in field crops in the region Pomorze i Mazury in 2007-2012

Characteristic	Investing	2007	2008	2009	2010	2011	2012
UAA (ha)	Non-investing	76.5	61.4	65.8	81.9	71.7	70.9
	Investing	106.9	105.1	106.8	121.5	114.3	114.6
Total production (PLN)	Non-investing	221,059	133,385	147,604	198,615	219,550	264,685
	Investing	355,735	301,156	292,004	409,379	386,118	499,858
Total sales (PLN)	Non-investing	205,785	123,004	138,152	184,082	202,291	247,268
	Investing	320,043	269,326	286,602	384,794	352,078	463,643
Income (PLN)	Non-investing	123,556	45,900	64,092	112,071	116,519	143,975
	Investing	162,406	110,224	117,703	209,807	190,245	253,610

Source: Own elaboration based on the Polish FADN data.

In the case of farms specializing in horticulture, the differences in the size of UAA between investing and non-investing farms were much larger than these observed by field crops farms (Tab. 5.15). The investing horticultural farms were almost during the entire period 3-4-fold larger than the non-investing ones. Exclusively in the last year of the analysis investing farms were only by about a half larger than non-investing ones. In the case of the total production in half of the examined years its observed value was higher in the case of farms pursuing investment and in the remaining years these were non-investing farms that had higher production values. This could suggest both, the fact that in subsequent years dominated farms specializing in other crops, as well as the fact that the situation of this type of farms differed significantly due to the unstable situation in the markets of horticultural products. The same applies to the value of sales. In the case of the level of income a clearly higher figures were observed in investing farms. The exception is the year 2009. But in 2012, despite the small difference in the size of arable land and sales volume, the difference in income level amounted to many hundreds p.p. Nevertheless, all these comments must be treated with caution due to a low number of farms of this kind in the studied FADN. This means that the specific conditions under which a given farm operates may significantly affect the picture of the situation in the whole group.

Table 5.15. Characteristics of the investing and non-investing farms specializing in horticulture in the region Pomorze i Mazury in 2007-2012

Characteristic	Investing	2007	2008	2009	2010	2011	2012
UAA (ha)	Non-investing	3.2	4.1	4.3	5.5	4.2	6.1
	Investing	16.7	11.2	10.5	28.9	16.9	9.0
Total production (PLN)	Non-investing	141,784	211,547	219,534	234,487	173,757	217,364
	Investing	239,903	168,422	159,648	331,883	328,719	85,655
Total sales (PLN)	Non-investing	139,940	210,091	219,996	233,916	174,100	205,104
	Investing	211,476	167,936	151,620	321,308	334,374	280,845
Income (PLN)	Non-investing	39,017	51,228	49,069	40,480	29,073	34,069
	Investing	49,714	51,392	31,137	95,764	90,299	285,019

Source: Own elaboration based on the Polish FADN data.

In the case of farms specializing in permanent crops, the differences between investing and non-investing farms were highly visible (Tab. 5.16). Throughout the period considered investing farms were on average much larger than those that were not implementing any investment. Also, production, sales and income of the investing farms were clearly superior to those that characterized the non-investment holdings.

Table 5.16. Characteristics of the investing and non-investing farms specializing in permanent crops in the region Pomorze i Mazury in 2007-2012

Characteristic	Investing	2007	2008	2009	2010	2011	2012
UAA (ha)	Non-investing	25.2	12.4	13.4	8.4	28.9	18.1
	Investing	84.8	72.1	52.1	55.7	36.8	64.2
Total production (PLN)	Non-investing	119,510	101,044	81,099	117,808	130,588	173,912
	Investing	432,964	179,610	345,767	201,295	188,349	110,510
Total sales (PLN)	Non-investing	111,503	120,511	76,056	25,000	65,305	168,896
	Investing	401,104	184,084	327,481	198,293	192,904	119,870
Income (PLN)	Non-investing	65,305	-3,397	24,535	40,484	84,420	37,630
	Investing	269,508	80,900	114,439	130,596	113,276	121,755

Source: Own elaboration based on the Polish FADN data.

In the case of farms specializing in milk cows also clearly visible was the difference between investing and non-investing farms (Tab. 5.17). All the analysed indicators were on average significantly higher in the case of investing farms than in the non-investing ones.

Table 5.17. Characteristics of the investing and non-investing farms specializing in milk cows in the region Pomorze i Mazury in 2007-2012

Characteristic	Investing	2007	2008	2009	2010	2011	2012
UAA (ha)	Non-investing	27.5	29.1	32.1	38.1	38.2	33.6
	Investing	34.8	38.0	43.0	46.2	48.3	49.2
Total production (PLN)	Non-investing	120,431	99,536	105,946	136,092	172,185	166,924
	Investing	161,557	156,767	170,122	218,625	260,612	282,829
Total sales (PLN)	Non-investing	86,382	87,380	96,403	115,438	143,865	138,361
	Investing	127,967	139,384	149,883	189,369	220,901	239,477
Income (PLN)	Non-investing	54,720	42,776	35,110	67,361	73,094	71,307
	Investing	69,232	64,936	67,668	130,596	113,276	115,629

Source: Own elaboration based on the Polish FADN data.

Among farms specializing in other grazing livestock significant advantage of the investing farms over non-investing ones was observed in the case of UAA size, production, sales and income and it was present throughout the period considered (Tab. 5.18).

Table 5.18. Characteristics of the investing and non-investing farms specializing in other grazing livestock in the region Pomorze i Mazury in 2007-2012

Characteristic	Investing	2007	2008	2009	2010	2011	2012
UAA (ha)	Non-investing	33.9	38.9	39.8	37.2	33.5	39.0
	Investing	52.5	52.2	53.7	49.1	63.7	63.9
Total production (PLN)	Non-investing	96,955	103,850	99,919	68,947	59,589	98,176
	Investing	232,659	189,304	170,151	157,190	186,925	191,805
Total sales (PLN)	Non-investing	72,155	87,159	86,437	51,074	45,380	75,189
	Investing	190,906	169,807	148,161	128,496	143,574	146,242
Income (PLN)	Non-investing	40,850	43,562	36,842	41,710	28,816	43,606
	Investing	101,966	71,988	67,000	68,546	92,161	88,312

Source: Own elaboration based on the Polish FADN data.

In the case of farms specializing in granivores in 2007 non-investing farms were significantly larger than investing ones (Tab. 5.19). In subsequent years the investing farms were much larger than the non-investing holdings.

A typical for other types of farms relationship between investing and farms non-investing also appeared in the case of mixed farms. Thus, the investing farms were significantly larger than those with no investment (Tab. 5.20).

Table 5.19. Characteristics of the investing and non-investing farms specializing in granivores in the region Pomorze i Mazury in 2007-2012

Characteristic	Investing	2007	2008	2009	2010	2011	2012
UAA (ha)	Non-investing	89.0	34.4	41.5	40.8	34.2	36.8
	Investing	51.7	58.6	60.6	57.8	73.1	70.7
Total production (PLN)	Non-investing	718,740	251,632	577,736	433,900	621,167	436,059
	Investing	607,023	669,592	633,110	644,507	901,263	1,281,320
Total sales (PLN)	Non-investing	698,565	242,454	579,909	419,570	207,190	420,710
	Investing	546,749	632,503	632,916	610,980	852,424	1,279,296
Income (PLN)	Non-investing	207,190	54,830	143,317	101,969	118,575	102,385
	Investing	115,056	137,644	172,753	158,241	240,424	313,776

Source: Own elaboration based on the Polish FADN data.

Table 5.20. Characteristics of the investing and non-investing mixed farms in the region Pomorze i Mazury in 2007-2012

Characteristic	Investing	2007	2008	2009	2010	2011	2012
UAA (ha)	Non-investing	37.6	38.5	41.7	36.6	37.3	36.2
	Investing	54.7	60.5	57.7	61.2	52.6	60.4
Total production (PLN)	Non-investing	125,602	114,927	107,873	1,175,28	127,765	140,904
	Investing	209,142	191,410	213,972	220,101	235,436	288,885
Total sales (PLN)	Non-investing	92,916	92,093	89,920	89,889	95,838	106,456
	Investing	161,228	159,952	182,560	55,000	71,918	227,050
Income (PLN)	Non-investing	46,178	31,320	37,825	50,969	53,409	54,622
	Investing	71,918	60,740	67,462	97,097	84,632	108,253

Source: Own elaboration based on the Polish FADN data.

Investment in the region Wielkopolska i Śląsk

In the case of farmers from the region Wielkopolska i Śląsk, the popularity of each category of investment was similar to that observed in the region Pomorze i Mazury (Tab. 5.21). With the exception of 2007, more than 2/3 of investment expenditure incurred was associated with the purchase of machinery and equipment. Steadily growing percentage of farmers was opting for the purchase of land. In 2012 the share of farms investing in land was 18.5%.

Only the median expenditure on machinery and equipment was different from zero (Tab. 5.22), and its level was increasing steadily. In 2012 it reached PLN 9,000. In contrast, the median of total investment expenditure fluctuated from year to year. It reached its highest level in 2012, when it amounted to PLN 44,900.

Table 5.21. Share of farms that incurred expenditure for a category of investment in the region Wielkopolska i Śląsk

Year	Land	Buildings	Machines	Means of transport	Other
2007	14.1	8.6	60.7	25.1	48.0
2008	14.9	4.9	67.9	29.0	34.1
2009	15.8	5.3	66.2	30.4	35.2
2010	15.9	5.2	68.0	32.2	31.5
2011	17.2	4.9	68.7	31.2	33.6
2012	18.5	5.5	67.1	29.6	34.5

Source: Own elaboration based on the Polish FADN data.

Table 5.22. Median amount of investment expenditures in the region Wielkopolska i Śląsk

Year	Land	Buildings	Machines	Means of transport	Other	Sum
2007	0	0	4,000	0	819	34,782
2008	0	0	5,500	0	0	28,002
2009	0	0	6,000	0	0	31,000
2010	0	0	8,030	0	0	42,687
2011	0	0	8,900	0	0	41,180
2012	0	0	9,000	0	0	44,934

Source: Own elaboration based on the Polish FADN data.

The highest was an average expenditure related to the purchase of agricultural land (Tab. 5.23). In 2012 it amounted to PLN 186,400. The expenditure on transport equipment was growing steadily, except for a significant decrease in 2011 and it was on average almost twice as high as spending on machinery and equipment. The overall level of investment spending fluctuated and in 2012 it reached the highest level of PLN 140,300.

The share of farms investing in the region Wielkopolska i Śląsk underwent fluctuations in the analysed period (Tab. 5.24). The highest average percentage of investing farms was recorded in the case of farms with in milk cows.

Table 5.23. Average amount of expenditure on different categories of investment (min. PLN 2,000 spent on a given category) in the region Wielkopolska i Śląsk

Year	Land	Buildings	Machines	Means of transport	Other	Sum
2007	102,866	58,356	42,288	70,938	57,456	90,599
2008	123,418	42,121	43,403	81,055	43,547	88,463
2009	169,774	67,865	59,568	118,750	43,987	121,564
2010	142,193	58,025	71,038	128,894	48,402	130,698
2011	161,178	105,379	63,007	113,811	43,390	126,346
2012	186,402	54,269	64,113	136,535	56,098	140,315

Source: Own elaboration based on the Polish FADN data.

Table 5.24. Share of farms that incurred investment expenditure in the region Wielkopolska i Śląsk in 2007-2012 by type of production

Farm type	2007	2008	2 009	2 010	2 011	2 012
Field crops	53.3	48.8	47.2	52.3	54.9	55.5
Horticulture	45.3	35.8	43.6	35.6	38.1	37.7
Permanent crops	65.1	55.6	42.3	47.5	48.2	55.6
Milk cows	71.7	65.1	59.6	64.3	67.9	69.7
Other grazing livestock	77.1	66.6	60.3	43.6	51.8	49.3
Granivores	53.0	37.0	46.0	45.9	45.7	44.1
Mixed	53.6	45.0	45.1	44.0	47.8	46.6
Average	55.5	46.9	47.6	48.4	51.3	51.1

Source: Own elaboration based on the Polish FADN data.

Among the farms specializing in field crops, average investment expenditure declined in 2008 (Tab. 5.25). However, in subsequent years, it was steadily growing. Unlike the other analysed groups of farms, it was not expenditure on machinery and equipment that was the highest, but the expenditure on land.

Table 5.25. Average amount of investment expenditure incurred by farms specializing in field crops in the region Wielkopolska i Śląsk in 2007-2012 (in PLN)

Type of investment	2007	2008	2009	2010	2011	2012
Land	30,826	28,073	48,385	48,136	60,423	64,692
Buildings	3,839	2,959	2,655	2,261	4,457	4,064
Machines	38,526	39,648	48,620	69,512	61,031	61,313
Means of transport	29,618	35,864	49,398	48,051	51,617	52,162
Other	14,485	8,690	6,968	7,794	13,964	12,434
Sum	117,293	114,234	156,027	175,754	191,492	194,665

Source: Own elaboration based on the Polish FADN data.

In the group of horticultural farms the highest level of investment spending was recorded in 2007 (Tab. 5.26). In subsequent years, the scale of investment fluctuates. The highest level of investment expenditure concerned expenditure in the category "other".

Table 5.26. Average amount of investment expenditure incurred by farms specializing in horticulture in the region Wielkopolska i Śląsk in 2007-2012 (in PLN)

Type of investment	2007	2008	2009	2010	2011	2012
Land	20,765	3,657	13,397	3,334	26,575	9,327
Buildings	40,770	2,856	10,732	7,390	2,132	4,981
Machines	43,917	47,692	49,863	59,044	22,368	19,569
Means of transport	13,214	16,778	28,534	29,772	29,468	17,801
Other	172,609	41,467	164,258	138,145	86,242	178,200
Sum	291,275	112,450	266,784	237,686	166,784	229,878

Source: Own elaboration based on the Polish FADN data.

Investment expenditure in the case of farms specializing in permanent crops fluctuated (Tab. 5.27). The highest average investment expenditure related to the purchase of machinery and the category "other".

Table 5.27. Average amount of investment expenditure incurred by farms specializing in permanent crops in the region Wielkopolska i Śląsk in 2007-2012 (in PLN)

Type of investment	2007	2008	2009	2010	2011	2012
Land	53,878	7,423	17,952	21,393	15,481	17,567
Buildings	2,166	2,760	2,642	7,544	3,704	3,667
Machines	11,088	25,599	19,925	18,712	48,428	18,806
Means of transport	8,888	30,804	24,521	21,569	20,355	29,859
Other	18,530	18,025	13,827	16,019	16,568	21,492
Sum	93,549	82,610	76,869	85,237	104,536	91,391

Source: Own elaboration based on the Polish FADN data.

In the group of farms specialised in milk cows average level of investment expenditure was growing steadily (Tab. 5.28). Among the analysed investment types, the highest level of investment spending was recorded in relation to expenditure on machinery, equipment and means of transport.

Table 5.28. Average amount of investment expenditure incurred by farms specializing in milk cows in the region Wielkopolska i Śląsk in 2007-2012 (in PLN)

Type of investment	2007	2008	2009	2010	2011	2012
Land	1,853	14,449	13,646	14,637	13,642	18,449
Buildings	3,214	2,466	2,500	5,777	3,429	3,259
Machines	25,291	38,366	31,233	45,859	51,534	52,008
Means of transport	14,946	23,791	41,374	26,903	44,326	47,592
Other	18,678	5,313	9,786	15,445	15,912	16,569
Sum	63,982	83,386	96,539	108,622	128,842	137,876

Source: Own elaboration based on the Polish FADN data.

In the case of farms specializing in other grazing livestock the average level of investment spending underwent significant changes (Tab. 5.29). In the case of category "other" the level of spending was very high throughout the period. In addition, the high level of investment spending referred to machines, equipment and means of transport.

Table 5.29. Average amount of investment expenditure incurred by farms specializing in other grazing livestock in the region Wielkopolska i Śląsk in 2007-2012 (in PLN)

Type of investment	2007	2008	2009	2010	2011	2012
Land	9,640	11,263	14,628	4,705	8,742	14,844
Buildings	5,190	1,691	6,025	977	1,247	646
Machines	27,010	28,808	40,205	28,862	29,255	31,841
Means of transport	21,826	16,584	32,833	37,893	30,663	26,229
Other	35,451	28,841	21,439	5,368	10,858	29,830
Sum	99,117	87,187	115,130	77,804	80,765	103,391

Source: Own elaboration based on the Polish FADN data.

Average investment expenditure in the group of farms specializing in granivores was growing until 2010. In the following year it decreased and in the following rose slightly (Tab. 5.30). Expenditure for individual types of investment in the period underwent significant changes of different directions.

Among the mixed farms an average level of investment expenditure varied dramatically in the analysed period (Tab. 5.31). The decrease in the expenditure occurred in 2009 and 2011. The highest level of investment expenditure was recorded for the purchase of machinery and equipment and means of transport.

Table 5.30. Average amount of investment expenditure incurred by farms specializing in granivores in the region Wielkopolska i Śląsk in 2007-2012 (in PLN)

Type of investment	2007	2008	2009	2010	2011	2012
Land	9,464	19,811	25,131	15,256	25,778	20,395
Buildings	4,226	4,823	7,573	3,608	15,339	4,214
Machines	20,511	24,319	43,380	51,666	39,790	36,633
Means of transport	14,180	23,415	41,109	55,488	28,130	34,155
Other	29,497	28,567	14,253	21,570	17,971	32,952
Sum	77,878	100,935	131,445	147,589	127,008	128,351

Source: Own elaboration based on the Polish FADN data.

Table 5.31. Average amount of investment expenditure incurred by mixed farms in the region Wielkopolska i Śląsk in 2007-2012 (in PLN)

Type of investment	2007	2008	2009	2010	2011	2012
Land	7,318	14,581	17,130	14,629	13,940	29,532
Buildings	3,885	1,304	1,485	1,592	2,136	1,531
Machines	19,744	21,321	30,700	34,370	31,058	30,604
Means of transport	12,624	15,900	24,268	37,252	25,213	33,777
Other	23,650	9,460	10,290	9,769	8,859	8,824
Sum	67,221	62,566	83,873	97,612	81,206	104,267

Source: Own elaboration based on the Polish FADN data.

In the case of farms engaged in field crops, investing farms were almost throughout the period considered almost twice larger than those that did not invest (Tab. 5.32). The same applied to all analysed indicators.

Table 5.32. Characteristics of the investing and non-investing farms specializing in field crops in the region Wielkopolska i Śląsk in 2007-2012

Characteristic	Investing	2007	2008	2009	2010	2011	2012
UAA (ha)	Non-investing	39.1	42.6	38.8	49.2	46.1	46.8
	Investing	72.4	75.9	44.9	81.1	81.1	76.8
Total production (PLN)	Non-investing	153,382	147,800	134,855	181,297	189,150	233,897
	Investing	309,694	285,880	244,315	340,108	385,296	432,412
Total sales (PLN)	Non-investing	140,124	138,955	132,988	159,099	178,481	210,536
	Investing	281,157	259,708	243,745	310,292	355,348	388,185
Income (PLN)	Non-investing	66,180	54,303	47,249	93,740	113,890	118,173
	Investing	131,757	103,971	87,418	166,798	103,122	208,939

Source: Own elaboration based on the Polish FADN data.

Among farms specialising in horticulture, the farms implementing investment projects were significantly larger than farms that did not implement such projects (Tab. 5.33). The difference was clear for all the examined characteristics, though not in all cases the observed level of this difference was the same.

Table 5.33. Characteristics of the investing and non-investing farms specializing in horticulture in the region Wielkopolska i Śląsk in 2007-2012

Characteristic	Investing	2007	2008	2009	2010	2011	2012
UAA (ha)	Non-investing	5.2	5.1	7.8	6.3	6.2	6.8
	Investing	8.9	10.9	12.1	13.0	12.8	12.7
Total production (PLN)	Non-investing	383,301	489,418	520,037	365,572	398,513	388,175
	Investing	782,704	635,045	735,119	874,842	674,628	800,676
Total sales (PLN)	Non-investing	382,439	487,552	519,813	360,329	391,360	381,011
	Investing	786,903	630,649	732,848	868,253	669,044	795,832
Income (PLN)	Non-investing	119,548	119,263	131,517	88,926	87,042	87,275
	Investing	179,892	114,415	187,332	253,257	89,351	153,864

Source: Own elaboration based on the Polish FADN data.

In respect of farms specializing in permanent crops difference between farms which implemented investments and those that did not was not stable during the entire study period (Tab. 5.34). In some years investing farms were larger than non-investing ones, and in other years, the situation was reversed.

Table 5.34. Characteristics of the investing and non-investing farms specializing in permanent crops in the region Wielkopolska i Śląsk in 2007-2012

Characteristic	Investing	2007	2008	2009	2010	2011	2012
UAA (ha)	Non-investing	12.2	36.7	42.8	22.3	20.5	13.2
	Investing	20.7	24.0	32.9	33.2	35.9	35.6
Total production (PLN)	Non-investing	139,234	190,571	142,135	187,149	129,467	162,433
	Investing	205,347	264,791	240,563	270,135	241,241	387,044
Total sales (PLN)	Non-investing	141,430	182,939	139,820	167,120	146,590	132,529
	Investing	191,534	241,947	230,408	260,624	270,930	320,990
Income (PLN)	Non-investing	45,916	61,175	35,311	70,925	97,132	44,763
	Investing	75,092	55,451	30,005	84,255	70,137	166,978

Source: Own elaboration based on the Polish FADN data.

In the group of farms specialising in milk cows, those investing were larger than those that did not invest (Tab. 5.35). This difference did not exist only in 2008.

Table 5.35. Characteristics of the investing and non-investing farms specializing in milk cows in the region Wielkopolska i Śląsk in 2007-2012

Characteristic	Investing	2007	2008	2009	2010	2011	2012
UAA (ha)	Non-investing	18.5	35.8	38.8	27.9	28.3	28.2
	Investing	33.2	35.8	48.5	45.0	46.1	45.2
Total production (PLN)	Non-investing	122,541	185,882	113,834	163,738	187,863	209,893
	Investing	223,471	228,049	229,601	327,891	407,851	400,779
Total sales (PLN)	Non-investing	96,679	177,581	100,319	136,535	151,864	170,972
	Investing	179,786	200,120	200,753	281,933	341,600	347,392
Income (PLN)	Non-investing	49,320	60,317	37,082	64,870	117,604	71,035
	Investing	105,859	82,677	92,351	140,841	104,895	140,041

Source: Own elaboration based on the Polish FADN data.

In the case of farms specializing in other grazing livestock also investing farms were much larger than those that did not realized investment (Tab. 5.36). This applied to all analysed indicators.

Table 5.36. Characteristics of the investing and non-investing farms specializing in other grazing livestock in the region Wielkopolska i Śląsk in 2007-2012

Characteristic	Investing	2007	2008	2009	2010	2011	2012
UAA (ha)	Non-investing	28.8	32.6	28.1	28.5	29.2	27.6
	Investing	42.9	45.8	39.5	44.1	39.4	44.6
Total production (PLN)	Non-investing	201,040	167,857	170,924	90,749	95,730	105,549
	Investing	306,734	307,420	286,360	209,544	239,609	294,646
Total sales (PLN)	Non-investing	155,946	149,639	148,711	72,212	72,306	86,461
	Investing	244,503	269,923	250,813	166,676	191,641	241,611
Income (PLN)	Non-investing	81,318	59,618	58,809	46,297	92,023	39,205
	Investing	126,552	108,906	94,761	86,231	93,064	104,526

Source: Own elaboration based on the Polish FADN data.

Among farms dealing with granivores investing farms also exceeded non-investing ones (Tab. 5.37). The difference between them was stable and amounted to approx. 1/3 in the case of most of the surveyed years and characteristics.

In the case of mixed farms of the region Wielkopolska i Śląsk the difference between farms realizing investment projects and those that did not invest was significant (Tab. 5.38). This applied to all of the studied indicators.

Table 5.37. Characteristics of the investing and non-investing farms specializing in granivores in the region Wielkopolska i Śląsk in 2007-2012

Characteristic	Investing	2007	2008	2009	2010	2011	2012
UAA (ha)	Non-investing	23.8	32.1	34.8	25.2	26.0	25.6
	Investing	36.9	43.0	41.7	44.4	42.3	43.4
Total production (PLN)	Non-investing	272,294	219,888	247,472	240,355	285,315	312,853
	Investing	336,637	458,457	483,466	500,160	565,361	662,377
Total sales (PLN)	Non-investing	243,198	201,277	230,796	206,946	236,160	262,707
	Investing	273,321	399,637	450,652	445,598	487,885	587,978
Income (PLN)	Non-investing	58,665	61,847	72,336	71,175	106,122	85,061
	Investing	77,275	117,491	140,847	134,570	119,385	175,496

Source: Own elaboration based on the Polish FADN data.

Table 5.38. Characteristics of the investing and non-investing mixed farms in the region Wielkopolska i Śląsk in 2007-2012

Characteristic	Investing	2007	2008	2009	2010	2011	2012
UAA (ha)	Non-investing	24.8	26.7	41.1	26.7	27.5	26.7
	Investing	41.2	43.8	40.7	45.9	42.4	44.2
Total production (PLN)	Non-investing	129,229	123,556	117,942	133,746	158,251	171,438
	Investing	230,371	214,484	229,215	248,065	269,213	316,002
Total sales (PLN)	Non-investing	96,007	99,769	98,202	102,948	118,117	132,419
	Investing	176,285	171,736	199,662	200,140	210,812	248,316
Income (PLN)	Non-investing	43,116	35,347	38,364	53,078	113,483	59,901
	Investing	75,752	68,444	76,600	94,345	114,375	118,387

Source: Own elaboration based on the Polish FADN data.

Investment in the region Mazowsze i Podlasie

In the region Mazowsze i Podlasie farmers mostly invested in the purchase of machinery and equipment (Tab. 5.39). However, in comparison with other regions, a very large role played investments categorized as "other". The least common was investment in buildings.

Table 5.39. Share of farms that incurred expenditure for a category of investment in the region Mazowsze i Podlasie

Year	Land	Buildings	Machines	Means of transport	Other
2007	11.2	3.5	58.8	24.9	56.7
2008	11.7	3.2	64.9	23.9	48.4
2009	12.3	3.0	63.0	25.0	50.1
2010	13.0	3.0	60.3	24.9	48.9
2011	12.5	3.6	63.5	25.0	51.1
2012	16.2	3.2	64.4	30.2	49.9

Source: Own elaboration based on the Polish FADN data.

The median of investment expenditure was different from zero in the case of two types of investments – investment in machinery and equipment and "other" investment (Tab. 5.40). The median of expenditure on machinery and equipment was increasing steadily, decreasing only in 2010. In the category "other" there were large fluctuations, as well as in relation to the total investment expenditure. It should also be noted that the median of total expenditure was lower in this region than in the others.

Table 5.40. Median amount of investment expenditure in the region Mazowsze i Podlasie

Year	Land	Buildings	Machines	Means of transport	Other	Sum
2007	0	0	3,200	0	3,035	20,600
2008	0	0	4,500	0	1,668	18,895
2009	0	0	4,700	0	2,000	22,000
2010	0	0	4,300	0	1,728	20,785
2011	0	0	4,800	0	2,078	25,500
2012	0	0	6,200	0	1,938	33,159

Source: Own elaboration based on the Polish FADN data.

Unlike in the regions already discussed, in Mazowsze and Podlasie the average expenditure on purchase of land was lower than on means of transport (Tab. 5.41). This means that the purchase of land affected a smaller area than on average in other regions.

Table 5.41. Average amount of expenditure on different categories of investment (min. PLN 2,000 spent on a given category) in the region Mazowsze i Podlasie

Year	Land	Buildings	Machines	Means of transport	Other	Sum
2007	46,728	38,758	27,785	54,381	52,618	66,478
2008	54,195	30,051	31,054	66,389	32,669	59,373
2009	56,519	35,523	44,835	98,172	29,123	75,517
2010	54,470	59,923	46,532	94,538	37,393	78,938
2011	7,683	44,266	48,645	95,111	31,125	81,879
2012	96,536	58,428	61,638	118,445	35,555	110,909

Source: Own elaboration based on the Polish FADN data.

Among farms in Mazowsze i Podlasie region most often investment projects were implemented by farms specializing in milk cows (Tab. 5.42). While the least likely to undertake investment were mixed farms.

Table 5.42. Share of farms that incurred investment expenditure in the region Mazowsze i Podlasie in 2007-2012 by type of production

Farm type	2007	2008	2009	2010	2011	2012
Field crops	49.5	50.3	44.9	55.8	58.6	59.7
Horticulture	55.0	41.6	46.9	39.4	39.6	43.5
Permanent crops	57.0	56.0	49.8	47.9	55.0	58.5
Milk cows	71.1	62.8	57.4	60.0	66.8	66.7
Other grazing livestock	76.5	69.3	63.0	45.2	48.7	50.8
Granivores	52.6	50.3	53.2	42.9	46.7	53.3
Mixed	50.1	41.5	38.1	38.8	39.6	43.3
Average	57.8	52.7	49.6	48.5	52.4	55.1

Source: Own elaboration based on the Polish FADN data.

In the case of farms specializing in field crops the difference between investing and non-investing farms was large (Tab. 5.43), which was clearly evident in the case of all analysed indicators.

Table 5.43. Characteristics of the investing and non-investing farms specialising in field crops in the region Mazowsze i Podlasie in 2007-2012

Characteristic	Investing	2007	2008	2009	2010	2011	2012
UAA (ha)	Non-investing	19.4	20.6	25.5	33.0	35.8	35.3
	Investing	36.1	38.0	39.6	51.9	50.5	49.6
Total production (PLN)	Non-investing	76,756	69,780	69,801	112,573	141,237	159,314
	Investing	166,087	147,838	148,373	216,781	230,219	256,802
Total sales (PLN)	Non-investing	65,924	62,067	64,547	99,140	126,832	151,783
	Investing	141,397	139,996	144,996	190,713	212,740	233,571
Income (PLN)	Non-investing	33,659	27,033	28,087	58,722	73,199	71,213
	Investing	71,861	57,391	60,940	118,955	111,689	125,149

Source: Own elaboration based on the Polish FADN data.

The difference between farms realizing investment projects and the ones not investing in the case of farms specialising in horticulture in the region Mazowsze i Podlasie was visible, but not so much with regard to the size of UAA, as in the case of other types of holdings (Tab. 5.44).

In the case of farms specializing in permanent crops these were also investing farms that were clearly larger than those not investing (Tab. 5.45). This difference was recorded for each of the studied indicators.

Table 5.44. Characteristics of the investing and non-investing farms specialising in horticulture in the region Mazowsze i Podlasie in 2007-2012

Characteristic	Investing	2007	2008	2009	2010	2011	2012
UAA (ha)	Non-investing	8.3	7.9	7.3	9.2	7.9	8.2
	Investing	8.4	8.4	8.9	9.9	9.9	11.2
Total production (PLN)	Non-investing	166,094	167,617	187,985	137,279	186,283	187,489
	Investing	523,391	802,381	854,727	407,989	367,097	331,706
Total sales (PLN)	Non-investing	161,918	163,845	186,329	134,366	184,161	183,980
	Investing	519,514	797,476	849,749	404,636	359,914	321,994
Income (PLN)	Non-investing	60,707	32,874	50,955	47,875	61,890	40,975
	Investing	101,144	143,796	186,813	128,165	367,097	100,973

Source: Own elaboration based on the Polish FADN data.

Table 5.45. Characteristics of the investing and non-investing farms specialising in permanent crops in the region Mazowsze i Podlasie in 2007-2012

Characteristic	Investing	2007	2008	2009	2010	2011	2012
UAA (ha)	Non-investing	11.7	10.9	12.2	12.5	11.9	15.6
	Investing	14.9	17.2	21.3	20.3	19.8	17.2
Total production (PLN)	Non-investing	98,800	95,502	84,129	113,821	116,493	143,084
	Investing	180,782	173,584	204,928	239,192	276,425	230,530
Total sales (PLN)	Non-investing	102,527	82,819	81,923	110,447	108,320	149,167
	Investing	177,004	171,649	199,058	228,378	260,146	218,149
Income (PLN)	Non-investing	31,616	23,765	16,957	46,493	51,912	53,700
	Investing	79,235	29,212	35,309	87,981	118,439	88,870

Source: Own elaboration based on the Polish FADN data.

Among the farms specialising in milk cows also the dominant were clearly investing farms (Tab. 5.46). These farms were larger and had higher production, sales and income than the non-investing ones.

Table 5.46. Characteristics of the investing and non-investing farms specialising in milk cows in the region Mazowsze i Podlasie in 2007-2012

Characteristic	Investing	2007	2008	2009	2010	2011	2012
UAA (ha)	Non-investing	18.8	19.8	21.7	22.9	22.5	23.2
	Investing	25.7	26.7	27.7	35.4	34.7	34.9
Total production (PLN)	Non-investing	94,726	87,019	79,534	106,956	119,873	130,714
	Investing	152,565	140,701	142,572	229,448	259,241	269,505
Total sales (PLN)	Non-investing	72,678	75,346	68,949	86,511	94,455	105,818
	Investing	120,334	122,779	126,440	196,649	219,466	230,623
Income (PLN)	Non-investing	44,294	36,537	29,569	50,429	50,869	48,563
	Investing	70,751	56,905	54,069	103,307	110,339	101,171

Source: Own elaboration based on the Polish FADN data.

Also in the case of farms specializing in other grazing livestock it was noted that investing farms were much larger than those with no investment (Tab. 5.47). This observation was evident in the case of all the studied indicators.

Table 5.47. Characteristics of the investing and non-investing farms specialising in other grazing livestock in the region Mazowsze i Podlasie in 2007-2012

Characteristic	Investing	2007	2008	2009	2010	2011	2012
UAA (ha)	Non-investing	21.0	21.5	24.6	28.5	22.1	22.9
	Investing	32.9	36.2	38.5	35.8	33.9	34.7
Total production (PLN)	Non-investing	95,496	89,277	90,496	75,900	75,155	87,136
	Investing	210,797	195,656	200,832	164,407	176,015	176,178
Total sales (PLN)	Non-investing	68,734	74,982	77,072	60,049	53,664	65,496
	Investing	166,442	174,360	181,228	130,921	130,708	135,820
Income (PLN)	Non-investing	44,659	33,550	36,105	36,027	33,518	32,513
	Investing	95,319	76,359	74,925	84,508	76,191	64,997

Source: Own elaboration based on the Polish FADN data.

In the case of agricultural holdings specialising in granivores the difference between investing and non-investing farms was clearly visible (Tab. 5.48). Investing farms were significantly larger than those that did not undertake investment projects.

Table 5.48. Characteristics of the investing and non-investing farms specialising in granivores in the region Mazowsze i Podlasie in 2007-2012

Characteristic	Investing	2007	2008	2009	2010	2011	2012
UAA (ha)	Non-investing	19.0	22.0	20.7	23.8	22.4	23.8
	Investing	30.0	32.4	34.4	34.2	36.9	36.3
Total production (PLN)	Non-investing	185,556	223,085	225,785	228,318	284,447	310,934
	Investing	320,200	393,584	392,767	452,055	511,295	565,087
Total sales (PLN)	Non-investing	167,612	203,105	226,620	208,975	257,515	285,325
	Investing	284,696	362,536	394,222	455,652	470,678	555,268
Income (PLN)	Non-investing	47,040	54,330	69,215	67,430	83,332	90,095
	Investing	61,741	96,072	121,241	135,049	133,103	136,048

Source: Own elaboration based on the Polish FADN data.

In the case of mixed farms the difference between investing and non-investing entities was evident (Tab. 5.49). The advantage of investing farms over non-investing ones concerned the size of their UAA, level of production, sales and income.

Table 5.49. Characteristics of the investing and non-investing mixed farms in the region Mazowsze i Podlasie in 2007-2012

Characteristic	Investing	2007	2008	2009	2010	2011	2012
UAA (ha)	Non-investing	16.8	18.4	18.6	18.3	18.7	18.7
	Investing	25.1	27.5	29.4	29.5	28.4	30.9
Total production (PLN)	Non-investing	66,370	69,051	66,885	71,798	83,202	85,496
	Investing	123,351	126,002	129,687	147,378	161,528	187,992
Total sales (PLN)	Non-investing	45,794	56,328	57,380	52,667	60,986	64,459
	Investing	91,092	103,745	118,174	118,946	128,053	155,248
Income (PLN)	Non-investing	23,510	22,350	21,622	32,433	33,948	32,145
	Investing	44,114	43,049	41,976	65,825	65,299	71,860

Source: Own elaboration based on the Polish FADN data.

The average investment expenditure of farms specializing in field crops in the region Mazowsze i Podlasie was steadily increasing throughout the period considered (Tab. 5.50). The highest investment expenditure related to the purchase of machinery, equipment and means of transport.

Table 5.50. Average amount of investment expenditure incurred by farms specializing in field crops in the region Mazowsze i Podlasie in 2007-2012 (in PLN)

Type of investment	2007	2008	2009	2010	2011	2012
Land	9,324	9,554	11,004	16,088	20,241	54,040
Buildings	2,773	2,770	2,964	2,637	2,948	4,039
Machines	14,821	20,092	23,221	39,256	40,717	50,039
Means of transport	12,864	21,263	22,775	37,279	32,877	56,791
Other	15,170	7,563	10,284	15,072	18,801	17,356
Sum	53,953	59,243	68,248	109,332	114,584	182,266

Source: Own elaboration based on the Polish FADN data.

In the case of farms involved in horticulture the highest level of investment spending was recorded in 2007 (Tab. 5.51). However, in subsequent years, the spending was steadily decreasing. It was only in 2012 that this expenditure was higher than in the previous year. The highest level of investment expenditure concerned category "other".

Contrary to other analysed types of farms, in the case of farms specialising in permanent crops an average level of investment spending reached the highest value in 2010 (Tab. 5.52). The highest spending was recorded in investment category "other", which in this case may mean the realization of investment in permanent crops plantations.

Table 5.51. Average amount of investment expenditure incurred by farms specializing in horticulture in the region Mazowsze i Podlasie in 2007-2012 (in PLN)

Type of investment	2007	2008	2009	2010	2011	2012
Land	11,045	0	2,847	2,435	2,921	2,143
Buildings	2,138	2,620	2,035	8,267	3,159	6,170
Machines	65,389	41,229	46,820	25,407	19,489	37,738
Means of transport	11,226	16,665	16,009	18,989	11,299	22,287
Other	319,066	78,670	56,185	38,898	27,451	64,477
Sum	408,864	138,184	120,896	91,996	62,318	132,815

Source: Own elaboration based on the Polish FADN data.

Table 5.52. Average amount of investment expenditure incurred by farms specializing in permanent crops in the region Mazowsze i Podlasie in 2007-2012 (in PLN)

Type of investment	2007	2008	2009	2010	2011	2012
Land	3,466	2,389	4,219	6,648	7,937	7,382
Buildings	2,009	3,277	1,908	1,457	545	1,504
Machines	11,034	18,946	20,052	18,765	27,766	34,148
Means of transport	11,454	17,321	27,060	15,329	31,829	23,238
Other	39,005	30,047	34,723	72,703	28,700	27,402
Sum	66,968	71,981	87,962	114,902	96,777	93,674

Source: Own elaboration based on the Polish FADN data.

In the case of farms specialising in milk cows a steady increase in the average level of investment expenditure was observed (Tab. 5.53). The highest and constantly increasing level of spending referred to investment involving the purchase of means of transport.

Table 5.53. Average amount of investment expenditure incurred by farms specializing in milk cows in the region Mazowsze i Podlasie

Type of investment	2007	2008	2009	2010	2011	2012
Land	2,913	4,654	4,441	4,490	5,793	7,755
Buildings	2,103	2,164	2,422	2,347	2,465	2,817
Machines	13,519	19,496	2,776	32,000	34,061	45,082
Means of transport	11,837	12,957	21,527	22,447	20,029	33,841
Other	15,131	8,517	5,736	16,050	16,338	15,390
Sum	43,502	45,789	59,889	77,334	77,686	103,886

Source: Own elaboration based on the Polish FADN data.

The upward trend in expenditure on investment in farms specializing in other grazing livestock stopped in 2010 (Tab. 5.54). Renewed growth was recorded only in 2012. The highest level of expenditure concerned the purchase of machinery and equipment.

Table 5.54. Average amount of investment expenditure incurred by farms specializing in other grazing livestock in the region Mazowsze i Podlasie in 2007-2012 (in PLN)

Type of investment	2007	2008	2009	2010	2011	2012
Land	5,741	5,853	7,466	4,989	8,524	15,729
Buildings	2,668	2,960	2,398	0	2,416	2,156
Machines	19,051	24,153	35,982	26,911	22,587	43,657
Means of transport	16,587	17,939	31,581	30,776	30,823	29,122
Other	24,963	18,940	15,717	7,038	8,028	14,645
Sum	68,009	67,844	92,143	69,715	70,379	103,309

Source: Own elaboration based on the Polish FADN data.

In the case of farms specializing in granivores an average level of investment was steadily growing (Tab. 5.55). Only in 2010 a small drop was recorded. The highest average level of investment expenditure related to investment involving purchase of machines and equipment.

Table 5.55. Average amount of investment expenditure incurred by farms specializing in granivores in the region Mazowsze i Podlasie in 2007-2012 (in PLN)

Type of investment	2007	2008	2009	2010	2011	2012
Land	5,333	12,735	8,068	8,853	14,866	11,797
Buildings	2,778	2,782	2,449	2,335	4,966	2,789
Machines	20,897	21,810	36,322	40,146	39,558	41,824
Means of transport	15,552	14,440	30,154	29,242	23,790	48,805
Other	36,577	29,492	18,496	26,251	23,440	25,315
Sum	79,136	80,260	95,489	106,827	106,620	130,531

Source: Own elaboration based on the Polish FADN data.

In the case of mixed farms of the region Mazowsze i Podlasie an average level of investment was growing practically during the whole analysed period (Tab. 5.56). The exception was 2010, when the level of these expenses decreased slightly. The highest average investment expenditure was observed for expenditure on means of transport.

Table 5.56. Average amount of investment expenditure incurred by mixed farms in the region Mazowsze i Podlasie

Type of investment	2007	2008	2009	2010	2011	2012
Land	3,747	5,107	6,091	7,657	9,719	11,813
Buildings	2,925	2,544	2,218	2,220	2,663	2,281
Machines	10,482	13,975	18,763	15,032	20,945	24,891
Means of transport	12,191	11,284	16,617	18,185	22,396	28,416
Other	11,413	7,499	7,991	6,034	7,603	10,272
Sum	38,758	38,410	49,681	47,128	61,326	75,672

Source: Own elaboration based on the Polish FADN data.

Investment in the region Małopolska i Pogórze

The structure of investment expenditure undertaken in the region Małopolska i Pogórze was similar to that observed in other regions (Tab. 5.57). The most common were investment projects involving purchase of machines and equipment, and the rarest ones relating to buildings.

Table 5.57. Share of farms that incurred expenditure for a category of investment in the region Małopolska i Pogórze

Year	Land	Buildings	Machines	Means of transport	Other
2007	14.8	2.6	62.6	27.0	50.3
2008	14.6	4.8	63.7	29.0	40.6
2009	15.8	4.7	63.6	31.5	40.2
2010	15.4	6.3	67.6	27.9	31.5
2011	16.8	5.1	66.3	28.1	38.7
2012	15.2	5.8	71.8	33.9	37.3

Source: Own elaboration based on the Polish FADN data.

As in other regions, only the median of investment related to the purchase of machines was higher than zero (Tab. 5.58). Median of total investment expenditure, except for a small decline in 2008, was steadily growing.

Just as in the region Mazowsze i Podlasie, also in this region the highest average investment expenditure related to the purchase of means of transport and not to investment in land purchase (Tab. 5.59). All categories of investment expenditure underwent large fluctuations throughout the period considered.

Table 5.58. Median amount of investment expenditure in the region Małopolska i Pogórze

Year	Land	Buildings	Machines	Means of transport	Other	Sum
2007	0	0	3,950	0	2,043	19,627
2008	0	0	3,698	0	0	18,602
2009	0	0	4,473	0	0	23,578
2010	0	0	5,700	0	0	25,000
2011	0	0	6,548	0	0	28,863
2012	0	0	7,905	0	0	39,204

Source: Own elaboration based on the Polish FADN data.

Table 5.59. Average amount of expenditure on different categories of investment (min. PLN 2,000 spent on a given category) in the region Małopolska i Pogórze

Year	Land	Buildings	Machines	Means of transport	Other	Sum
2007	35,766	79,215	30,053	61,002	43,003	64,430
2008	41,828	25,641	25,827	72,020	45,082	63,112
2009	39,319	21,905	40,457	94,880	46,420	81,976
2010	51,508	58,300	42,871	92,293	57,554	84,559
2011	36,482	58,921	51,112	88,136	38,591	82,802
2012	99,335	40,261	67,641	125,667	36,992	122,459

Source: Own elaboration based on the Polish FADN data.

Average percentage of farms investing in this region fluctuated around 50% (Tab. 5.60). The exception was 2010, when it dropped to 44%. For most types of farms the share of the ones investing underwent slight fluctuations. Only in the case of farms specializing in other grazing livestock a huge drop of 20 p.p. was recorded in 2007-2009 and a further decline by another 20 p.p. in 2010. In subsequent years, there was an increase of approx. 10 p.p.

Table 5.60. Share of farms that incurred investment expenditure in the region Małopolska i Pogórze in 2007-2012 by type of production

Farm type	2007	2008	2009	2010	2011	2012
Field crops	53.6	48.8	51.7	56.7	60.2	62.2
Horticulture	41.5	42.1	45.5	35.2	39.3	45.3
Permanent crops	60.9	55.3	57.7	50.5	54.2	51.6
Milk cows	51.4	70.8	46.8	52.6	57.4	64.4
Other grazing livestock	71.5	68.8	51.1	28.8	40.0	39.7
Granivores	57.9	48.3	59.0	51.9	45.5	57.1
Mixed	46.3	46.1	39.1	34.9	43.3	46.3
Average	52.3	50.9	47.9	44.1	49.0	52.8

Source: Own elaboration based on the Polish FADN data.

The populations of farms specializing in field crops implementing investment projects and those that did not undertake any investment were not characterized by the same features throughout the period considered (Tab. 5.61). Up to 2009, the investing farms were larger than non-investing ones, and later the situation was reversed, which may indicate that farms with a greater potential earlier realised the necessary investment and then they were implemented by those that had fewer resources.

In the case of horticultural farms in each of the years analysed, it was noted that investing farms were slightly larger than those not investing (Tab. 5.62). Typically, it also meant that the production, sales and income were higher among investing farms.

Among the farms specializing in permanent crops the difference in size between investing and non-investing farms was small (Tab. 5.63). However, in the case of other analysed indicators the difference was much larger, in favour of investing farms.

Table 5.61. Characteristics of the investing and non-investing farms specialising in field crops in the region Małopolska i Pogórze in 2007-2012

Characteristic	Investing	2007	2008	2009	2010	2011	2012
UAA (ha)	Non-investing	21.9	36.4	36.2	40.8	27.8	45.7
	Investing	43.6	36.5	37.3	37.0	38.3	36.6
Total production (PLN)	Non-investing	96,251	96,042	91,518	187,895	181,850	155,614
	Investing	215,111	196,693	195,596	278,712	365,485	432,212
Total sales (PLN)	Non-investing	82,778	89,233	87,951	168,412	167,855	142,996
	Investing	185,356	183,920	182,136	255,274	329,197	390,600
Income (PLN)	Non-investing	63,127	30,291	33,161	88,588	90,712	76,683
	Investing	68,684	62,292	74,173	113,389	159,545	218,567

Source: Own elaboration based on the Polish FADN data.

Table 5.62. Characteristics of the investing and non-investing farms specialising in horticulture in the region Małopolska i Pogórze in 2007-2012

Characteristic	Investing	2007	2008	2009	2010	2011	2012
UAA (ha)	Non-investing	3.5	3.5	3.2	3.8	4.2	4.3
	Investing	4.0	4.0	4.2	5.8	4.8	4.8
Total production (PLN)	Non-investing	233,483	204,191	219,399	253,740	250,585	245,070
	Investing	174,596	475,677	524,968	365,485	496,054	469,273
Total sales (PLN)	Non-investing	230,094	204,225	214,463	252,428	249,374	245,365
	Investing	163,321	472,339	521,814	329,197	490,630	466,530
Income (PLN)	Non-investing	88,132	43,585	56,009	43,558	45,084	48,286
	Investing	75,550	85,319	108,537	159,545	110,832	117,935

Source: Own elaboration based on the Polish FADN data.

Table 5.63. Characteristics of the investing and non-investing farms specialising in permanent crops in the region Małopolska i Pogórze in 2007-2012

Characteristic	Investing	2007	2008	2009	2010	2011	2012
UAA (ha)	Non-investing	11.8	12.3	13.6	14.3	15.2	15.1
	Investing	13.5	13.6	14.2	15.8	18.5	18.3
Total production (PLN)	Non-investing	143,442	123,405	110,597	116,811	106,250	122,581
	Investing	174,596	129,486	132,408	121,818	184,388	157,692
Total sales (PLN)	Non-investing	127,875	113,148	125,538	107,493	104,306	100,544
	Investing	163,321	150,035	130,690	119,067	165,293	162,505
Income (PLN)	Non-investing	51,024	47,664	27,372	45,926	32,427	43,494
	Investing	75,550	36,184	52,474	36,723	96,320	63,012

Source: Own elaboration based on the Polish FADN data.

Just as in the case of farms specializing in permanent crops, the differences between investing and non-investing farms were shaped among farms engaged in milk cows (Tab. 5.64). The differences in production volume were small compared to the differences observed for the other studied indicators.

Table 5.64. Characteristics of the investing and non-investing farms specialising in milk cows in the region Małopolska i Pogórze in 2007-2012

Characteristic	Investing	2007	2008	2009	2010	2011	2012
UAA (ha)	Non-investing	17.9	18.2	17.2	19.6	17.7	17.5
	Investing	19.9	20.7	25.7	26.4	26.6	26.7
Total production (PLN)	Non-investing	64,169	70,217	60,591	77,224	102,954	98,137
	Investing	133,540	125,696	118,857	191,511	207,350	245,670
Total sales (PLN)	Non-investing	44,997	58,914	51,109	62,451	84,485	78,297
	Investing	104,280	109,755	106,353	164,128	171,246	203,897
Income (PLN)	Non-investing	63,367	25,664	26,260	35,977	44,265	42,155
	Investing	86,274	56,301	57,660	75,720	83,557	86,255

Source: Own elaboration based on the Polish FADN data.

In the case of farms engaged in other grazing livestock investing farms were until 2011 larger than non-investing ones (Tab. 5.65). This difference was evident for all the analysed characteristics of the farms in question.

In the case of farms specializing in granivores, the difference between investing and non-investing farms was clearly visible in the analysed period (Tab. 5.66). Investing farms were characterized by larger surface of UAA, higher production, sales and income.

Table 5.65. Characteristics of the investing and non-investing farms specialising in other grazing livestock in the region Małopolska i Pogórze in 2007-2012

Characteristic	Investing	2007	2008	2009	2010	2011	2012
UAA (ha)	Non-investing	25.8	24.7	22.9	24.2	23.2	26.2
	Investing	37.1	39.7	33.8	30.4	44.5	39.5
Total production (PLN)	Non-investing	73,190	75,825	95,225	52,781	51,984	65,233
	Investing	216,210	190,162	175,623	130,606	190,853	169,437
Total sales (PLN)	Non-investing	49,027	66,796	83,370	42,649	39,336	48,830
	Investing	173,335	166,554	151,926	104,027	153,520	135,517
Income (PLN)	Non-investing	85,969	31,611	33,040	25,244	25,132	29,730
	Investing	101,244	67,427	58,990	50,964	80,595	63,577

Source: Own elaboration based on the Polish FADN data.

Table 5.66. Characteristics of the investing and non-investing farms specialising in granivores in the region Małopolska i Pogórze in 2007-2012

Characteristic	Investing	2007	2008	2009	2010	2011	2012
UAA (ha)	Non-investing	16.6	16.7	18.4	17.7	17.9	21.4
	Investing	28.2	28.0	26.1	23.5	27.3	31.9
Total production (PLN)	Non-investing	301,234	465,139	419,501	227,027	559,512	423,152
	Investing	557,273	563,832	433,008	434,076	346,427	516,982
Total sales (PLN)	Non-investing	312,197	492,198	466,460	233,906	554,348	383,829
	Investing	553,868	575,333	438,507	413,748	265,535	494,927
Income (PLN)	Non-investing	82,952	107,863	108,481	61,493	119,888	79,656
	Investing	65,260	98,342	120,278	101,688	111,755	134,694

Source: Own elaboration based on the Polish FADN data.

As with most other types of farms in all the regions concerned, also in the case of mixed farms in the region Małopolska i Pogórze it was observed that investing farms were about twice as big as the non-investing ones (Tab. 5.67). The same applied to the other analysed characteristics.

In the case of farms specializing in field crops, an average level of investment spending was steadily growing with the exception of the year 2011, when it was slightly lower than in the previous year (Tab. 5.68). In most of the analysed years, the highest level of expenditure was noted for purchase of means of transport.

In the case of farms specialising in horticulture the average level of investment spending in the second half of the period under consideration was considerably lower than in the first one (Tab. 5.69). In 2008 the number of entities undertaking investment in land and buildings was so small that there was no justification for calculating the average.

Table 5.67. Characteristics of the investing and non-investing mixed farms in the region Małopolska i Pogórze in 2007-2012

Characteristic	Investing	2007	2008	2009	2010	2011	2012
UAA (ha)	Non-investing	13.4	15.0	18.8	15.1	18.6	16.4
	Investing	26.4	35.3	36.0	34.5	37.0	36.0
Total production (PLN)	Non-investing	64,853	67,680	64,165	82,408	81,426	83,961
	Investing	136,987	120,655	145,710	142,211	173,167	200,020
Total sales (PLN)	Non-investing	44,920	53,342	51,570	67,190	56,257	61,577
	Investing	98,643	99,572	127,320	114,207	136,741	164,936
Income (PLN)	Non-investing	68,546	19,830	19,919	30,780	28,081	28,446
	Investing	78,137	32,955	41,667	53,244	59,852	71,007

Source: Own elaboration based on the Polish FADN data.

Table 5.68. Average amount of investment expenditure incurred by farms specializing in field crops in the region Małopolska i Pogórze in 2007-2012 (in PLN)

Type of investment	2007	2008	2009	2010	2011	2012
Land	48,595	66,218	49,757	48,625	41,865	77,885
Buildings	131,872	10,842	13,085	109,235	80,500	31,347
Machines	41,368	30,123	45,855	71,528	77,966	143,483
Means of transport	65,909	288,269	125,203	108,872	109,990	187,271
Other	27,757	41,832	26,553	98,000	55,261	42,252
Sum	74,323	76,008	91,368	132,782	125,706	202,096

Source: Own elaboration based on the Polish FADN data.

Table 5.69. Average amount of investment expenditure incurred by farms specializing in horticulture in the region Małopolska i Pogórze in 2007-2012 (in PLN)

Type of investment	2007	2008	2009	2010	2011	2012
Land	21,250	-	51,425	0	10,500	-
Buildings	506,070	-	85,025	58,067	62,480	35,258
Machines	41,905	45,896	31,687	28,580	31,454	31,092
Means of transport	51,503	44,000	73,099	118,172	53,960	94,116
Other	110,298	93,140	221,421	156,670	81,615	73,429
Sum	130,441	82,227	150,506	93,459	68,212	81,567

Source: Own elaboration based on the Polish FADN data.

Average investment expenditure incurred by farms specializing in permanent crops fluctuated significantly during the period (Tab. 5.70). The highest level of expenditure concerned investment in means of transport.

Table 5.70. Average amount of investment expenditure incurred by farms specializing in permanent crops in the region Małopolska i Pogórze in 2007-2012 (in PLN)

Type of investment	2007	2008	2009	2010	2011	2012
Land	25,126	40,167	31,400	25,800	30,713	43,530
Buildings	0	71,942	-	57,515	68,636	40,489
Machines	26,731	14,717	32,066	19,667	80,576	26,295
Means of transport	43,402	69,268	53,348	85,135	55,150	69,918
Other	39,503	42,610	39,892	35,207	49,357	44,188
Sum	52,088	69,789	55,683	53,942	83,952	69,862

Source: Own elaboration based on the Polish FADN data.

In the case of farms specializing in milk cows average level of investment underwent considerable fluctuations (Tab. 5.71). The highest level of expenditure was observed in the case of investment in means of transport.

Table 5.71. Average amount of investment expenditure incurred by farms specializing in milk cows in the region Małopolska i Pogórze in 2007-2012 (in PLN)

Type of investment	2007	2008	2009	2010	2011	2012
Land	26,735	23,756	34,127	67,918	20,034	48,698
Buildings	0	4,293	16,346	40,369	72,207	37,400
Machines	29,826	20,664	34,020	43,604	42,503	54,265
Means of transport	69,366	50,189	80,601	100,576	103,882	127,361
Other	17,857	11,357	14,900	43,490	36,690	43,109
Sum	62,912	36,186	62,850	89,903	79,541	109,551

Source: Own elaboration based on the Polish FADN data.

In the case of farms specializing in other grazing livestock an average level of investment spending was declining since 2007 until 2010, when it reached the lowest level in the period considered and in subsequent years it was growing (Tab. 5.72). The highest level of spending characterized expenditure on means of transport. As for investment in buildings during a half of the analysed years so few farms undertook such projects that calculating their mean value was not justifiable.

Table 5.72. Average amount of investment expenditure incurred by farms specializing in other grazing livestock in the region Małopolska i Pogórze in 2007-2012 (in PLN)

Type of investment	2007	2008	2009	2010	2011	2012
Land	91,878	27,346	19,666	5,650	20,994	38,133
Buildings	-	10,624	-	79,612	80,565	-
Machines	39,426	25,284	35,984	34,967	65,178	50,775
Means of transport	78,904	62,867	89,666	18,143	170,320	139,079
Other	48,709	30,803	32,239	9,377	12,470	54,566
Sum	86,043	56,048	65,582	46,272	90,422	111,407

Source: Own elaboration based on the Polish FADN data.

Average level of investment undertaken by farms specializing in granivores fluctuated widely (Tab. 5.73). Moreover, spending on particular types of investment was characterized by major changes. During the period considered the highest level of average spending was recorded in the case of investment in means of transport.

Table 5.73. Average amount of investment expenditure incurred by farms specializing in granivores in the region Małopolska i Pogórze in 2007-2012 (in PLN)

Type of investment	2007	2008	2009	2010	2011	2012
Land	10,847	25,938	48,100	119,534	36,813	48,552
Buildings	20,271	28,983	39,175	18,948	-	119,693
Machines	21,294	40,926	31,280	35,151	70,996	56,210
Means of transport	75,861	104,496	100,155	125,673	73,166	136,695
Other	97,455	234,305	55,843	35,258	32,610	40,264
Sum	76,229	131,913	91,015	88,004	80,609	122,987

Source: Own elaboration based on the Polish FADN data.

In the case of mixed farms of this region average expenditure on investment was on the rise until 2009. The next year it fell by about 20% to start growing again in 2011 (Tab. 5.74). For most of the year under review the highest investment expenses related to the purchase of means of transport. With the small size of farms in the region, it can be a consequence of a lack of sufficient financial resources to make investment significantly increasing the scale of production. It may also show that those farms are at the stage of development at which investment is aimed at increasing the efficiency of the use of land resources.

Table 5.74. Average amount of investment expenditure incurred by mixed farms in the region Małopolska i Pogórze the years 2007-2012 (in PLN)

Type of investment	2007	2008	2009	2010	2011	2012
Land	19,885	25,475	18,261	23,834	44,717	176,207
Buildings	4,725	37,090	5,814	43,342	18,255	18,652
Machines	19,324	18,659	45,823	34,496	38,840	48,067
Means of transport	49,583	68,604	78,847	65,088	76,342	100,473
Other	25,200	21,850	42,051	41,015	19,440	19,248
Sum	38,032	40,085	72,408	57,317	59,376	101,188

Source: Own elaboration based on the Polish FADN data.

Naturally, the analysis of the scale and structure of investment in the Polish agriculture presented in this chapter represents only an introduction to the study of this phenomenon. The next step in an in-depth analysis should first of all focus on the structure of the sources of financing of the investment made and the impact of the situation on various agricultural markets on the scope and nature of the investment projects undertaken. It is also important to pay attention to the structure of assets held before undertaking the investment. Then, an assessment of the impact of investment on the subsequent economic performance of the farms. However, in this case, a significant limitation is the very short time series of data available in Polish FADN. However, first analyses of this kind have already been made. The results of such a study conducted by M. Wigier and D. Osuch pointed out that generally better economic performance characterized farms, which financed their investment projects with their own funds and/or bank loans than those that made use of public support. However, the study conducted by B. Wieliczko, J. Fogarasi and M. Wigier indicated that better results observed in the case of farms that made the investment without the participation of public funds requires further analysis. It must be borne in mind that the time series for the new EU member states is too short and thus it does not allow to discern a long-term impact of investment on the situation and the competitiveness of farms.

Summary

The competitiveness of agriculture in the face of climate change is inextricably linked with the ability to create and implement new technologies and agricultural practices, simply with the ability to be innovative. In the case of the EU member states this is even more important as it is the only solution for sustained ability to compete and to achieve a competitive advantage. This is so vital because the costs of production, especially labour costs, are much higher in the EU than in most other countries possessing considerably greater potential when it comes to the availability of agricultural land and which are located in the regions with climate conditions more favourable for agricultural production. Therefore, it is necessary within the framework of agricultural policy and within other national policies and Community actions to stimulate innovation in the agri-food sector and to increase its productivity, as well as the sustainability of agriculture.

Analysis of public influence on the scale of innovation, productivity and sustainable agri-food sector covers a number of policies and activities of the state. In order to prepare such an analysis it is necessary to use a number of indicators, including, among others, the state of agriculture, the level of socio-economic development, condition of the financial markets and the level of public trust. A further step of this analysis is to draw conclusions and develop on its basis an action plan that will alleviate any negative aspects of state influence and will lead to an increase of a positive impact of measures implemented on long-term performance of the agriculture (Fig. S.1).

The analysis of research methods used for evaluating the impact of investment support on changes in agriculture conducted based on the data on the implementation of investment support in years 2007-2012 in selected EU member states shows that the assessment of the impact of this support on income and gross value added as well as determining its effectiveness are very difficult, since the separation of the impact of support from other factors is problematic[76].

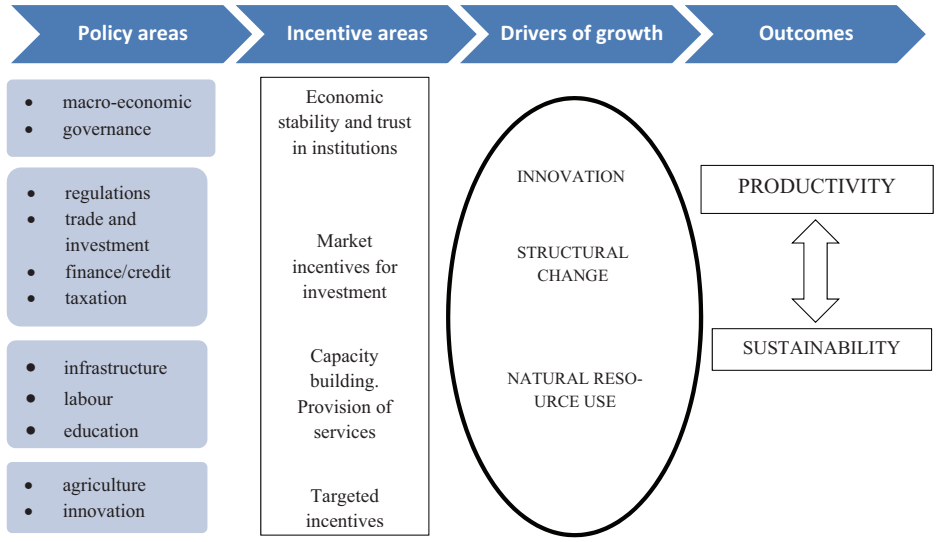
The results of analysis of the scale and structure of investment made in recent years in Polish farms show that the level of investment is still modest given the level of use of fixed assets observed in the Polish agriculture[77]. Clearly visi-

[76] European Commission – Directorate-General for Agriculture and Rural Development – Unit E.4, *Investment Support under Rural Development Policy. Final Report,* Publications Office of the European Union, Brussels 2014.

[77] J. Fogarasi, B. Wieliczko, M. Wigier, K. Tóth, (2014), *Financing of Agriculture and Investment Supports in Agriculture* [in:] Potori N., Chmieliński P., Fieldsend A. (ed.), 2014,

ble is the increasing diversity in the situation of different groups of farms. Farms undertaking investment projects are generally larger than those that do not invest, which means that the larger farms systematically improve the equipment of their holdings, and thus also their competitive potential.

Figure S.1. Policy drivers of innovation, productivity and sustainability in the agriculture and agri-food sector



Source: OECD (2014), Analysing policies to improve agriculture productivity growth, sustainability. Draft framework, OECD, Paris, p. 4.

Analysis of the impact of agricultural support should be made on the basis of at least a few years' time perspective in order to enable an assessment of the impact of all elements of agricultural policy instruments. This is also necessary because of the impact of economic situation in agriculture and the wider economy on the actual performance of supported farms. The influence of these external factors may mitigate or amplify the impact of measures directed to agriculture, hence the need for a broader perspective in evaluation studies.

Structural changes in Polish and Hungarian agriculture since EU accession: lessons learned and implications for the design of future agricultural policies, Research Institute of Agricultural Economics, Budapest.

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ANNEX

List of EU regulations concerning the operation of the CAP towards 2020

- Regulation of the European Parliament and Council Regulation (EU) No 1305/2013 of 17 December 2013. On support for rural development by the European Agricultural Fund for Rural Development (EAFRD) and repealing Council Regulation (EC) No 1698/2005 (OJ L 347, 12.20.2013).
- Regulation of the European Parliament and Council Regulation (EU) No 1306/2013 of 17 December 2013 on the financing of the common agricultural policy, management, and monitoring and repealing Council Regulation (EEC) No 352/78, (EC) No 165/94, (EC) No 2799/98, (EC) No 814 / 2000, (EC) No 1290/2005 and (EC) No 485/2008 (OJ L 347, 12.20.2013).
- Regulation of the European Parliament and Council Regulation (EU) No 1307/2013 of 17 December 2013. Laying down rules for direct payments to farmers under support schemes under the common agricultural policy and repealing Council Regulation (EC) No 637/2008 and Regulation (EC) No 73/2009 (OJ L 347, 20.12.2013).
- Regulation of the European Parliament and Council Regulation (EU) No 1308/2013 of 17 December 2013 establishing a common organization of the markets in agricultural products and repealing Council Regulation (EEC) No 922/72, (EEC) No 234/79, (EC) No 1037/2001 and (EC) No 1234/2007 (OJ L 347, 12.20.2013).
- Commission Delegated Regulation (EU) No 639/2014 of 11 March 2014. On completion of the European Parliament and Council Regulation (EU) No 1307/2013 establishing rules for direct payments to farmers under support schemes under the common agricultural policy and the amendment of Annex X to the Regulation (OJ L 181, 20.06.2014).
- Commission Delegated Regulation (EU) No 640/2014 of 11 March 2014. Supplementing Regulation of the European Parliament and Council Regulation (EU) No 1306/2013 as regards the integrated administration and control system and the conditions for refusal or withdrawal of payments and administrative penalties with applicable to direct payments, rural development and the cross-compliance (OJ L 181, 20.06.2014).
- Commission Implementing Regulation (EU) No 641/2014 of 16 June 2014. Laying down rules for the application of the European Parliament and Council Regulation (EU) No 1307/2013 establishing rules for direct payments to

farmers under support schemes under the common agricultural policy (OJ L 181, 06.20.2014).

- Commission Delegated Regulation (EU) No 807/2014 of 11 March 2014. Supplementing Regulation of the European Parliament and Council Regulation (EU) No 1305/2013 on support for rural development by the European Agricultural Fund for Rural Development (EAFRD) and introducing Transition (OJ L 227, 07.31.2014).
- Commission Implementing Regulation (EU) No 808/2014 of 17 July 2014. Laying down rules for the application of the European Parliament and Council Regulation (EU) No 1305/2013 on support for rural development by the European Agricultural Fund for Rural Development (EAFRD) (OJ L 227, 31.07.2014).
- Commission Implementing Regulation (EU) No 809/2014 of 17 July 2014. Laying down rules for the application of the European Parliament and Council Regulation (EU) No 1306/2013 as regards the integrated administration and control system, rural development measures and cross compliance (OJ L 227, 31.07.2014).

Table A1. Payment rates for packages of the agri-environment-climate measure

Package	Payment rate	100% of basic rate	75% of basic rate	60% of basic rate
1. Sustainable agriculture	400 PLN/ha	0.1-50 ha	50-100 ha	>100 ha
2. Soil and water protection	650 PLN/ha (intercrops)	0.1-50 ha	50-100 ha	>100 ha
	450 PLN/ha (protective strips on slopes >20%)	0.1-50 ha	50-100 ha	>100 ha
3. Maintaining orchards with traditional varieties of trees	1964 PLN/ha	-	-	-
4. Valuable habitats and endangered species of birds in Natura 2000 sites*	600 PLN/ha (extensive agriculture in special bird protection areas)	0.1-50 ha	50-100 ha	>100 ha
	642-1,199 PLN/ha (depending on bird species present)	0.1-50 ha	50-100 ha	>100 ha
	600-1,276 PLN/ha (depending on the type of habitat)	0.1-50 ha	50-100 ha	>100 ha
5. Valuable habitats outside Natura 2000 sites	600-1,300 PLN/ha (depending on the type of habitat)	0.1-50 ha	50-100 ha	>100 ha
6. Maintaining endangered plant genetic resources in agriculture	750 PLN/ha (crops)	0.1-50 ha	50-100 ha	>100 ha
	1000 PLN/ha (seed production)	0.1-50 ha	50-100 ha	>100 ha
7. Maintaining endangered animal genetic resources in agriculture	360-1,600 PLN/animal (depending on animal species)**	-	-	-

*For Natura 2000 located within national parks degressive rates do not apply.

**For cows (100 animals) and sows (70 animals) maximum size of a herd eligible for payment is determined.

Source: Own elaboration based on RDP 2014-2020.

Table A2. Payment rates for packages within the measure “Organic farming”

Package	Payment rate	100% of basic rate	75% of basic rate	60% of basic rate
Payments in period of conversion towards organic farming				
Field crops	966 PLN/ha	0,1-50 ha	50-100 ha	>100 ha
Horticulture	1,557 PLN/ha	0,1-50 ha	50-100 ha	>100 ha
Herbs	1,325 PLN/ha	0,1-50 ha	50-100 ha	>100 ha
Orchards	1,882 PLN/ha (basic orchard trees) 790 PLN/ha (extensive orchards)	0,1-50 ha	50-100 ha	>100 ha
Feed crops	787 PLN/ha	0,1-50 ha	50-100 ha	>100 ha
Permanent grassland	428 PLN/ha	0,1-50 ha	50-100 ha	>100 ha
Payments aimed at mintaining organic farming				
Field crops	792 PLN/ha	0,1-50 ha	50-100 ha	>100 ha
Horticulture	1,310 PLN/ha	0,1-50 ha	50-100 ha	>100 ha
Herbs	1,325 PLN/ha	0,1-50 ha	50-100 ha	>100 ha
Orchards	1,501 PLN/ha (basic orchard trees) 660 PLN/ha (extensive orchards)	0,1-50 ha	50-100 ha	>100 ha
Feed crops	559 PLN/ha	0,1-50 ha	50-100 ha	>100 ha
Permanent grassland	428 PLN/ha	0,1-50 ha	50-100 ha	>100 ha

Source: Own elaboration based on RDP 2014-2020.

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