

**SIGNIFICANCE OF PUBLIC FUNDS IN INVESTMENT
ACTIVITY OF FARMS IN POLAND
(ON THE EXAMPLE OF PODKARPACIE)**

Abstract

The paper aims at assessment of the public funds support to investment activities of agricultural holdings and determination of how possible it was to fund the implemented investments without the state aid. The research was held in 2012 among 129 farms, which in 2004-2011 benefited from public financial aid in their investment activity. The selected farms were researched with the use of interview questionnaire concerning organisation of farms, obtained economic results and assessment of executed investments. To determine the possibilities of financing investments at researched farms without the public financial aid the linear programming method was used to develop models of farms, where public financial aid was replaced with commercial loan or own cash, if possible.

It was decided that state aid in financing investments should be directed at farms likely to develop, which are not able to finance investments without state aid. Farms, which are too small to guarantee independent development in the future, and too large, which can gather up funds for investments without state aid, should be excluded from the support.

Key words: state aid, investments, investment financing, farm

Introduction

The investment activity is one of the factors responsible for development of agriculture and improvement of its competitiveness. The level and efficiency of agricultural production rests on the volume of initial inputs together with the level of provision of fixed assets, which result from the past investment decisions (Grzelak, 2014; Sckokai and Moro, 2009). Apart from the fact that investments in

agriculture condition the level of obtained output, they also have to meet specific standards as regards environmental protection, animal welfare, work ergonomics, reduction in emissions of greenhouse gasses, etc. (Czubak, 2015; Grzelak, 2014), which puts certain requirements on agricultural investments and hinders the investment process. Moreover, because of the technology treadmill and the fact that in rich countries the demand for food is characterised by low price elasticity and supply curves in agriculture are more elastic (Binswanger, Mundlak, Yang and Bowers, 1985), the benefits following from changes in the field of better efficiency of agricultural production, modernisation of production techniques in agriculture and increase in the production volume, rather go to consumers than farmers (Czyżewski and Matuszczak, 2015; Kusz, 2014; Schultz, 1953; Swinnen, Gorter, Rausser and Banerjee, 2000). The gains from modernisation of production techniques in agriculture can be considered from the perspective of a private farmer's interest but, in relation to the functions fulfilled by agriculture, also from the view point of public interest. In the area of private benefits, these are benefits linked to better farming efficiency leading to higher agricultural income, greater satisfaction from the performed job, higher status for farmers, lower farming risk, better market rating, greater specialisation and economic strength of agricultural holdings, etc. Whereas from the perspective of the public interest, these are benefits in the field of higher food security in physical terms and better quality of food products; while in the environmental area – lowering of the unfavourable impact of agriculture on the environment (Kusz, 2014). As it follows from the above, benefits from the investment activity pursued by farmers not only go to the very farmers but are also seized by consumers and concern the public interest. On many occasions, this justifies the introduction of instruments supporting modernisation of farms as part of agricultural policy.

Investment activity is closely linked to spending of cash, which is hard to come by, to invest in agriculture. Funds generated by operating activities are usually insufficient to the investment needs. Hence, investment activity based on equity can be impossible or too long-lasting. Furthermore, the financial market failures (Hubbard and Kashyap, 1992; Kulawik, 2002; Stiglitz and Weiss, 1981) – broadly discussed in the literature – have a number of ramifications for the farmers. They basically consist in limited access to loans, consequently, making it impossible to execute full development plans and achieve the optimum production level, they also limit capital accumulation, reduce the rate of return over investment, restrict the possibilities to embrace new production technologies and improve farming efficiency and, as a result, the possibility to fulfil the assumed goals.

Mitigation of the negative effects of credit constraints is not easy for agricultural policy. First of all, the setting to create the internal capital-generating capacities should be improved by establishing conditions making it possible to achieve satisfactory production profitability and agricultural income. Additionally, extension of smoothly working financial infrastructure allows for mitigation of the effects of

information asymmetry. Financial market failures lead to a failure to allocate the factors of production (e.g. underinvestment) and should be addressed by relevant measures, which can cover both relevant legal framework for bank regulations, assessment of borrowers, promotion of competition, precise determination of the credit rating and assistance in making investments by agricultural holdings. The failures of agricultural financial markets are very often used by politicians as arguments to justify aid to investment activities. According to Petrick (2004), the role of the government in the aspect of failures of agricultural financial markets is crucial. However, no simple mechanisms exist to effectively overcome the problem of credit rationing. The governmental policy should aim primarily at reduction of reasons for failures of agricultural financial markets. As noted by Kulawik (2002), banks' interest in extending loans to farmers depends also on the policy of the state towards this sector of the agricultural economy.

In the conditions of financial market failures, agricultural policy instruments allowing for provision of financial support to investment projects from public funds play a vital role in the investment stimulation in agriculture. As shown by research of Kusz, Gędek and Kata (2015), state aid granted to support investments in agriculture, especially programmes financed by the European Union, constitutes a considerable share in the funding of investment activity in agriculture in Poland. State aid in investment activities can, however, add to deformation of the farm-level economic account of cost-effectiveness of investments. This can result in farmers deciding to make investments exceeding the actual needs and choosing solutions that do not have an economic justification. If a farmer chooses devices or technologies with technical parameters exceeding the needs of a farm this can increase the future costs of depreciation, and repairs and maintenance. These costs can constitute an additional and unnecessary burden for the holding which has a negative impact on the farming efficiency. What is more, it is also possible that support will go to entities which are able to invest without state aid. The choice of state aid recipients is a tough one, but it should consider the effective use of aid funds, so as to target them at farms requiring investments but lacking the possibilities to fund them on their own. The support should not cover farms too small to develop and farms that can fund investments on their own (Józwiak and Ziętara, 2013).

Research objective, materials and methods

The paper aims at assessment of the public funds¹ supporting the investment activities of agricultural holdings and determination of how possible it was to fund the realised investments without the state aid.

The basic source of information used in the research is empirical data collected in an interview questionnaire carried out among randomly selected farms.

¹ Public funds are understood in the paper as financial resources directly supporting investment activities under the European Union funds.

The research concerned the status of farms at two time periods: T_0 – before starting investments (2004), and T_1 – at the investment exploitation phase (2011).

The substantive scope of the interview questionnaire covered:

period T_0 :

- respondent's characteristics (sex, age, education, etc.),
- level of provision of a farm with factors of production (land, labour, capital),
- volume of crop production (cultivation area and yields), livestock production (herd size and production effects) and the level of provided services.

period T_1 :

- level of provision of a farm with factors of production (land, labour, capital),
- volume of crop production (cultivation area and yields), livestock production (herd size and production effects) and the level of provided services,
- level of incurred material and financial costs and costs of labour,
- level of investment inputs throughout the analysed period,
- characteristics of realised capital investments in production and their economic and non-economic effects,
- sources of financing investment activities.

Research was held at farms meeting the following criteria:

- investments in fixed assets in 2004-2008,
- using financial support under the Sectoral Operational Programme "Restructuring and modernisation of the food sector and rural development in 2004-2006" Measure 1.1 "Investment in agricultural holdings" in their investment activities,
- investment realisation phase lasts at least four years (investment implementation phase started at the latest in 2008).

At the first stage of research the research area was selected. It was assumed that it will be a voivodeship of the lowest investment activity of farmers and the lowest activity of farmers as regards obtaining state aid for investment activities. The following characteristics were used to assess investment activities of farmers: the value of investment inputs per one farm, the value of investment inputs per 1 ha of utilised agricultural area (UAA), the value of investment inputs per one person working in agriculture and the value of investment inputs against the gross value of fixed assets (data used as empirical material was taken from the statistical yearbooks of the Central Statistical Office of 2002-2008). The value of investment inputs was expressed in fixed prices of 2008. The values given in current prices were calculated into fixed prices of 2008, making an adjustment based on the index of prices of investment goods and services purchased by individual agricultural holdings. Whereas to assess the activity as regards winning state aid for investment activities the following characteristics were used: the value of received state aid per one farm, the value of received state aid per 1 ha of UAA, the value of received state aid per one person working in agriculture, the value of received state aid against the gross value of fixed

assets and the value of state aid per one executed project (data used as empirical material was taken from the reports of the Agency for Restructuring and Modernisation of Agriculture and the statistical yearbooks of the Central Statistical Office for the period of implementation of the SOP "Restructuring and modernisation of the food sector and rural development in 2004-2006" – given the applicability of the $n+2$ rule it was 2004-2008). Using the linear ordering method (based on the procedure of zero unitarization) a ranking of voivodeships was created according to the investment activity of framers and activity of farmers as regards acquisition of state aid. The Podkarpackie Voivodeship was selected for the research, as it was classified at the final place of the ranking list.

At the second stage of the research surveys at farms were conducted in the selected voivodeship. In the Podkarpackie Voivodeship, the population of farms that benefitted from payments to investment activities amounted to 482, out of which 129 farms were randomly selected for the research². In 2012, the selected farms were researched using the interview questionnaire concerning the organisation of farms, their economic results and assessment of realised investments. The period of analysis covered the years between 2004 and 2011. The voivodeship with the lowest investment activity was selected because in the regions of fragmented agrarian structure there might be a problem of agriculture marginalisation. This results in concentration of state aid in regions with better developed agriculture and the process of growing polarisation of farms and disproportions in the level of agriculture development in individual regions (Czudec, Kata, Miś and Zając, 2008). This spatial scope was selected because the authors wanted to show the problem issues in the region with agriculture characterised by serious structural defects.

In order to define the possibilities of funding the realised investments in the researched agricultural holdings without the public financial support, farm models were developed, which assumed a lack of public financial support that was replaced by a commercial loan or, if possible, own cash. Farm models were prepared for respective years from 2004 to 2011. To accurately reflect the conditions prevalent at the farms the model structure is based on the initial data coming from agricultural holdings, which were collected under the conducted research. Given the fact that the models are of *ex post* character, the decision variables concerning economic parameters (farmers obtaining prices for agricultural products and prices of means of agricultural production) were entered into the model according to the average values for a given period. In order to determine the financial possibilities of investment activities for the researched farms, the linear programming method (linear optimisation model) was used which consists of limiting conditions (balancing), boundary conditions and goal functions (Majewski, Sulewski, Waś, Guba and Zięta, 2009).

² The sampling without replacement was used.

The following form of the model was used:

1. limiting conditions:

$$\text{(limitation no. 1) } a_{11}x_1 + a_{12}x_2 + \dots + a_{1n}x_n \leq b_1$$

.....

$$\text{(limitation no. m) } a_{m1}x_1 + a_{m2}x_2 + \dots + a_{mn}x_n \leq b_m$$

2. boundary conditions:

$$x_1 \geq 0 \quad x_2 \geq 0 \quad \dots \quad x_n \geq 0$$

3. goal function:

$$F(x) = F(x_1, x_2, \dots, x_n) = c_1x_1 + c_2x_2 + \dots + c_nx_n \rightarrow \max$$

where: a_{ij} – technical parameters; x_j – decision variables; c_j – goal function parameters.

The values of income from a family farm, obtained from the created models, were used as grounds to prepare, for individual years of the 2004-2011 period, cash flow statements for operating activities – funds saved up in the form of net agricultural income and depreciation; investment activities – expenditures incurred for investments and funds obtained from sale of investments; and financial activities – covering acquirement or loss of funding sources. Whereas the operating activity was somewhat modified, i.e. the revenues were increased by off-farm income and decreased by the estimated value of the farmer's own labour input. The cost of one hour of the farmer's own labour was calculated on the basis of the average net wage in the economy. Considering the costs of the farmer's own labour, made it possible to estimate the charge for own labour of the farmer and his family, which decides on the level of the possible consumption. Satisfying consumption in the household of a farmer fulfils an important role since its coverage allows for generation of the accumulation fund (Grzelak, 2014). No possibility to execute the full value of assumed investments resulted in reduction of investments to the level of financial possibilities of a farm³. In this case, an expert's method was used and investments that affected the level of obtained production to the lowest extent were limited in the first place. It was also assumed that investments were indivisible and bulky, and investments realised at the same time were interrelated between each other.

The researched farms were divided into four groups, by the value of investments feasible without state aid, calculated on the basis of created models and cash flow statements against the actual level of investment inputs⁴:

³ The initial level of investment inputs was equal to the investment inputs actually realised at the researched farms with the use of aid funds. However, in case of no financial support from the public funds not all researched farms were able to finance such a level of investments, which resulted in the need to restrict the investments to the level ensuring their implementation based on a commercial loan.

⁴ This index was calculated by dividing the value of investment inputs feasible without financial state aid by the value of investment inputs actually incurred at the researched farms.

- group I – where the value of feasible investments ranges from 0% to 25%,
- group II – where the value of feasible investments ranges from 26% to 50%,
- group III – where the value of feasible investments ranges from 51% to 75%,
- group IV – where the value of feasible investments is above 75%.

Table 1 presents the number and structure of farms broken down into individual groups.

Table 1

Number and structure of the researched farms by individual groups

Farm group	Number of farms in the group (unit)	Share (%)
Group I (0-25%)	48	37.2
Group II (26-50%)	19	14.7
Group III (51-75%)	27	20.9
Group IV (>75%)	35	27.2
Total	129	100

Source: own calculations.

Research results

The average UAA at the researched farms in 2004 was at 36.6 ha and in 2011 it was by 1.4 times higher (Table 2). As for the conditions in the Podkarpackie Voivodeship the researched holdings were characterised by over the average size of UAA (according to the CSO data, in 2004 the average area of an individual farm having more than 1 ha of UAA in the Podkarpackie Voivodeship amounted to 3.5 ha and in 2010 – 4.1 ha). This proves that farms of much greater economic strength than the average farm in the country apply for aid from the European Union funds for development of agricultural holdings. What is more, farms that were most able to finance investments without the EU support (group IV) were characterised by the highest production potential expressed in the UAA. In all the analysed farm groups an increase in UAA was apparent; it was the lowest in group II. The significance of UAA rental should be also noted, as its share in 2004 amounted to 33.6% in UAA and in 2011 it was slightly higher and amounted to 36.4%, and in groups I, II and III the share of rentals increased (respectively, group I in 2004 – 17.8%, and in 2011 – 37.1%; group II in 2004 – 16.7%, and in 2011 – 21.1%; group III in 2004 – 35.5%, and in 2011 – 51.7%), while in group IV the importance of rental in the analysed period dropped from the level of 41.9% in 2004 to 33.4% in 2011 (Table 2).

Table 2

Characteristics of the researched farms

Parameter	Total		Group I (0-25%)		Group II (26-50%)		Group III (51-75%)		Group IV (>75%)	
	2004	2011	2004	2011	2004	2011	2004	2011	2004	2011
Utilised agricultural area (ha)										
\bar{x}	36.6	52.7	13.5	29.4	40.1	42.7	28.2	51.5	73.0	91.0
Vs	114.4	91.4	51.4	94.5	86.4	70.6	45.3	51.1	82.3	72.2
min	2.8	5.4	2.8	5.4	12.8	12.8	7.0	9.2	6.9	7.2
max	248.4	247.4	31.0	111.5	132.3	108.6	52.4	107.9	248.4	247.4
Rented utilised agricultural area (ha)										
\bar{x}	12.3	19.2	2.4	10.9	6.7	9.0	10.0	26.6	30.6	30.4
Vs	282.1	151.6	141.3	134.9	144.9	133.6	88.6	82.9	204.0	151.1
min	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
max	248.4	206.4	15.0	70.0	30.0	39.9	35.5	79.0	248.4	206.4
Number of full-time employees (AWU/100 ha of UAA)										
\bar{x}	11.0	8.4	18.1	13.0	9.2	9.9	8.5	5.2	4.2	3.8
Vs	86.4	95.5	57.6	71.3	79.8	93.8	70.9	62.9	71.0	84.1
min	1.0	0.8	6.2	1.7	1.5	2.6	1.7	1.4	1.0	0.8
max	42.6	37.0	42.6	37.0	26.6	31.4	28.7	17.3	14.4	13.9
Value of fixed assets per one full-time employee (PLN thousand/AWU)										
\bar{x}	167.0	351.5	126.9	254.0	167.8	335.6	167.9	442.7	220.7	423.5
Vs	72.7	66.6	57.2	65.0	48.4	41.4	48.6	57.4	84.1	68.1
min	17.1	72.5	17.1	72.5	64.5	166.0	62.6	119.3	27.3	99.0
max	878.0	1,348.4	295.5	1,029.3	350.8	723.7	375.0	1,297.7	878.0	1,348.4
Value of fixed assets per 1 ha of UAA (PLN thousand/ha)										
\bar{x}	15.3	21.4	21.2	24.0	14.9	32.3	13.1	21.1	9.1	12.3
Vs	99.4	86.7	80.8	51.4	85.9	97.7	71.7	85.4	161.6	101.5
min	1.1	4.5	1.9	7.3	3.4	7.6	3.4	4.9	1.1	4.5
max	107.1	92.5	107.0	48.9	36.7	92.4	39.1	92.3	87.8	76.0

Source: own calculations.

Similar beneficial changes were noted for relations of labour inputs to UAA. The analysed farms noted a drop in the number of full-time employees per 100 ha of UAA (Table 2). In 2004, the average number of full-time employees per 100 ha of UAA amounted to 11.0 and in 2011 it was by 23.6% less.

The greatest drop was noted in group III (38.8%). Whereas only in group II the level of labour inputs per 100 ha of UAA increased slightly. In case of technical devices for labour and technical devices for land a growth in all discussed groups was noted, which was a resultant of all realised investments. Technical devices for labour in 2011 were at a level by 2.1 times higher than in 2004. But then, in group III it was 2.6 times higher, in group I and II – 2.0 times and in group IV – 1.9 times more. In case of technical devices for land there was also a growth in indices at the researched holdings. The greatest changes in the index was typical of group II (2.2 times higher level of the index in 2011 than in 2004), while the lowest – group I (1.1 times higher level of the index in 2011).

Changes that took place at the researched farms, concerning factors of production, should be considered as beneficial. In particular, in the conditions of dynamically changing prices of factors of production and, above all, growing labour costs as compared to the other factors of production (Runowski and Zięta, 2011), it is necessary to implement labour-saving production technologies resulting in a growth in the relation of capital to labour. This results in substitution of increasingly more expensive labour inputs with cheaper capital.

Analysing the production potential of farms, which rests on the possibilities to fund investments without the financial aid from the European Union, it can be noted that farms from group IV, i.e. with the greatest possibilities to fund investments without the state aid, were characterised by significantly higher UAA. Moreover, the level of inputs of the labour force per 100 ha of UAA in this group of farms was characterised by a better relation than in other groups. Farms from group I were characterised by the lowest production potential measured by UAA. The data point to the fact that farms characterised by significant production possibilities resulting from their potential do not require support in the investment process from public funds.

In the researched farms the value of investment inputs incurred in 2004-2011 was at an average level of PLN 515.8 thousand (Table 3). Along with a growth in the possibilities of funding the investment inputs without the state aid the value of realised investments also grew. In group IV the level of realised investments was by two times higher than in group I. The level of realised investments per one full-time employee was in the present period at PLN 242.7 thousand per AWU, while the level of investments per 1 ha of UAA was at PLN 11.7 thousand of UAA. At the same time, farms from group III and group IV were characterised by significantly higher expenditure per one full-time employee than group I and II. In case of realised investment inputs per one ha of UAA, the lowest index was noted for farms from group IV and the highest for farms from group II.

Table 3

The level of realised investments for the researched farms in 2004-2011

Parameter	Total	Group I (0-25%)	Group II (26-50%)	Group III (51-75%)	Group IV (>75%)
Investment inputs (PLN thousand)					
\bar{x}	515.8	345.1	503.6	602.0	690.2
Vs	96.6	108.2	57.0	55.9	105.9
min	23.4	57.2	100.0	181.0	23.4
max	2,850.4	1,423.1	948.2	1,114.0	2,850.4
The value of investment inputs per one full-time employee ^a (PLN thousand per AWU)					
\bar{x}	242.7	167.7	207.7	327.1	300.2
Vs	89.7	108.5	58.7	66.4	88.9
min	21.0	22.3	50.0	59.3	21.0
max	1,108.0	862.9	526.8	772.5	1,108.0
The value of investment inputs per 1 ha of UAA ^a (PLN thousand per ha of UAA)					
\bar{x}	11.7	11.5	18.3	13.8	6.7
Vs	87.1	63.2	97.6	73.3	62.4
min	1.5	3.3	4.2	2.4	1.5
max	55.0	35.0	50.8	55.0	20.3

^a The number of full-time employees and UAA for 2011 was taken to calculate the value of investment inputs per one full-time employee as well as the value of investment inputs per 1 ha of UAA.

Source: own calculations.

Analysing the type of realised investments it was stated that the highest share belongs to investments in machinery, devices and tractors (Table 4). Investments in buildings and structures accounted for 21.15% of investment inputs, while the highest share was in farms of group II (40.37%). To a lower extent farmers invested in the purchase of land and the investments in land purchase had the highest share in group IV. The advantage of investments in machinery, devices and tractors follows from the fact that these investments have mobile character and are characterised by lower irreversibility, higher elasticity and higher level of liquidity, which lowers the risk of making wrong investment decisions. Also for this type of investments there is a well-functioning market of second-hand machinery, which makes it possible to recover funds in case of a wrong investment decision. For investments in fixed immobile assets, such as land, buildings and structures, permanent plantations, irrigation facilities, etc., the investment risk is higher. The assets are characterised by a lack of the possibility to move them but also a certain specificity (they were constructed for a specific production). Fixed immobile assets (except for land) are characterised by low or non-existent value of resale. This increases the risk of investing in such assets given the irreversibility of the investment decision (Kataria, Curtiss and Balmann, 2012).

Table 4

*The type of realised investments at the researched farms in 2004-2011
(% of investment inputs)*

Type of investments	Total	Group I (0-25%)	Group II (26-50%)	Group III (51-75%)	Group IV (>75%)
Land	16.32	14.66	2.46	9.47	27.55
Plantings	0.17	-	-	0.08	0.42
Buildings and structures	21.15	22.76	40.37	25.19	9.72
Tractors	29.35	38.39	21.20	27.63	27.53
Means of transport	1.22	1.31	0.20	1.41	1.44
Machinery and devices	30.78	21.29	33.87	35.44	32.92
Primary herd livestock	0.64	1.56	0.23	0.78	0.09
Technical infrastructure	0.36	-	1.67	-	0.33
Computers and software	0.01	0.03	-	-	-

Source: own calculations.

As for the character of realised investments, according to farmers, investments of modernisation and development character were the most important (Table 5). Modernisation investments are mainly to reduce production costs and development investments are primarily targeted at increasing the owned production potential and strengthening of the competitive position. The share of replacement investments amounted to 16.0% and this share was the highest in group IV. A small percentage of investments was classified by farmers as investments concerning the public interest, i.e. investments linked to environmental protection and improvement of animal welfare. The modernisation, development and replacement investments realised at the researched farms concern, above all, the so far pursued sectors of agricultural production. In such case, the risk of failure is definitely lower than in the case of new directions of production.

Table 5

Character of realised investments (% of investment inputs^a)

Character of investments	Total	Group I (0-25%)	Group II (26-50%)	Group III (51-75%)	Group IV (>75%)
Modernisation investments	43.07	45.54	39.15	42.74	43.16
Replacement investments	16.00	11.75	7.92	11.28	25.29
Development investments	43.09	47.02	50.09	50.07	32.93
Innovation investments	1.80	3.42	1.77	2.22	0.41
Restructuring investments	0.98	2.12	-	1.86	-
Investments concerning the public interest	3.39	4.04	12.21	0.96	1.08

^a The farmer could classify investments to more than one type.

Source: own calculations.

The effects of realised investments were defined based on the opinions of farmers (Table 6). The effects of investments should be understood as results that were revealed or can be revealed at farms making investments or in the setting of such farms (Kulawik, 1997). The character of the effects of investments can be different. Three groups of effects were distinguished: physical, economic and financial, and non-economic (Table 6). Among physical effects the ones most commonly indicated were: growth in production scale, growth in UAA, better market position and growth in agricultural production quality. The assessment of the degree of the effects' execution on a five-point scale was average (from 3.1 to 3.6). In all groups of the analysed farms a high share of indications was noted for effects linked to a growth in production scale and UAA. Whereas a better market position and growth in agricultural production quality referred primarily to farms from group IV and III. Among economic and financial effects most of the indications went to the growth in agricultural income, growth in the value of a farm and obtained financial benefits in the form of aid funds. Moreover, the effects obtained in the form of financial benefits and growth in the value of a farm were assessed by farmers as strong (scores, respectively, at 4.2 and 4.1). An important effect was also the possibility to reduce production costs, but the realised investments – according to farmers – did not allow for a high level of execution of the effect (average score 3.3). In the group of non-economic effects the farmers most often pointed to making the work easier and more effortless and to improving the work safety conditions. The level of obtaining these two effects, according to the farmers, was significant (scores, respectively, at 4.1 and 4.0). It should be also noted that in case of group II the high share of indications concerned the effects linked to environmental protection, better animal welfare and better sanitary and hygienic conditions at farms.

Table 6

The effects of investment activity in the opinion of farmers

Type of effects	Total		Group I (0-25%)		Group II (26-50%)		Group III (51-75%)		Group IV (>75%)		
	A	B	A	B	A	B	A	B	A	B	
	Physical effects										
Growth in UAA	3.1	72.1	3.5	66.7	2.2	57.9	3.8	85.2	2.5	77.1	
Growth in production scale	3.6	89.1	3.7	87.5	3.3	94.7	3.8	96.3	3.4	82.9	
Starting new activity	1.9	17.8	2.0	16.7	2.2	26.3	1.5	7.5	1.6	22.9	
Ceasing activity	1.5	10.1	1.0	8.3	1.4	26.3	1.0	3.7	2.3	8.6	
Better market position	3.4	73.6	3.2	56.3	3.4	63.2	3.7	92.6	3.3	88.6	
Introduction of new production technology	3.3	63.6	3.5	50.0	2.9	73.7	3.9	63.0	3.1	77.1	
Change in production direction	2.2	28.7	2.5	20.8	2.0	42.1	2.0	14.8	2.3	42.9	

cont. Table 6

Growth in agricultural production quality	3.5	72.1	3.7	62.5	3.2	57.9	3.7	85.2	3.3	82.9
Starting non-agricultural activity	2.8	12.4	2.4	10.4	2.6	26.3	3.3	14.8	3.0	5.7
Possibility to sale agricultural goods at times of good prices	3.3	26.4	2.8	16.7	3.4	36.8	3.6	29.6	3.5	31.4
Provision of new services	2.1	16.3	2.6	14.6	1.0	26.3	2.8	22.2	1.0	8.6
Reduction of losses	2.7	38.0	2.7	37.5	2.6	63.2	3.0	37.0	2.3	25.7
Elimination of bottlenecks and reserves	2.6	37.2	2.8	33.3	2.0	42.1	2.9	44.4	2.4	34.3
Independence from the need to benefit from agricultural services	3.9	59.7	3.7	52.1	3.4	63.2	4.0	59.3	4.3	68.6
Possibility to avoid the peak demand for labour inputs and objectified labour	2.9	45.7	2.7	45.8	3.0	47.4	2.8	37.0	3.1	51.4
Economic and financial effects										
Reduced production costs	3.3	71.3	3.1	70.8	2.7	68.4	3.2	66.7	3.7	77.1
Obtaining financial benefits from the EU	4.2	82.9	3.9	68.8	4.3	100	4.2	92.6	4.4	85.7
Reduced farming risk	3.3	58.1	3.3	41.7	3.2	52.6	3.3	74.1	3.4	71.4
Reduced employment	2.3	27.9	1.9	18.8	2.4	36.8	2.2	18.5	2.5	42.9
Growth in agricultural income	3.5	89.9	3.3	91.7	4.0	84.2	3.4	92.6	3.7	88.6
Increase in the farm value	4.1	84.5	3.9	81.3	4.5	89.5	4.2	92.6	4.1	80.0
Non-economic effects										
Higher status and satisfaction from running a farm	3.7	59.7	3.6	45.8	3.8	57.9	4.0	70.4	3.5	71.4
Adjustment to legal requirements	3.4	62.8	3.4	54.2	3.2	57.9	3.6	51.9	3.3	65.7
Making work easier and more effortless	4.1	88.4	3.9	87.5	4.3	100	4.2	88.9	4.2	82.9
Better work safety conditions	4.0	86.0	3.9	81.3	3.9	89.5	4.2	100	4.1	80.0
Environmental protection	3.7	71.3	3.6	66.7	4.3	73.7	3.6	74.1	3.5	74.3
Better sanitary and hygienic conditions	3.7	66.7	3.6	58.3	4.2	84.2	3.6	81.5	3.6	57.1
Better animal welfare conditions	3.7	51.9	3.6	52.1	3.7	78.9	4.4	63.0	2.8	28.6

A – Value of the average score on a scale from 1 to 5 (1 – insignificant effect, 5 – very strong effect).

B – Frequency of occurrence (percentage of farmers pointing to a given effect).

Source: own calculations.

The analysis of the sources of financing of the implemented investments makes it possible to determine the significance of the public financial support in investment activity (Table 7). Equity was the main source of investment financing for the researched farms (39.10%), it was followed by cash obtained from

the EU aid funds (33.77%) and then by preferential loans. The importance of the European Union funds in the funding of investment activity varied in individual groups of agricultural holdings. They were the most important for holdings classified into the first two groups. In group I their share was at 38.27%, in group II – 39.96% and in group III – 33.35%, while in group IV – 28.51%. The share of commercial loans was also minor, and the lowest involvement of commercial loan in the funding of investment activity was typical of farms with the greatest possibilities of financing investment inputs without the aid funds from the European Union (in group IV the share of commercial loan in the structure of the investment portfolio was 7.97%). The farms from other groups, especially group II, were characterised by definitely higher share of commercial loan in the investment financing. This may follow from the fact that these farms were characterised by lower possibilities to fund part of eligible costs of investments based on own funds. The data show that the researched farmers were looking for sources of funding the investment activity that would be cheaper and biased by lower financial risk. Such a hierarchy of investment funding follows from the fact of research sample selection, but also it reflects the farmers' drive at isolation from the loan market and unwillingness to undertake financial risk linked to debt.

Table 7

Sources of financing investments for the researched farms (%)

Sources of financing	Total	Group I (0-25%)	Group II (26-50%)	Group III (51-75%)	Group IV (>75%)
Equity	39.10	36.11	35.90	37.95	43.20
Commercial loan	11.23	12.43	19.08	10.23	7.97
Preferential loan	15.70	13.00	4.91	18.18	20.16
Loan	0.20	0.20	0.16	0.31	0.14
SAPARD programme	0.29	0.10	0.00	0.48	0.41
SOP 2004-2006 Measure 1.1 Investment in agricultural holdings	20.90	21.46	33.47	17.50	17.83
SOP 2004-2006 Measure 2.4 Diversification of agricultural activities and activities close to agriculture activities to provide multiple activities or alternative incomes	0.62	1.05	2.09	0.25	-
RDP 2004-2006 Adjustment of agricultural holdings to the EU standards	0.58	1.10	0.98	0.03	0.43
RDP 2007-2013 Modernisation of agricultural holdings	10.42	14.06	3.42	13.66	8.50
RDP 2007-2013 Diversification towards non-agricultural activities	0.96	0.50	-	1.43	1.34

Source: own calculations.

The research determined also the significance of the European Union funds in the investment activity based on the developed models of agricultural holdings, which pointed to a possible level of investment inputs of researched holdings without the EU financial support. From the research it follows that the level of investment inputs for the researched farms would amount to 56.32% against the actually incurred investment inputs (Fig. 1). At the same time, for group I the level of obtained cash, both from operating activities and off-farm income after consideration of own labour costs, did not allow for investments. In group II the level of feasible investments amounted to 33.84%, i.e. it was also much limited. It should be stated that the two groups of farms without support to investments in the form of aid funds would not be able to modernise the production techniques. In case of group III, a decrease in the investment inputs to actually realised ones is 36.13%, while in case of group IV it is only 1.24%. The farms classified as group IV are able to carry out investments without financial support from the public funds based on the commercial loan or cash saved up from this type of activity.

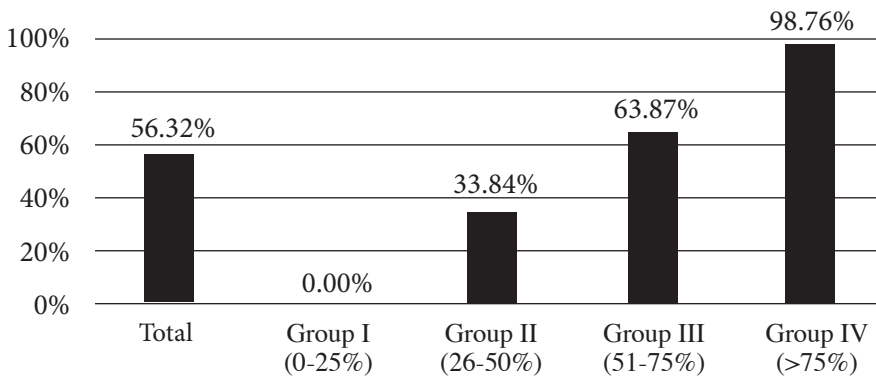


Fig. 1. Level of investments feasible without financial resources from the European Union at the researched farms (%).

Source: own calculations.

The effects of state aid to investment activity can be also assessed based on changes in the economic and financial results obtained by a farmer (Table 8). The total output value in the analysed period grew by 1.89 times, while the highest growth was noted for group I – it was as much as 2.75 times, the smallest growth in the production value was in group II (1.57 times). The comparison of the total output value for group II and III should be noted. In 2004, farms from the two groups were characterised by a similar level of achieved production. However, in 2011 the differences in the total output value between group III and group II were at PLN 91.3 thousand (group III got by

49.97% higher total output value). This may point to the fact that investment plans assuming a growth in the production volume decide on obtaining the permanent development ability.

Table 8

Economic and financial results of researched farms

Parametr	Total	Group I (0-25%)	Group II (26-50%)	Group III (51-75%)	Group IV (>75%)
Total output value in 2004 (PLN thousand)					
\bar{x}	134.8	47.3	116.1	117	278.7
Vs	122.7	55.9	67.1	63.9	89.4
min	5	5	48.8	28.9	17.4
max	945.4	110.1	282.6	353.4	945.5
Total output value in 2011 (PLN thousand)					
\bar{x}	255.7	130.3	182.7	274	453.4
Vs	103.6	89.2	56	45.2	88.9
min	16.3	16.3	34.8	84.5	39.7
max	1,683.6	593.4	351	626	1,683.6
Income from a family farm minus costs of own labour of a farmer in 2004 (PLN thousand)					
\bar{x}	13.9	-31.3	4.5	4.1	88.7
Vs	586.6	-59.2	1012	672.7	134.5
min	-73.2	-73.2	-28.8	-70.1	-24.3
max	397	-0.6	127.1	66.2	397
Income from a family farm minus costs of own labour of a farmer in 2011 (PLN thousand)					
\bar{x}	52.6	-20.2	23.1	62.3	161
Vs	258.5	-244.7	142.1	81.4	129.7
min	-119.9	-119.9	-12.4	-12.3	-20.2
max	825	107.6	96.1	196	825
Share of agricultural holdings achieving agricultural income at parity level (%)					
2004	41.1	0	36.8	59.3	85.7
2011	69	29.2	78.9	96.3	97.1
Financial margin for 2004-2011 (model solution) (PLN thousand)					
\bar{x}	284.8	-201.5	89.2	260.8	1,076.4
Vs	294.6	-76	80.2	62.9	117.3
min	-615.3	-615.3	6.6	53.6	98.6
max	5,169.2	36.5	206.4	672.5	5,169.2

Source: own calculations.

Table 8 presents the level of obtained income from a family farm less the estimated own labour cost of a farmer and his family. This enabled to define the ability of farms to generate agricultural income at the parity level. A negative value of income at the parity level was noted in group I, in the remaining farms the average value of thus calculated income was positive. At the same time, in 2004 and 2011 the highest values were noted for group IV. The percentage of farms obtaining parity income in individual groups should also be emphasised. In 2004, no agricultural holdings from group I noted a positive value. Most of farms obtaining agricultural income allowing for coverage of the estimated cost of own labour was in group IV. Changes that took place at researched farms, as a result of realised investments, made it possible to increase the share of farms reaching parity income. For group III and IV there were over 96% of such agricultural holdings in 2011. The lowest number of farms generating parity income was noted in group I. The data point to the fact that state aid targeted at farms of lower production scale fails to build permanent grounds for independent development in the future, while agricultural holdings from group IV – characterised by the highest production scale both in 2004 and 2011 – do not need state aid in investment activity. Such farms can fund investments based on own funds and commercial loans. A factor deciding on the possibilities of benefiting from state aid by the farmers should be the production scale (these cannot be either too small or too large farms), and the support should, in the first place, be targeted at investments aiming at growth in the production possibilities of a farm. Table 8 presents also the level of margin obtained by the researched farms, which was allocated to investment activities, resulting from the created models without the state aid for investments in 2004-2011. This margin was calculated as a value of income from a family farm increased by the value of depreciation and off-farm income and less the estimated value of own labour of a farmer and his family. The level of earned margin is also linked to the level of obtained total output value.

Table 9 presents the case study for a selected farm. This farm is targeted at live pig production under a closed cycle with the maximum possible herd size of 40 sows. The farm realised investments for a total sum of PLN 618.9 thousand. In 2006 and 2011, these were investments in machinery, devices and tractors funded in 50% with the use of the EU funds and 50% own funds, while in 2009 the farmer acquired UAA paying for the purchase from his own funds. The commercial loan has been entered into the created model as a source of funding to replace public funds. The created model points to the possibility to fund investments without state aid based on the generated financial margin.

Table 9

Results of the model solution for an exemplary agricultural holding specialising in live pigs production under a closed cycle

Parameter	Years							
	2004	2005	2006	2007	2008	2009	2010	2011
Utilised agricultural area (ha)	17.97	17.97	17.97	17.97	17.97	17.97	29.47	29.47
including arable land (%)	96.55	96.55	96.55	96.55	96.55	96.55	97.90	97.90
Share of rented UAA (%)	11.74	11.74	11.74	11.74	11.74	11.74	24.87	24.87
Own labour force (number of able-bodied people)	2	2	2	2	2	2	2	2
Number of sows (LU) max. 40 units	38	38	38	40	40	40	40	40
Number of farrows per one sow per year	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Number of piglets ready for breeding per sow per one farrow	11	11	11	11	11	11	11	11
Share of cereals in the cropping structure (%)	98.70	98.70	98.70	99.31	99.31	99.31	99.31	99.31
Total output value (PLN thousand)	326.5	296.5	279.3	316.5	362.3	390.0	369.2	451.0
Income from a family farm (PLN thousand)	81.4	65.7	35.6	25.6	33.4	88.5	57.5	79.8
Off-farm income (PLN thousand)	14.8	15.3	15.9	17.8	19.9	21.1	21.9	23.1
Investment inputs (PLN thousand)	-	-	325.9	-	-	45.0	-	248.0
Share of equity in investment funding (%) min. 20%	-	-	45.0	-	-	100.0	-	80.0
Financial margin (PLN thousand)	85.3	71.1	61.8	87.6	85.2	113.6	78.5	96.2
Accumulated value of cash from the estimated cash flows (PLN thousand)	85.3	156.4	71.5	108.9	146.8	171.0	207.9	67.0

Source: own calculations.

Conclusions

The research made it possible to draw the following conclusions:

1. Farms having the highest investment financing capacities without the support from public funds were characterised by a much greater production potential than other holdings. But then, the production potential of agricultural holdings, which would not have realised investments without state aid, was much lower and did not allow generating sufficient cash to realise investments. Therefore, state aid in investment financing should be targeted at agricultural holdings having the potential to develop, which do not have the ability to

finance investments without state aid. Farms too small to guarantee independent development in the future and too large, which are able to accumulate public funds for investments without state aid should not be covered by aid.

2. When awarding state aid in investment activity the character of planned investments should be taken into account. Investments of development nature, enabling extension of the production scale should be supported in the first place.
3. Changes that were noted for the researched agricultural holdings concerning relations between factors of production should be considered as beneficial, especially as regards labour-land relation and capital-labour relation. The realised investments result in substitution of increasingly more expensive labour inputs by relatively cheaper capital.

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ZNACZENIE FUNDUSZY PUBLICZNYCH W DZIAŁALNOŚCI INWESTYCYJNEJ GOSPODARSTW ROLNICZYCH W POLSCE (NA PRZYKŁADZIE PODKARPACIA)

Abstrakt

Celem pracy jest ocena wsparcia z funduszy publicznych działalności inwestycyjnej gospodarstw rolniczych oraz określenie możliwości sfinansowania zrealizowanych inwestycji bez wsparcia publicznego. Badania przeprowadzono w 2012 roku w 129 gospodarstwach rolniczych, które w latach 2004-2011 w działalności inwestycyjnej korzystały z publicznego wsparcia finansowego. W wytypowanych gospodarstwach zrealizowano badania z wykorzystaniem kwestionariusza wywiadu, dotyczącego organizacji gospodarstw, uzyskanych wyników ekonomicznych oraz oceny zrealizowanych inwestycji. W celu określenia możliwości sfinansowania w badanych gospodarstwach inwestycji bez publicznego wsparcia finansowego, zastosowano metodę programowania liniowego, przy pomocy której opracowano modele gospodarstw rolniczych, w których publiczne wsparcie finansowe zostało zastąpione kredytem komercyjnym bądź – w miarę możliwości – własnymi środkami pieniężnymi.

Stwierdzono, że pomoc publiczna w finansowaniu inwestycji powinna być kierowana do gospodarstw rolniczych potencjalnie rozwojowych, nieposiadających zdolności do sfinansowania inwestycji bez pomocy publicznej. Poza strefą pomocy powinny się znaleźć gospodarstwa zbyt małe, aby gwarantować w przyszłości samodzielny rozwój, ale także zbyt duże, które bez pomocy publicznej mogą zgromadzić środki finansowe na inwestycje.

Słowa kluczowe: pomoc publiczna, inwestycje, finansowanie inwestycji, gospodarstwo rolne

Accepted for print: 11.12.2015.