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IMPACT OF SUBSIDIES IN AGRICULTURE ON THE VALUE OF FIXED ASSETS ON AGRICULTURAL FARMS IN POLAND AND SPAIN IN LIGHT OF FADN DATA IN THE YEARS 2004-2016

Key words: fixed assets in agriculture, FADN, agricultural accounting, subsidies in agriculture

Abstract. The article presents changes in the value of fixed assets in relation to the amounts of subsidies directed to farms in two selected European Union countries – Poland and Spain – in the years 2004-2016. Both of these countries were selected on the basis of similar qualitative and quantitative characteristics that are characteristic of agriculture. An additional determinant of the choice of these countries was a similar economic situation before and after accession to the structures of the European Union. The article consists of an introduction, where the essence and significance of fixed assets in agriculture is presented, followed by the material and methodology of the research. A comparison of fixed assets of both countries was based on statistical data from the European Farm Accountancy Data Network (FADN). Analysis of material shows that, in 2004-2016, in Poland and Spain, the value of fixed assets was strongly positively correlated with total subsidies – excluding subsidies on investment (SE605), total direct payments (SE606), subsidies on intermediate consumption (SE625) and decoupled payments (SE630). Additionally, it was determined that, in Poland and Spain, the value of fixed assets was strongly negatively correlated with total subsidies on crops (SE610) and other subsidies (SE699). The value of property, plant and equipment in Poland and Spain increased gradually during the period under review.

INTRODUCTION

Over the last century, Spain and Poland have restructured their economies by moving from a typical agriculture-based system towards one dominated by industrial and service sectors. According to Jose A. Pérez-Méndez [1992], “the evolution of the national economy is focused on the development of a service – and industry-based economy rather than an economy based on agriculture”. As emphasized by the author, agriculture is not adequately tapped into, and therefore its potential cannot be fully exploited. The analysis of investment amounts per agricultural employee per farm per hectare of agricultural land in Spain and in Poland reveals they are below the European Union’s (EU) average level and below levels reported in other sectors of the economy [Carballido 2013, Pereira et al. 2018]. Additionally, agriculture differs in nature from other sectors of the national economy. It should be borne in mind that irrespective of size and form of legal organization, each farm “is a system of assets and rights organized by the owner for the

purposes of agricultural production, primarily intended to be marketed. The farm is the main source of livelihood for the family, and may allow it to reach a socio-economic level comparable to that of other sectors (...)” [Carballido 2013]. To maintain a similar socio-economic level for the farming population, agricultural production relies on fixed assets which are an essential resource enabling the farm to engage into farming activities [Wasilewska 2009]. Fixed assets are part of productive input in agriculture, and primarily affect the line of production (...). A defined set of fixed assets owned by the farm may have an impact on the economic viability and profitability of its activities [Gołębiewska 2010]. According to Ryszard Manteuffel [1981], fixed assets owned by a farm determine agricultural output. In turn, according to Urszula Malaga-Taboła [2007], farmers should mostly invest in technical measures to guarantee high-quality agricultural products sold at high prices [Urban, Kowalska, 2015]. Hence, agricultural modernization should primarily consist of implementing new technologies for agricultural production [Golka, Wójcicki 2009, Szeptycki 2005, Pawlak 2012], and the pace of changes in investment expenditure at a farm level depends on investment capacities of farms [Golka, Wójcicki 2009, Pawlak 2012]. The main barriers to farm investments are endogenous and exogenous conditions, with the former being of major importance. Key endogenous factors include: agricultural production potential, the degree to which fixed assets comply with state of art, sensitivity of investment decisions, and ability to finance investments in fixed assets [Kusz et al. 2015]. In order to continue activity, a farm must renew its property, plant and equipment on a regular basis as a way of guaranteeing further operations and development.

According to Anna Szelaż-Sikora and Józef Kowalski [2010], the benefits of EU aid programmes for Polish agriculture have given the possibility of modernizing the machine park faster. However, according to Walenty Poczta [2011], the reason for changes in the farmers’ approach to investing were subsidies from funds directed to the EU’s common agricultural policy and an increase in demand for Polish agricultural and food products on the single European market. In addition, the research of Wawrzyniec Czubak and Magdalena Mikołajczyk [2012] confirms that, in Poland, farmer investment activities are visible especially after the accession of Poland to the European Union (EU) and the inclusion of agriculture in the common agricultural policy. Therefore, the purpose of the article is to assess the impact of subsidies in agriculture on the value of fixed assets in Polish and Spanish farms participating in the European FADN in 2004-2016.

MATERIAL AND METHODS OF STUDIES

To achieve the purpose of the article, the data available on the website of the European FADN accounting data collection system from 2004 to 2016, i.e. farms in the FADN field of observation, were used. The figures were divided into the following thematic groups: fixed assets and subsidies. As part of fixed assets, they were divided into smaller generic groups: land, permanent crops (SE446), buildings (SE450), machinery (SE455), breeding livestock (SE460). As part of the subsidy, the following were distinguished: Total subsidies - excluding on investments (SE605), total direct payments (SE606), total subsidies on crops (SE610), total subsidies on livestock (SE615), total support for rural development (SE624), subsidies on intermediate consumption (SE625), decoupled payments (SE630),

support_art68 (SE650) and other subsidies (SE699). Data obtained from the European FADN accounting data collection system were analyzed and evaluated. For analysis and evaluation of FADN data, Pearson correlations were used, i.e. the coefficient determining the level of the linear relationship between random variables, the correlation coefficient value is in the closed range [-1, 1]. The higher its absolute value, the stronger the linear relationship between the variables. 0 – means no linear relationship, 1 – a positive relationship, and -1 – a negative relationship between features.

RESULTS OF THE STUDY

The total value of fixed assets in the period from 2004 to 2016, in Poland and Spain, is shown in Figure 1. Significant differences in value were observed between 2004 and 2008, whereby farms in Spain had an almost 2.5-fold higher total value of fixed assets than farms in Poland. In 2004, Spain owned EUR 148,577 thous. in total fixed assets. In 2008 this value already constituted EUR 218,061 thous. In the case of Polish farms, a gradual increase in the value of total fixed assets was also observed, i.e. in 2004 this value amounted to EUR 57,795 thous., reaching a level of EUR 85,890 thous. in 2008.

In Poland, after 2009 (until 2012), the value of total fixed assets did not change significantly and remained at a level of EUR 120,072 to 134,777 thous. A similar situation took place in Spain, where the value of total fixed assets ranged from EUR 227,812 to 207,978 thous. In 2009, farms in Spain had a ~1.9-fold higher value of total fixed assets. In subsequent years this difference reduced to reach 1.34 in 2013 and 2014. The main groups of fixed assets mainly included: land and permanent crops (SE446), buildings (SE450), machinery (SE455) and breeding livestock (SE460). An analysis of changes in the value of total fixed assets shows that Spain had a higher value of land, permanent crops (SE446),

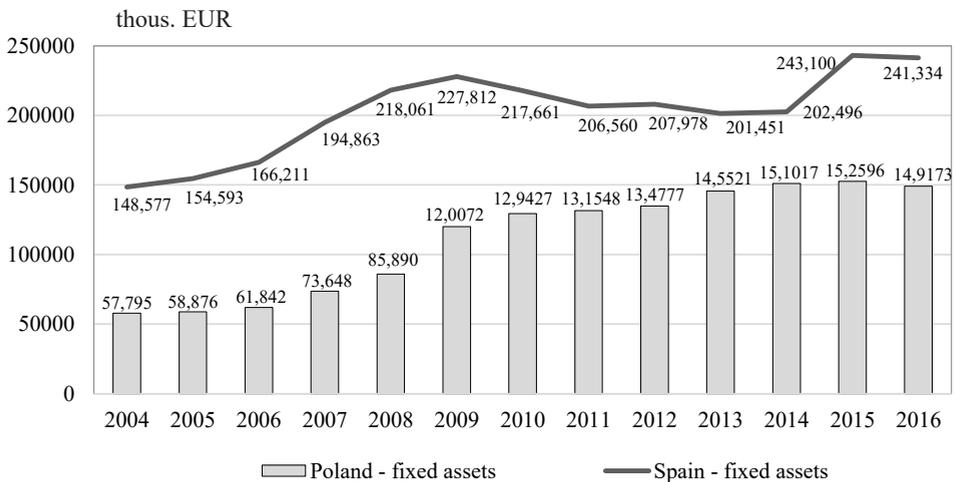


Figure 1. Total fixed assets in Poland and Spain between 2004 and 2016

Source: study based on: [FADN 2019]

which is undoubtedly associated with a large number of vineyards and pastures (Table 1). In the initial years of analysis, i.e. in 2004-2008, in Spain, this value was eight times higher than in Poland. After 2009 this difference narrowed and was only three times higher.

In 2004-2016, the value of buildings (SE450) in Poland was higher than in Spanish farms. Also, Poland witnessed a progressive increase in the value of buildings: from EUR 26,446 thous., in 2004 to EUR 34,368 thous., in 2016 (a growth rate of 30%). In turn, the corresponding figures for Spain were EUR 18,306 thous., in 2004 and as much as EUR 25,634 thous., in 2016 (a growth rate of ca. 40%). Another finding is that the value of breeding livestock (SE460), which is also part of fixed farming assets (livestock), is several times higher in Spain than in Poland. In 2004-2016, the value of breeding livestock in Spain was on average three times higher than in Poland. In 2004, Spanish farms had 3.28 times more breeding animals than their Polish counterparts. In the next years, i.e. from 2005 to 2014, that ratio followed a slight downward trend, decreasing from 2.65 to 2.29. Animal numbers on Spanish farms were nearly four times higher (3.65 in 2015 and 3.97 in 2016). In 2004, the value of the livestock population in Spain was EUR 7,591 thous., compared to EUR 2,314 thous., in 2016, the last year covered by this analysis (a growth rate of 57%). In Poland, the corresponding figures were EUR 2,314 and 3,334 thous., (a growth rate of 31%). In the study period, the average numbers of breeding animals in Spain and Poland were EUR 8,983 thous., and EUR 3,444 thous., respectively.

Table 1. The value of fixed assets for an average farm in the FADN field of observation in Poland and Spain in 2004-2016

Years	The value of fixed assets [thous. euro]							
	Poland	Spain	Poland	Spain	Poland	Spain	Poland	Spain
	land, permanent crops (SE446)		buildings (SE450)		machinery (SE455)		breeding livestock (SE460)	
2004	13,431	113,225	26,446	18,306	15,604	9,456	2,314	7,591
2005	10,195	118,348	29,421	18,638	16,657	10,171	2,603	7,435
2006	12,307	129,935	29,879	18,320	16,915	10,228	2,740	7,727
2007	17,964	157,224	33,218	17,714	19,337	11,937	2,989	7,989
2008	20,314	178,090	38,411	19,616	23,727	12,485	3,438	7,869
2009	66,598	186,572	30,972	20,817	19,654	12,094	2,848	8,329
2010	72,983	176,573	32,951	21,285	20,445	11,324	3,052	8,481
2011	73,952	167,829	32,979	19,101	21,457	11,090	3,162	8,541
2012	76,570	159,511	32,292	21,325	22,782	18,160	3,137	8,984
2013	81,644	155,942	34,538	19,643	25,970	16,636	3,374	9,234
2014	85,880	159,992	35,896	18,720	25,752	14,709	3,408	9,046
2015	88,053	189,220	35,835	24,930	25,248	16,586	3,373	12,327
2016	87,151	185,840	34,368	25,634	24,180	16,599	3,334	13,236

Source: study based on [FADN 2019]

Agricultural subsidies in Spain were at a different level (Table 2). In 2004, the value of total subsidies – excluding on investments (SE605) amounted to EUR 7,103 thous., and increased by 58.71% in 2016. Throughout the analyzed period, the value of this additional payment gradually increased to finally reach a level of EUR 12,098 thous., in 2016. In the case of total direct payments (SE606), their successive increase is observed from the value of EUR 6,620.67 thous., in 2004 to EUR 10,940.2 thous., in 2016. This increase was 60%. On the other hand, total subsidies on crops (SE610) decreased. In 2004, these payments amounted to EUR 4,655 thous., so that in 2016 their value was at a level of EUR 819 thous. Total subsidies on livestock (SE615) were EUR 1,919 and 1,935 thous., respectively in 2004 and 2005. In subsequent years, i.e. 2006-2009, these payments decreased by about 50%. On the other hand, in the years 2010-2015, subsidies for animal production were even more reduced and already constituted a value lower by about 65% compared to 2004.

The situation was different in the case of total support for rural development (SE624), where the subsidy increased, i.e. in 2004 this value was at a level of EUR 2.98, so that in 2016 the value of the subsidy amounted to EUR 1,035, which was an increase of subsidies by 3.47 times compared to 2004. Subsidies on intermediate consumption (SE625) increased by over 127% in 2016 compared to 2004. In the case of area and decoupled payments (SE630), the value of these payments was EUR 8,981 in 2016 and has gradually been increasing proportionally since 2006. Special support in agriculture (SE650), in Spain, took place in 2009-2014. These amounts varied and ranged from EUR 67 to 366. Other subsidies (SE699) were the highest between 2004-2007 and 2009-2011 and represented an average of EUR 160. In 2016, the remaining payments in Spain amounted to EUR 9. In Poland, total subsidies – excluding on investments (SE605) were at a level of EUR 2,035 in 2004, while in 2016 the value of operating subsidies was EUR 5,619, which was an increase of 36%. However, in the case of total direct payments (SE606) in Poland, they increased by approximately 42% in 2016 compared to 2004. Subsidies related to subsidies for total subsidies on crops (SE610) increased almost five times, and total subsidies on livestock (SE615) increased, i.e. in 2004 they amounted to EUR 2 and in 2016 the value of these payments reached EUR 463. The value of payments for total support for rural development (SE624) also increased at a rapid pace, i.e. in 2004 it was EUR 34 and in 2016 this value was EUR 730. Subsidies on intermediate consumption (SE625) were shaped in a similar way. On the other hand, single area payments and additional payments (SE630) successively increased from EUR 730 (2004) to EUR 3,856 in 2016. Special support (SE650) was granted in Poland between 2010-2014 and amounted to EUR 43 in 2010 and EUR 165 in 2014, respectively. Other subsidies (SE699) were the lowest in 2004 and 2016 and the value of these payments was at a level of EUR 107 and 73. In the years 2006-2012, the value of these payments ranged from EUR 1,025 to 1,751. The correlation between fixed assets and subsidies on Spanish farms is presented in Table 3.

In Spain, strong and very strong correlations between the value of fixed assets and payments were identified in the case of total subsidies – excluding on investments (SE605), total direct payments (SE606), subsidies on intermediate consumption (SE625), and decoupled payments (SE630). However, a negative correlation was observed in the case of subsidies for total subsidies on crops (SE610), total subsidies on livestock (SE615) and other payments (SE699). On the other hand, in the case of correlations between individual

Table 2. The types and value of agricultural support for an average farm in the FADN field of observation in Spain and Poland in 2004-2016

Country	Years	Value of support [EUR]								
		(SE605)	(SE606)	(SE610)	(SE615)	(SE624)	(SE625)	(SE630)	(SE650)	(SE699)
Spain	2004	7,103	6,620	4,655	1,919	298	15	0	0	196
	2005	7,181	6,723	4,674	1,935	268	0	81	0	171
	2006	7,548	6,970	1,538	884	392	25	4,510	0	187
	2007	7,081	6,577	1,453	942	369	75	4,087	0	144
	2008	9,264	8,259	1,886	908	880	114	5,390	0	76
	2009	9,240	8,438	2,132	901	649	82	5,194	133	142
	2010	10,179	9,194	1,233	674	868	95	7,153	67	151
	2011	9,890	8,881	1,203	675	882	104	6,903	110	120
	2012	9,734	8,656	673	714	970	100	7,196	184	77
	2013	9,621	8,494	762	662	1,044	78	6,973	328	98
	2014	10,404	8,976	781	681	1,306	83	7,507	366	45
	2015	11,976	10,556	940	875	1,260	90	8,730	0	81
	2016	12,098	10,940	819	1,136	1,035	118	8,981	0	9
Poland	2004	2,035	1,954	1116	2	34	46	730	0	107
	2005	2,340	1,890	60	0	433	17	958	0	872
	2006	3,768	2,443	77	-1	1,218	47	1,231	0	1,196
	2007	4,028	2,924	61	0	1,019	82	1,459	0	1,406
	2008	5,289	3,703	77	0	1,362	203	1,895	0	1,751
	2009	5,289	3,923	153	0	1,099	141	2,158	0	1,612
	2010	5,164	4,350	23	32	1,196	167	2,600	43	1,729
	2011	5,746	4,558	20	37	1,092	193	3,211	47	1,340
	2012	5,892	4,389	87	45	947	210	3,266	126	1,025
	2013	5,580	4,660	98	51	1,042	237	3,720	148	813
	2014	5,962	4,506	110	51	969	254	3,997	165	436
	2015	5,817	4,365	318	463	433	257	3,583	0	134
	2016	5,619	4,554	233	463	730	264	3,856	0	73

(SE605) – total subsidies – excluding on investments, (SE606) – total direct payments, (SE610) – total subsidies on crops, (SE615) – total subsidies on livestock, (SE624) – total support for rural development, (SE625) – subsidies on intermediate consumption, (SE630) – decoupled payments, (SE650) – support art68, (SE699) – other subsidies

Source: study based on [FADN 2019]

Table 3. The correlation between the value of fixed assets and agricultural support for an average farm in the FADN observation field in Spain in 2004-2016

	Fixed assets	(SE605)	(SE606)	(SE610)	(SE615)	(SE624)	(SE625)	(SE630)	(SE650)	(SE699)
Fixed assets	1									
(SE605)	0.865	1								
(SE606)	0.870	0.995	1							
(SE610)	-0.726	-0.678	-0.647	1						
(SE615)	-0.638	-0.522	-0.481	0.928	1					
(SE624)	0.757	0.904	0.858	-0.755	-0.664	1				
(SE625)	0.893	0.762	0.751	-0.788	-0.734	0.750	1			
(SE630)	0.865	0.893	0.875	-0.934	-0.824	0.885	0.851	1		
(SE650)	0.121	0.252	0.180	-0.433	-0.504	0.551	0.231	0.369	1	
(SE699)	-0.731	-0.812	-0.787	0.658	0.449	-0.837	-0.767	-0.774	-0.362	1

(SE605) – total subsidies – excluding on investments, (SE606) – total direct payments, (SE610) – total subsidies on crops, (SE615) – total subsidies on livestock, (SE624) – total support for rural development, (SE625) – subsidies on intermediate consumption, (SE630) – decoupled payments, (SE650) – support art68, (SE699) – other subsidies

Source: study based on [FADN 2019]

payments, it is stated that a very strong and strong correlation occurs between payments for basic activity and direct payments, rural development subsidies or uniform area payments and additional payments. In the case of direct payments, a very strong and strong correlation took place in relation to support for rural development and uniform payments and additional payments. There was also a strong correlation between subsidies for crop production and subsidies for animal production. In the case of Poland, the results of the correlation between fixed assets and payments are presented in Table 4.

In Poland, a very strong and strong positive correlation between the value of fixed assets and subsidies was noted in the case of: total subsidies - excluding on investments (SE605), total direct payments (SE606), subsidies on intermediate consumption (SE625), and decoupled payments (SE630). However, a negative very strong and strong correlation between the value of fixed assets and subsidies was established in the case of subsidies for total subsidies on crops (SE610) and other subsidies (SE699). However, a very strong and strong positive correlation between payments was determined in the case of total subsidies - excluding on investments (SE605) and direct payments (SE606) as well as intermediate consumption (SE625) and decoupled payments (SE630). Direct payments (SE606) showed a very strong positive correlation in relation to the direct consumption subsidies (SE625) and single area payments and additional payments (SE630). Subsidies for crop production showed a negative strong and average correlation in the case of total support for rural development (SE624) and other payments (SE699).

Table 4. The correlation between the value of fixed assets and agricultural support for an average farm in the FADN field of observation in Poland in 2004-2016

	Fixed assets	(SE605)	(SE606)	(SE610)	(SE615)	(SE624)	(SE625)	(SE630)	(SE650)	(SE699)
Fixed assets	1									
(SE605)	0.889	1								
(SE606)	0.953	0.963	1							
(SE610)	-0.286	-0.517	-0.414	1						
(SE615)	0.552	0.380	0.413	0.101	1					
(SE624)	0.190	0.548	0.430	-0.771	-0.335	1				
(SE625)	0.924	0.912	0.936	-0.253	0.575	0.254	1			
(SE630)	0.973	0.886	0.935	-0.324	0.557	0.210	0.944	1		
(SE650)	0.560	0.492	0.542	-0.243	-0.172	0.227	-0.504	0.626	1	
(SE699)	-0.224	0.112	0.020	-0.588	-0.637	0.779	-0.218	-0.287	-0.107	1

(SE605) – total subsidies – excluding on investments, (SE606) – total direct payments, (SE610) – total subsidies on crops, (SE615) – total subsidies on livestock, (SE624) – total support for rural development, (SE625) – subsidies on intermediate consumption, (SE630) – decoupled payments, (SE650) – support_art68, (SE699) – other subsidies

Source: study based on [FADN 2019]

SUMMARY

The aim of the article was to assess the impact of subsidies in agriculture on the value of fixed assets in Polish and Spanish farms participating in the European FADN survey in 2004-2016. As a result of the analysis, the following conclusions can be made:

1. In Poland and Spain, the value of fixed assets is strongly positively correlated with total subsidies - excluding on investments (SE605), total direct payments (SE606), subsidies on intermediate consumption (SE625) and decoupled payments (SE630).
2. In Poland and Spain, the value of fixed assets is strongly negatively correlated with total subsidies on crops (SE610) and other payments (SE699).

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WPLYW SUBWENCJI W ROLNICTWIE NA WARTOŚĆ ŚRODKÓW
TRWAŁYCH W GOSPODARSTWACH ROLNYCH W POLSCE I W HISZPANII
W ŚWIETLE DANYCH FADN W LATACH 2004-2016

Słowa kluczowe: środki trwałe w rolnictwie, FADN, rachunkowość rolna,
subwencje w rolnictwie

ABSTRAKT

W artykule określono zmiany wartości środków trwałych w odniesieniu do kwot subwencji kierowanych do gospodarstw rolnych w dwóch wybranych krajach Unii Europejskiej – Polsce i Hiszpanii – w latach 2004-2016. Oba te kraje zostały wybrane na podstawie zbliżonych cech jakościowych i ilościowych charakterystycznych dla rolnictwa. Dodatkową determinantą wyboru tych krajów była podobna sytuacja ekonomiczna przed i po przystąpieniu tych krajów do Unii Europejskiej. Porównanie środków trwałych obu krajów oparto na danych statystycznych pochodzących z European Farm Accountancy Data Network (FADN). Z analizy materiału wynika, że w latach 2004-2016 w Polsce i w Hiszpanii wartość środków trwałych była silnie dodatnio skorelowana z dopłatami do działalności operacyjnej (SE605), płatnościami bezpośrednimi (SE606), dopłatami do zużycia bezpośredniego (SE625), a także z jednolitymi płatnościami obszarowymi oraz dodatkowymi płatnościami (SE630). Dodatkowo określono, że w Polsce i w Hiszpanii wartość środków trwałych była silnie ujemnie skorelowana z dopłatami do produkcji roślinnej (SE610) oraz pozostałymi dopłatami (SE699). Wartość środków trwałych w Polsce i w Hiszpanii w okresie objętym badaniem ulegała sukcesywnemu zwiększeniu.

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