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Price volatility of Polish agricultural commodities in the view of the Common Agricultural Policy

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Abstract: In the paper, the price volatility was examined. The authors used 650 weekly observations from 2003 to 2015. Such a long period of analysis helped to reveal periods with high volatility. The objective of the paper was to recognize price volatility of agricultural commodities in Poland. The authors chose beef, pork and wheat markets to show the differentiation of price volatility. It revealed periods of large and small volatility. The global market situation impacted Polish agricultural markets with the opening markets and a greater access to the new markets. The periods having the strongest impact on Polish agricultural markets were the integration with the EU, the global crisis in 2008, and problems in the EU zone. The prices of analysed agricultural commodities differed in various EU countries. The prices of wheat increased most in France, Hungary and Lithuania. The prices of store cattle increased most in the years 2004–2015 in Estonia, Sweden and Luxemburg. The prices of pigs increased most in Malta, Sweden and Cyprus.

Keywords: commodity markets, price volatility, CAP

Market competition is determined by various factors. One basic economic differentiating factor is price volatility. One of the causes of price volatility is inflation. Among other causes, there are changes in supply and demand, consumers' income, and consumer price expectations.

Price volatility is an important topic and has been well described in the literature. Radukic and Marković (2015) claim that the government controls the prices of goods in all economies. Mostly the upper limits of prices are controlled because developing countries face many problems, such as inflation. Government intervention is often a response to the oligopoly's effect on inflation, which causes economic losses and can harm the balance of payments. Prices are connections between markets and the transmission from one place to another in the marketing chain delivers information about market linkages. The most important of price relationships are those in the input and output markets, and diverse markets and supply chains (Han and Ahn 2015).

The price volatility of milk in Poland is particularly important. The reason for this is that the market is now under the control of the Common Agricultural Policy. Before the end of the EU production quotas, Polish dairy farmers had good conditions for development because the quotas kept milk prices high (Bórawski and Dunn 2014).

Many market members face the commodity price risk, especially producers, processors and traders. Price volatility is a key aspect of risk linked with receiving lower prices for agricultural commodities, while paying higher prices for the factors of production. A greater price risk can destabilize returns, disturb investment, and cause the resource outflow from markets (Figiel and Hamulczuk 2014). The different levels of the market are linked by market prices. The prices reflect the effect of integration among farmers, wholesalers and retailers and the level of competition (Weldesenbet 2013). Price volatility is important for retailers and consumers as its disturbances affect the food access (Bakucs and Fertő 2015).

Generally, the price growth of goods and services sold by private farms was lower than the price growth of goods and services purchased by private farms during the transition period. The integration into the EU Common Agricultural Policy had very important effects on agricultural commodity prices. After the integration, the prices of almost all agricultural commodities increased in response to opening new

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markets. However, after the integration the Polish commodity prices reflected the EU markets (Bórawski and Kwiatkowski 2007).

High price volatility can have an impact on trading positions of countries, increase product prices, and make production planning more difficult. This price volatility reflects the low price and income elasticities for agricultural products. Moreover, such exogenous shocks as weather and the nature of agricultural production can impact price volatility (Kemény et al. 2012). The volatility of prices will increase the likelihood of sales below cost. Agricultural products are characterized by seasonality, uncertainty in production, lack of control and high price volatility (Rude and Gervais 2009).

Price fluctuations are an integral part of the debate about food policies. A policy of agricultural commodity price volatility requires understanding how the fluctuations arise. First, the main causes are weather and other outside factors, which perturb supply. Expectations in the market can lead to an over- or undersupply. Of course, inelastic demand creates large price fluctuations in response to weather events. One solution to the problem of price fluctuations can be the storage (Mitra and Boussard 2012). A system of supply control can help to stabilize prices and reduce market risks (Nogueira et al. 2012).

AIM AND METHODOLOGY

The objective of the survey was to better understand the price volatility of wheat, beef and pork in Poland in the years 1993–2015. The authors used the weekly milk price data from the Main Statistical Office in Warsaw, entailing about 650 weekly observations.

The data about agricultural commodities are collected by the Ministry of Agriculture and Rural Development, the Advisory Centres and the Agricultural Chamber employees. These are the average market prices calculated as an average balance prices within each week. These prices do not come from commodity stock exchange because these markets do not sell goods year round, but only in their supply and stock accumulation periods. The analysis was based on 650 observations, which include 69 weekly prices before integration and 581 prices after May 1, 2004.

The authors compared the data with prices of agricultural commodities in the selected EU countries. The Eurostat data were used for this process.

COMMON AGRICULTURAL POLICY

The Common Agricultural Policy (CAP), with the aim to stabilize commodity markets, governs the EU markets. The CAP has introduced policies to protect the EU markets and to regulate price volatility. The most popular tools to govern the situation in agricultural markets are:

1. *import tariffs*, with the aim to keep the outside commodities prices lower than in the EU.

2. *subsidies,* the aim of which is to encourage farmers to produce more products. These payments are particularly important for the plant and animal production.

3. *an international intervention price,* which aims to prevent the prices from going too low and to help farmers to achieve higher incomes.

One of the most regulated markets within the EU is milk. The most important instrument has been the quota system. The quota means that the equilibrium in the market will be established at a price level that normally would not occur without quotas. However, the quota system was eliminated in May 2015. This new situation will impact markets, as the farmers now have the possibility to produce more milk, but, of course, the market prices will drop (Hamulczuk and Stańko 2009). Particularly important is the price volatility of milk in Poland. The quotas kept milk prices high and stable. Without them, the prices would vary more like the international prices (Bórawski and Dunn 2014).

The last stage involves the programming period 2014–2020. In 2009, the European Commission started talks about a new EU economic strategy for 2010–2020, while the last summit in Brussels on March 3, 2010, has established the overriding objectives of the Europe 2020 strategy, using all the instruments at the EU disposal. The result can be formulated in three basic concepts of the continuous development of the CAP (Puślecki et al. 2010).

I. concept – To reduce the CAP instruments, involving the abandonment of support for agricultural production and biofuels, liquidation or reduction of the first pillar. The reduction of the European standards to match the international WTO standards creates a high flexibility in the choice of instruments and leads to a principle of free competition between countries or regions.

II. concept – High agricultural prices represent an important impetus to a new priority for the EU agricultural policy. This variant largely focused on

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the first pillar of the CAP (direct payments and market intervention instruments), and the second pillar now focuses on the instruments that affect farms and their productivity.

III. concept – Indirect, proposes the transfer of a substantial part of the funds to Pillar II taking into account the dual nature of the European agriculture, which means that small farms will produce niche goods, and services related to the environmental protection, while large commercial farms are proposed to have sets of instruments depending on the services provided. European prices should reflect the average of the reference world prices and direct payments will remain an important element of the CAP, but will be modified in terms of their assessment, which would refer to the type of services provided by the farmer (Puślecki et al. 2010).

LESSONS ABOUT PRICE STABILIZATION PROCESSES IN POLAND

The first lesson learned from the Polish experience is that the introduction of the market economy in Poland in 1990 revealed problems with agriculture and rural areas. State farms financed from the government budget were losing money and were finally closed. On the other hand, private farms were generally small and had a low productivity. The export of grain was minimal. Agriculture was not prepared for the market economy during the transition period. Without state aid, the agricultural industry could not overcome its problems and food security was in danger. Moreover, investments in agriculture and rural areas improved transport and communications infrastructure. The costs of rural area development were financed partly from the state budget and also from the European Union programs such as the SAPARD, Phare, Struder, and others.

The second lesson learned from the Polish experience was that before the European integration, market intervention was partly successful in the development of farm competitiveness. The Agricultural Market Agency, established in 1990, had introduced minimal and intervention prices to guarantee a satisfactory level of income. The grains were harvested and sold directly to local Agricultural Market Agencies in July. This policy discouraged grain storage on farms and selling it directly to the market. Farmers did not have to cover the costs of storage, which would have decreased the farm income. However, on the other hand, the quality requirements were lax, which resulted in a reduction in the competitiveness of agriculture in Poland.

The third lesson is that the grain price stabilization in Poland after the European integration helped the economic and social development of Polish agriculture. Direct payments encouraged farmers to use more effective production methods. Stricter European requirements encouraged production of higher quality grain and the minimum size of delivery of 80 tons favoured larger, more efficient farms. The number of small farms (up to 5 ha of farmland) decreased and the average land area of farms increased in the years 2004–2008. A small number of large farms were the beneficiaries of the European Union aid and the vast majority of small farms received only small benefits (Ávalos-Sartorio 2006). Price stabilization tools in Europe and Asia have caused economic growth and reduced poverty (Cummings et al. 2006).

The fourth lesson is that even though the CAP instruments stabilized agriculture commodity prices, the international market globalization created agricultural price problems. World commodity prices are affected by world supply and demand and technological changes. Agricultural commodity price volatility creates uncertainty about future prices and the prices may be too low to cover the average production costs. The dynamics of price growth of Polish agricultural products sold by farmers were generally lower than the dynamics of price growth of goods and services purchased by private farms in the transition period.

The fifth lesson is that consumer preferences and requirements have changed in the last decade in Poland and other countries of Europe and the world. A particular attention is being paid to the value-added goods, which created the need for a greater integration of farms and food-processing enterprises. Local food supply chains require investment. Otherwise, high transaction costs and agriculture price volatility will reinforce the problems of low productivity (Poulton et al. 2006).

The sixth lesson is that Polish grain products are rather ecological and the EU consumers demand the high-quality products. That is why Polish products can compete in the European Union markets even though the new European Union regulations on aflotoxins will result in the trade outflow (Otsuki et al. 2001). It is the effect on output prices, which exert a great influence on input purchases, and variable transaction costs, which affect the input-use decisions. Transport

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costs in the input and output markets have clear effects on the transport-intensive use of agricultural inputs (Winter-Nelson and Temu 2005).

The accession to the EU opened new markets for commodities. That is why Polish production depends to a large extent on the world prices. The stabilization process plays a smaller role because Poland is the member of the world markets. Big turbulences in the global markets have an impact on the prices of Polish commodities.

COMMODITY MARKETS

The agricultural markets are under the control of the CAP (Common Agricultural Policy). The European policy regulates agricultural markets. The main goal is to control changes in the EU markets and the prices of commodities. However, the latest changes have released the production and intervention in agricultural markets. The CAP was established in 1962. The reform of the CAP started when the expansion of the European Union was planned. The new document "Agenda 2000" was written and contained the plans of the future EU agriculture policies with the new member countries.

Wheat market

The wheat market has been changing as an effect of new regulations including cereals like wheat, barley and maize. During most of the year, cereal prices are regulated by the market forces of demand and supply. Then in November, the intervention purchase is organized (Bórawski and Kwiatkowski 2007).

The intervention price decreased from 119.19 euro per tonne to 101.31 euro/tonne and it established a new situation on the market that was prepared in the document "Agenda 2000" (Figure 1).

The market problems have led to wide fluctuations in agricultural commodities in Poland. The problems of price volatility can be weakened by utilizing the production quotas and other tools (Bórawski et al 2015). Gozgor and Kablamaci (2014) claim that wheat is an example of a product where the supply-side factors affect the price co-movements. The wheat price is not linked to the prices of oil and other products.

The wheat market in Poland changed in the analysed period. First of all, the integration with the EU on 1st May 2004 lowered wheat prices down to less than 400 PLN/Ton. This was the effect of opening Polish markets to the Common Market. The prices on the Common Market were lower, so they decreased the price in Poland. Then the prices rose in the EU. The crises at the end of 2008 again pulled wheat prices down. The next period was linked to using tools controlling the market in mid2010. Since the end of 2010, wheat prices in Poland rose to the level of prices in the EU market. This was the effect of many influences, such as the price changes, the changes in production, and the protection of the EU markets against duties. The prices of wheat are particularly important for the economy because wheat products receive much attention by the consumers and the government because these products become an important food (Han and Ahn 2015).

Due to the tests results, we can analyse the first differences of the prices of wheat, beef and pork. We use the logarithmic transformations of the original series P_t, computed as $y_t = 100 \ln(P_t/P_{t-1})$.

The logarithmic differences of wheat show the most important price changes in the analysed period. The institution which is responsible for organizing the purchase is the Agricultural Market Agency in Poland. Its main role is to stabilize market prices in Poland. Any surplus of cereal is purchased by the Agricultural Market Agency at minimum prices. The minimum price was set by the government (Figiel and Scott 1997). Before the EU integration, the Agricultural Market Agency purchased cereals during the harvest. However, after the integration, the farmers have to sell it to the market during the harvest. That is why the price of wheat in the market is rather low (Bórawskiand Kwiatkowski 2007).

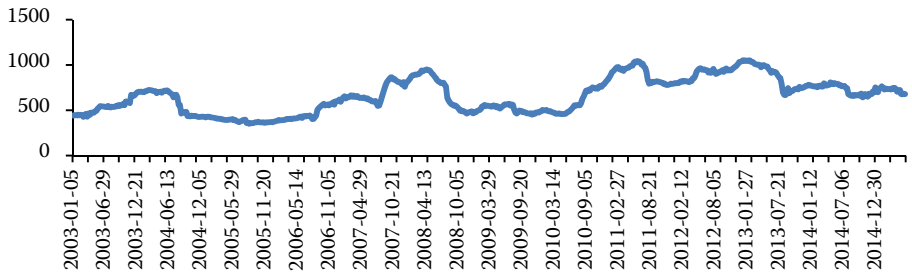

Figure 1. Prices of wheat (PLN per ton)

Source: own elaborations

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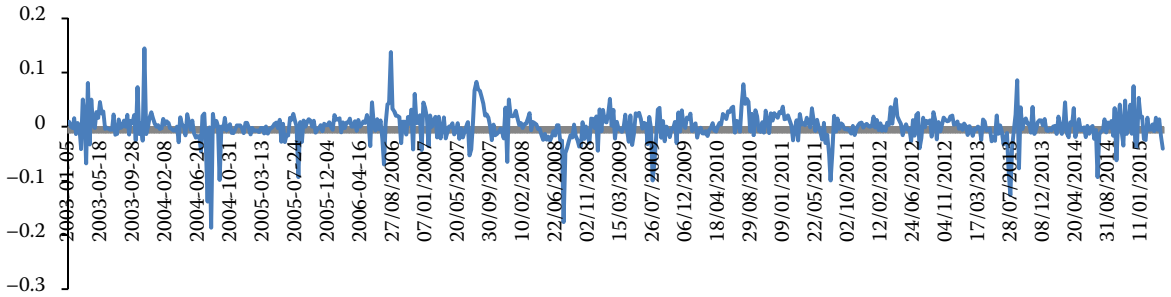

Figure 2. Logarithmic differences of wheat prices

Source: own elaborations

The greatest price increases were observed in 2006 to 2010 and 2012–2014. These increases were observed mainly at the end of these years or at the beginning of the subsequent years (Figure 2).

To analyse the prices of wheat, the authors presented the prices and their differences in the selected EU countries (Table 1). The selection of countries was caused by the availability of data. The lowest annual market prices for wheat were observed in 2004 in Austria (8.84 EUR/100 kg) and Hungary (9.31 EUR/100 kg). The highest price of wheat was observed in Greece (14.18 EUR/100 kg) and Portugal (13.84 EUR/100 kg). The highest increase of the annual market prices for wheat in the years 2004 to 2015 were observed in France (147.61 EUR/100 kg) (68.5%), Hungary (67.35 EUR) (58.4%) and Lithuania (54.7 EUR) (77.3%). The lowest increases of wheat prices were observed in Romania (21.98%) and Denmark (22.43%).

Table 1. Annual market prices for soft wheat in the selected EU countries (EUR/100 kg)

Country	2004	2009	2015	15/04
Belgium	10.87	11.05	15.44	42.04
Bulgaria	11.75	10.76	15.59	32.68
Czech Republic	12.23	10.93	15.84	29.52
Denmark	12.66	12.09	15.50	22.43
Germany	11.81	11.26	16.89	43.01
France	9.64	11.11	23.87	147.61
Latvia	10.21	11.31	15.76	54.36
Lithuania	10.48	11.47	16.22	54.77
Luxemburg	11.81	10.03	15.60	32.09
Hungary	9.31	10.62	15.58	67.35
Austria	8.84	8.32	12.71	43.78
Poland	10.42	11.16	16.00	53.55
Slovenia	11.89	11.93	16.83	41.55
Slovakia	9.57	10.33	14.63	52.87
Greece	14.18	13.50	19.40	36.81
Netherlands	11.05	11.05	15.60	41.18
Portugal	13.86	13.65	18.38	32.61
Romania	13.65	11.09	16.65	21.98
Finland	11.98	13.20	16.89	40.98
Sweden	10.65	10.74	15.07	41.50
United Kingdom	12.67	12.29	17.01	34.25
Min	8.84	8.32	12.71	X
Max	14.18	13.65	23.87	X
Difference	5.34	5.33	11.16	X

Source: Eurostat

Beef market

The beef market was also the subject of intervention within the Common Agricultural Policy. The document "Agenda 2000" introduced new changes in the beef market. The intervention price decreased from 3475 EUR/tonne (carcass weight, type R3) to 2787 EUR/tonne, and when the price declines under the intervention threshold, then the purchase is organized (Bórawski and Kwiatkowski 2007). Farmers have the possibility to regain the lower price through subsidies per hectare planted Meijl and Tongeren 2002) (Figure 3).

Since the integration with the EU, the prices of beef have increased due to the effect of the access to the Common Market. The integration has led to the increase of prices. Beef prices at the retail level have also increased. In July 2004, beef prices were about by 40% higher than in December 2003 (Bórawski and Kwiatkowski 2007).

The logarithmic differences of beef process confirm the stable increase changes. The biggest increases were at the beginning of the world crisis. The largest decreases took place at the beginning of 2014. This could be the effect of the conflict in Ukraine, which resulted in embargos introduced by both Russia and the EU (Figure 4).

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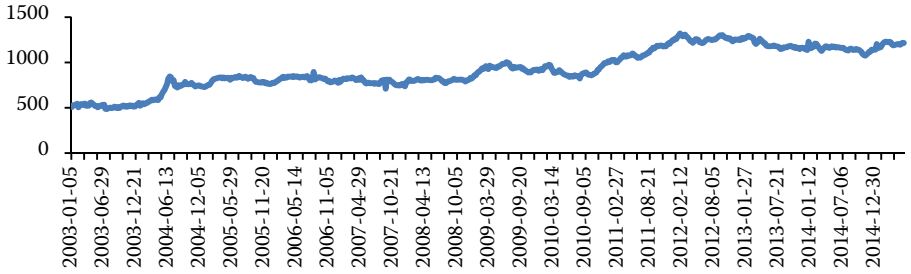

Figure 3. Prices of beef (PLN per 100 kg)

Source: own elaborations

The process of beef price stabilization is seen after the EU accession. Since the end of 2004, beef, prices increased only by 1% in March 2005.

The annual market prices for store cattle in the EU are presented in Table 2. The highest market prices for store cattle in the EU were observed in 2004 in Greece (346.20 EUR/100 kg), Malta (322.14 EUR/100 kg) and Portugal (300.10 EUR/100 kg). The annual market prices for store cattle increased in the years 2004 to 2015, with the highest increase in Estonia (130.8%), Sweden (74.8%) and Luxemburg (73.3%). The lowest increases were observed in Malta (8.6%), Hungary (9.90%) and Portugal (18.4%). The decrease in the years 2004–2015 has been observed in Cyprus.

Pork markets

The pork market is not as typical a market as the others. The EU integration led to the regulation by supply and demand in the market. *The consumption of pork*

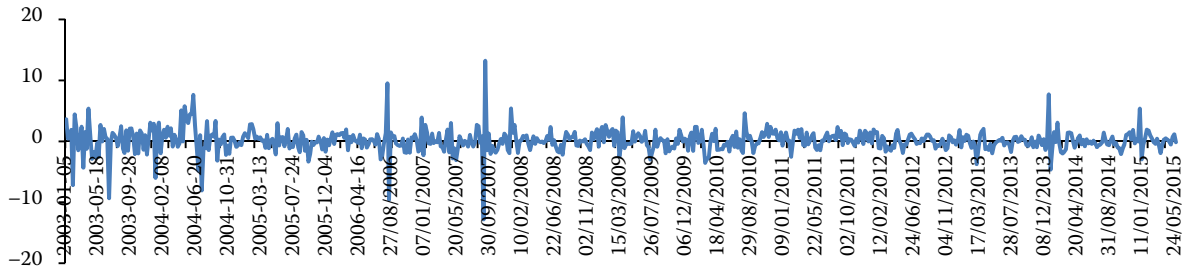

Figure 4. Logarithmic differences of beef prices

Source: own elaborations

Table 2. Annual market prices for store cattle in the selected EU countries (EUR/100 kg live weight)

Country	2004	2009	2015	15/04	Country	2004	2009	2015	15/04
Belgium	204.35	273.54	349.39	71.0	Austria	272.46	339.09	362.89	33.2
Czech Republic	232.73	275.01	325.48	39.0	Poland	221.33	233.26	306.36	38.4
Denmark	255.56	334.73	375.00	46.7	Portugal	300.10	349.72	355.31	18.4
Germany	245.81	343.18	364.19	48.2	Slovenia	246.09	322.47	337.90	37.3
Estonia	185.07	267.46	427.07	13.,8	Slovakia	232.13	308.13	326.53	40.7
Spain	251.47	344.23	357.58	42.2	Finland	243.56	352.74	381.27	56.5
France	279.00	332.74	382.22	37.0	Sweden	242.44	252.72	423.90	74.8
Ireland	264.74	300.33	352.10	33.0	Great Britain	244.53	303.87	416.80	70.4
Italy	254.59	368.39	382.09	50.1	EU	251.05	33.87	407.30	62.2
Latvia	162.83	223.99	198.20	21.7					
Lithuania	178.95	226.69	277.77	55.2	Min	162.83	223.99	198.20	–
Luxemburg	216.30	323.98	374.89	73.3	Max	346.20	421.18	427.07	–
Hungary	235.16	230.93	258.45	9.0	Difference	183.37	197.19	228.87	–
Malta	322.14	290.00	350.00	8.0					
Netherlands	235.36	304.88	320.57	3.2					

Source: Eurostat

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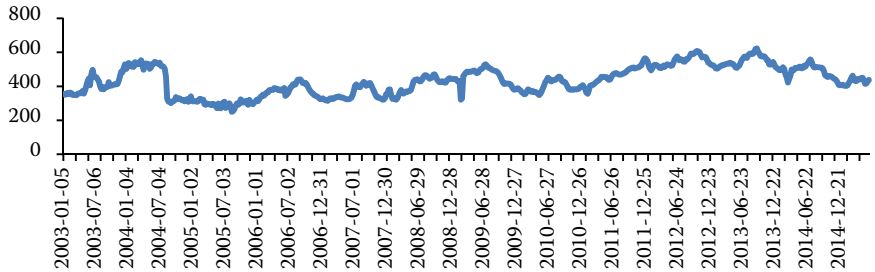

Figure 5. Prices of pork (PLN per ton)

Source: own elaborations

in Poland is high (48.1 kg pork in the year 2002 for the average Pole) compared to other countries in Europe (39.5 kg per capita in the EU-15 countries) (Bórawski and Kwiatkowski 2007). Poland is losing its position in pork production in the EU markets. The decrease of the swine heard led to a shortage of piglets, which was filled by imports (Figure 5).

The prices of pork fell after the EU integration. Then prices were stable for two years, before they started to increase. The beginning of the crisis did not have a big impact on pork prices and the prices changed for a few weeks. The decrees at the beginning of 2010 and 2011 changed the situation and since that time, the price has increased. The decrease of prices in the mid of 2013 were the effect of the Russian embargo on the EU food imports.

Logarithmic differences of pork prices confirm small changes on the pork market. The analysis of logarithmic differences of pork prices show that the biggest changes took part at the beginning of

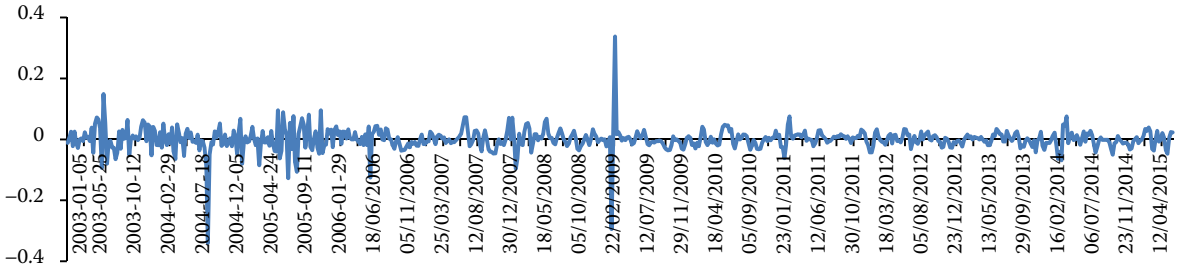

Figure 6. Logarithmic differences of pork prices

Source: own elaborations

Table 3. Annual market prices for pig carcass grade E in the EU (EUR/100 kg)

Country	2004	2009	2015	15/04 (%)	Country	2004	2009	2015	15/04 (%)
Belgium	135.06	133.24	121.77	–9.8	Malta	161.19	182.00	231.27	43.5
Czech Republic	145.81	149.96	140.93	–3.3	Netherlands	131.41	130.40	121.83	–7.3
Denmark	120.69	122.87	130.19	7.9	Austria	143.06	138.39	143.79	0.5
Germany	145.48	146.03	142.56	–2.0	Poland	143.97	143.69	136.97	–4.8
Estonia	143.83	149.80	142.76	–0.7	Portugal	141.63	151.96	148.77	5.0
Greece	159.19	172.98	160.48	0.8	Slovenia	142.87	137.78	154.88	8.4
Spain	139.05	145.17	139.43	0.3	Slovakia	142.19	153.36	145.26	2.2
France	131.30	131.06	134.46	2.4	Finland	127.73	144.74	150.22	17.6
Ireland	133.13	131.60	143.00	7.4	Sweden	129.58	137.84	175.96	35.8
Italy	155.06	151.93	147.77	–4.7	Great Britain	151.23	159.42	178.79	18.2
Cyprus	134.25	153.02	173.58	29.3	EU	138.36	142.22	139.58	0.9
Latvia	144.98	155.29	143.21	–1.2					
Lithuania	155.16	156.78	140.83	–9.2	Min	120.69	122.87	121.77	–
Luxemburg	145.97	147.32	139.17	-4.7	Max	161.19	182.00	231.27	–
Hungary	142.86	149.46	144.66	1.3	Difference	40.50	59.13	109.50	–

Source: Eurostat

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the crisis. Since then the changes in prices were stable, but mostly increasing. However, the Russian embargo on the European products pulled the prices down (Figure 6).

Figures 2, 4 and 6 show the first differences of wheat, beef and pork. The volatility of pork is higher than for wheat and beef. This is the effect of the elimination of intervention. The first differences of wheat and beef prices were higher before than after the EU integration. This probably is the effect of changed conditions after integration and the new rules and regulations after accession into the European Union (EU).

The annual market prices for pig carcass grade E has changed in the years 2004–2015 (Table 3). The lowest prices were in 2004 in: Denmark (120.69 EUR/100 kg), Finland (127.73 EUR/100 kg) and Sweden (129.58 EUR/100 kg). The highest prices in 2004 were in Malta (161.19 EUR per 100 kg), Greece (159.19 EUR/100 kg) and Lithuania (155.16 EUR per 100 kg). Pork prices face strong market competition around the world. The prices of pork decreased the most in the years 2004–2015 in: Belgium (–9.8%), Lithuania (–9.2%), Holland (–7.3%) and Italy (–4.7%). The annual market prices for pig carcass grade E increased most in the years 2004–2015 in: Malta (43.5%), Sweden (35.8%) and Cyprus (29.3%).

THE POSITIVE AND NEGATIVE IMPACTS OF THE CAP ON VOLATILITY AND AGRICULTURAL PRODUCERS

The Common Agricultural Policy is the main tool with the aim to increase the efficiency of agricultural producers, improve the conditions of life of rural inhabitants, stabilize markets and regulate market prices. However, the CAP has undergone changes. Most of the tools now focus on increasing the competitiveness of markets. The CAP underwent a reform in 2003 aimed at increasing the competitiveness of the rural sector, promoting markets, and developing rural areas sustainably (Rytko 2012). The research conducted by the authors' points out that 86% of the total output is produced in the old EU countries (EU 15) and 14% in the new members (EU 13). The introduction of new rules of the EU in 2003 has increased the economic results of agriculture. The European Union rural development policy is focused on four priority areas: 1 – improving the competitiveness of the agricultural and forestry sector, 2 – improving the environment and the countryside, 3 – improving the quality of life in rural areas and encouraging diversification of the rural economy, and 4 – the Leader approach. Area 1 involves measures aimed at improving human and physical potential in agriculture, food production, and forestry, including transfers of knowledge, innovations and implementation of high production standards. Subsidization schemes addressed at the low output farms that do not supply goods for the market continue to be the subject of much controversy. The low-performance farms contribute to the preservation of the historical agrarian structure. The high rate of the farmland conversion to non-agricultural uses is a serious problem in Poland and the EU, and poses a threat to food security (Wilkin 2011). The European Union sets stringent qualitative requirements for food products traded in the common market. In order to improve the quality of their products, Polish farmers have had to increase capital investments and introduce organizational and technical changes. (Bórawski and Gotkiewicz 2012).`

Area 2 provides funding for the protection and stabilization of natural resources, the preservation of farming and forestry systems of a high natural value and the protection of the traditional rural landscape. Area 3 supports the development of the local infrastructure and human capital to boost the enterprise growth, employment and diversification of the local economy. Area 4 draws upon the experiences of the Leader program, and supports innovative management practices which mobilize the rural community (a bottom-up approach) and create local action groups (Łapińska 2012).

The CAP is now regulated by the new budget perspectives 2014–2020. The CAP is having an impact on sustainable development of rural areas, in particular: improving efficiency, creating work places, conserving nature and land management, and keeping social peace and social security (Spychalski 2012). The Common Agricultural Policy budget will be decreased from EUR 413 billion to EUR 383 billion, of which EUR 282 billion will be allocated to direct payments. A similar balance between area I and area II appropriations will be maintained. The new budget will provide a more equitable distribution of the direct income support, but the Poland argument to eliminate differences in the value of direct payments between richer and poorer countries has not been implemented. According to the estimates, the value of direct payments to Polish farmers will increase from EUR 196 per hectare in 2013 to EUR 224 per hectare in 2020, but the direct income support will still be

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fixed based on historical production, therefore, its nominal value will decrease (Łapińska 2012).

In the legislation package of the CAP for 2014–2020 are actions supporting human capital, in particular the transfer of knowledge, extension services, basic services, risk management and local development. All of these actions should impact the efficiency of agriculture and improve the standard of living of rural inhabitants (Bórawski and Dunn 2015).

The European Union integration had an impact on the volatility of Polish agricultural commodities. First, it pulled the prices down to the prices in the Common Market, especially for the grain markets. Then the prices rose in the EU. In the years 2004–2007, in Poland the average prices of agricultural products increased by 12%. This proves that also in the Polish CAP activities have contributed to a stabilization of prices of agricultural products (Kiryluk-Dryjska and Bear Nawrocka 2010).

Since the end of 2010, the prices of agricultural commodities in Poland rose to the level of the EU market prices. The prices in the beef market have increased due to the effect of opening the Common Market and were by 40% higher in 2004 than in 2003.

The prices of pork fell after the EU integration. Then the prices were stable for two years, before they started to increase. The beginning of the crisis did not have a big impact on pork prices and the prices changed for a few weeks. The decrease at the beginning of 2010 and 2011 changed the situation and since that time, the pork price has increased. The decrease of prices in mid-2013 was the effect of the Russian embargo on the EU food imports.

The CAP is focused on increasing efficiency, which increases concentration and the scale of production. It supports the process of development of a wider farm competition, but small farmers are still treated as non-competitive. In 2008, the EU focused on small farms, pointing out their importance for the economic, social and environmental goals (Żmija and Czekaj 2012). Since the EU integration, the yields of plants have increased. The average wheat yield increased from 4.28 t/ha in 2004 to 4.57 t/ha in 2014. The wheat harvest in Poland increased from 9408 thousand tonnes in 2010 to 11 629 thousand tonnes in 2014. In the recent years, due to a decrease in prices, the farmers have less interest in the cereal cultivation. Unfavourable relative prices of cereals relative to the price of rape resulted in decreasing the acreage of winter crops in favour of rape. In 2015, in comparison with the previous year, the acreage of cereals decreased by 0.8% to 7.4 million hectares, of which 6.6 million hectares were the basic cereals and mixes because of the drought. In the structure of the grain sown area, winter wheat continued to dominate with the share of 59.1% (57.8% last season) (Cereals Market 2015).

The integration also affected pig production. In the first half of 2015, the domestic production of the three basic types of meat in hot carcass weight (without giblets) amounted to 2149 thousand tonnes, and by 9% higher than in the first half of 2014. Pork production may be approximately by 3% higher from the last year and it is expected to be 1,857 thousand tonnes, and the beef production will increase by 5% (to 441 thous. tonnes). The increase in pork production in the first half of 2015 was the result of the previous growth of pigs numbers in December 2014 (Meat market 2015).

The integration had also an impact on the cow and cattle production. In the recent years, the cattle population has not changed much, because of a systematic reduction of the number of cows. The remaining cattle population is growing at a variable rate, offsetting the decrease in the number of cows. In June 2015, the cattle population amounted to 5,960 thousand and it was by 0.7% higher than in the previous year. The number of cows was lower by 1.4%, and the remaining cattle numbers increased by 2.2%. The number of cattle aged 1 to 2 years increased by 6.7% and calves by 3.7%. The rate of the population growth of calves and cattle aged 1–2 years was much higher than in the previous year, indicating a greater interest in beef. The root of this phenomenon lays in the improved profitability of beef production, which took place despite the stagnation in calf prices and a slight increase in the price of young cattle for slaughter (Meat market 2015).

CONCLUSIONS

Price volatility of Polish agricultural commodities has changed. We can find some periods when the prices changed dramatically.

The first period with big changes of agricultural commodities prices was linked with the integration processes, which started on 1st May 2004. The opening of European markets led to decreases in Polish agricultural commodity prices. The loss of income was offset by subsidies and additional money, which farmers could get by using the Rural Development Programme.

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The next period with a high volatility occurred in 2008, when the global economic crisis happened. Most Polish agricultural commodity prices decreased. However, the period did not last very long. After a year, the prices started to increase.

The last problem with prices occurred during the Ukraine crisis and was linked with the embargos set by Russia and the EU for agricultural products.

The Common Agriculture Policy helped to stabilize agricultural markets within the EU. The policy is expected to bring a reduction of price volatility for the Polish agricultural markets in the future.

The analysis outlined in this paper shows significant price changes of agricultural commodities in Poland. However, the prices of pork changed the most and were significantly influenced by the production costs and the competition among processors. The market for pork in Poland is facing problems because of a strong world competition. Therefore, to reduce costs of production, the producers import piglets from Germany, the Netherlands and other countries. The intense competition in the Polish pork market forced processors to reduce costs in response to changing pork prices.

The prices of the analysed agricultural commodities in the EU changed differently. Wheat prices in the years 2004–2015 increased most in France, Hungary and Lithuania. Increasing demand for wheat in the world caused the increase prices in the Eastern EU countries.

The pork market caused different conditions for prices, which decreased in the years 2004-2015 in Belgium, Lithuania and the Netherlands.

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