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The connection of income situation of farms and the reproduction processes in Poland in the view of the EU integration[1]

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1. Introduction[2]

On one hand the economic theory, on the other economy practice indicate an inextricable connection of generated incomes and reproductive possibilities in micro (in companies, farms) as well as macro perspective (the whole economy). The earned income, void of all obligatory commitments connected with the labour factor salary, fiscal dues, credit and other charges leads to an economic surplus which appearance lets for the accumulative opportunities which are the basis of carried investments, and the same the exceeded reproduction. The income situation of Polish agriculture in first years of economy transformation did not favour those processes – the best case we had to deal with a simple reproduction and serve-mechanism actions of farms which by minimising own labour salary protected production assets, trying not to let them decapitalise. The EU integration brought a radical change of income situation of farms

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and the same the question arose on affects of this phenomenon on production structures involved in sector under discussion, investment and accumulative processes and expansion opportunities to external markets.

2. Productive factors[3]

The EU integration was probably the strongest incentive of relatively dynamic and eligible, as well as structural, changes. It concerns mostly the land resources for along with the EU accession the area of arable lands dropped from 19,3 million ha (in 2002) to approximately 18,3 million ha (in 2010) so close to 1,1 million ha, i.e. 5,5%. It results from non-farming purposes, e.g. development, road investments etc. At the same time the number of farms decreased – in comparison to the results of AC 2002 (Agricultural Census), in 2010 it decreased by 656 000, i.e. 22,4%, including the farms of arable land of more than 1 ha – by 393 000 (o 20,1%). It all led to increasing the average farming area from 5,76 ha in 2002 to 6,82 ha in 2010. Nevertheless the highest decrease dynamics in reference to 2002 was recorded among the smallest farms (in the area group of 1 ha and 1-5 ha of arable land – AL), where the number of farms dropped relatively by 26,8% and 24,8%. Also the number of farms of the area of 5-20 ha AL (by 17%). No a significant change was noticed in the number of the farms of 20-50 ha. However, a significant change was noticed in the number of biggest farms of the area of 50 and more ha AL – by 34,4%. It must be stressed that small farms (to 10 ha AL) still represent 84,7% of all operating farms.

When it comes to the labour factor then the number of the workers employed only and mainly on farms in 2010 reached 2304 thousand people, in this the majority (96,2%) are the ones working on individual farms as family labour. Despite the fact that the direct comparison of these numbers to the results of AC 2002 is not possible due to methodology, there is a slight tendency of decline of employees in farming.

For a full scope of the situation the issues connected with capital inputs in farming should be pointed. They annually grew dynamically which undoubtedly was a result of support programmes realised in Polish agriculture. It can be supposed that it caused a positive influence on the income level reached by farms, which is verified below.

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3 *Powszechny Spis Rolny 2010 r. – Raport z wyników,* http://www.stat.gov.pl/cps/rde/xbcr/gus/ PUBL_rl_psr_raport_z_wynikow_PSR_2010_260711.pdf (25.11.2011 r.)

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**Table 1. Investment inputs dynamics and accumulation rate
on Polish farms in 2004-2009 (in %)**

specification	2004	2005	2006	2007	2008	2009
Investment inputs dynamics on farms (previous year=100, current prices)	112,7	110,1	113,8	115,6	107	91,5
Accumulation rate as a relation of accumulation level to disposable incomes on individual farms	17,7	18,6	17,1	19,0	23,0	18,7
Accumulated incomes dynamics allocated for investments on farms	-	105,1	91,9	111,1	121,05	81,3

Source: A. Czyżewski, A. Grzelak, *Rolnictwo w Polsce
na tle sytuacji ogólnoekonomicznej kraju w okresie kryzysu 2007-2009,*
„Roczniki Nauk Rolniczych", Seria G, SGGW, Warszawa 2011

Right after the EU accession a high investment inputs dynamics is observed which could result from the favourable economic cycle in agriculture as in whole economy. Nevertheless we must be aware of the "base effect" existence which considers also the investment research in farming due to their very low level before the accession. Besides, economists claim that farmers strive for modernisation of their farms and increasing their productive resources was one of the goals via realisation of which the farms adjustment to market conditions was achieved. Also an interesting connection between the investment and saving of farming incomes dynamics is noticed (see diagram 1). The growth of investments in a particular year results in the decrease of accumulated incomes in the following year. The reason of this phenomenon can be relatively limited savings which run out in the conditions of current investments. However the realised investments do not generate such high incomes so that it could be reflected in growing savings. It is explained by significant, albeit negative correlation (-0,9) along with $R^2=81,8\%$, i.e. relatively low explanation of the variability of the analysed phenomenon.

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Diagram 1. Accumulated incomes dynamics allocated for investments on farms in relation to Investment inputs dynamics on farms

Correlation: r = -0,9046
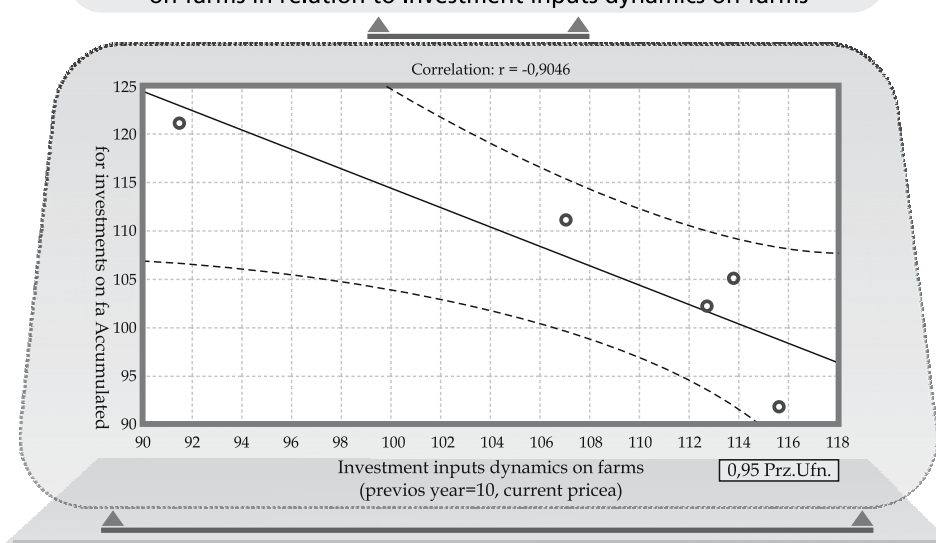
Accumulated incomes dynamics allocated for investments on farms = 213,81 - 0,9950 * Investment inputs dynamics on farms
R2=81,8%; estimation of rests normality – Shapiro-Wilk test p=0,6116>0,05

Source: Own study on the basis of Wykonanie Ustaw Budżetowych na rok 1996 (s.2/8), 1997 (s. 2/8), 1998 (s.2/9), 1999 (s.2/8), 2000 (s. 2/14), 2001, 2002, 2003, 2004, projektu Ustawy Budżetowej na rok 2005, a także 2005 oraz A.Czyżewski, Opinia o budżecie na 2002 r. w części dotyczącej rolnictwa, rozwoju wsi i rynków rolnych, "Wieś Jutra", 2002,/3, s.2-5, A.Czyżewski, Opinia o ustawie budżetowej na 2003 r. w części dotyczącej rolnictwa, rozwoju wsi i rynków rolnych, Druk Sejmowy nr 918, "Wieś Jutra" 2003/1(54), A.Czyżewski, Opinia o ustawie budżetowej na 2004 r. w części dotyczącej Rolnictwa, rozwoju wsi i rynków rolnych, "Wieś Jutra" 2004/1, A.Czyżewski, Opinia o ustawie budżetowej w części dotyczącej Rolnictwa, rozwoju wsi i rynków rolnych odpowiednio na 2005, 2006, 2007, 2009, 2010 i 2011, Dział Analiz i Opracowań Tematycznych Kancelarii Senatu RP.

3. Farming incomes[4]

The increase of budgetary expenditures on agriculture and the analysis of financial flows between the EU and Poland bring optimistic conclusions regarding the membership of Polish agricultural sector within the EU structures.

4   Excerpts of the following paper were used: A. Czyżewski, A. Poczta-Wajda, A. Sapa, *Przepływy finansowe między Polską a UE w ramach WPR na tle wyników ekonomicznych rolnictwa*, „Wieś i Rolnictwo", Polska Akademia Nauk (PAN) - Instytut Rozwoju Wsi i Rolnictwa, 2010/2, s. 109-122.

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To make a full evaluation we must look closer to the agricultural results and characterise the efficiency of the flows. The support given to Polish farmers form the EU budget led to a significant improvement of Polish farming income level. In 2008 the income per a full-time employee in farming was 2,5 times higher than in 2003. Also the decrease of the agricultural income disparity and the average income in national economy was noticed (see table 2).

**Table 2. The significance of the EU budgetary subsidies
in farming incomes in Poland in 2003-2010**

Specification	2003	2004	2005	2006	2007	2008	2009	2010
Income per a full-time employee in agriculture (AWU*) (zł)	4 259	10 290	8 252	9 984	12 690	10 609	13118	14335
Subsidy per a full-time worker (zł)	402	4009	3882	5198	5352	4772	7902	8665
Relation of an agricultural average income to an average national salary (in %)**	24,2	72,7	78,7	83,2	91,8	84,5	78,7	85,4
Subsidy rate in agricultural income (in %)	9,4	39,0	47,0	52,1	42,2	45,0	60,2	60,4

*AWU (Annual Work Unit) GUS takes 2120 hrs of work a year (265 days x 8 hrs)
**Disposal income parity per one person in family farms (farmers and workers) calculated on the basis of GUS data in 2004-2010

Source: Own study on the basis of inter alia the presentation by L. Goraja
Wpływ Wspólnej Polityki Rolnej na dochody polskich gospodarstw rolnych,
www.minrol.gov.pl (25.11.2011 r.)

Synthesising, it can be stated that the visibly improving parity of agricultural incomes could have been influenced by at least three factors, among which we can list: increasing share of subsidies in incomes, market relations which reflection can be found in the "price scissors" and the investment inputs on farms. And so, considering subsiding the payments, a gradual addiction of Polish agriculture income situation from the EU support can be noticed. The share of subsidies connected with the EU programmes in agricultural income reached 45% in 2008 and in 2010 exceeded 60% which means that the improvement of income situation

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of farmers is most of all the result of the EU support. The correlation index between the agricultural income parity and the subsidy share in income shows a strong, positive (85%) and statistically significant interdependence (see diagram 2).

It is worth to describe also another important factor which influences the incomes of farms which is the index of prices of agricultural sold products to the prices of products and services bought by farms. Starting from the year 2000 for the next 10 following years, a favourable tight of "price scissors" occurred only four times of which three times after the EU accession (see table 3). However it is difficult to show a direct interdependence between income situation of farms and "price scissors" because it is a result of many macroeconomic variables like NGP dynamics, the accepted political option of national policy, exchange rates and other factors. However, the correlation

Diagram 2. Relation of agricultural average income to average salary in economy (in %) regarding Subsidiary share in agricultural income (in %).
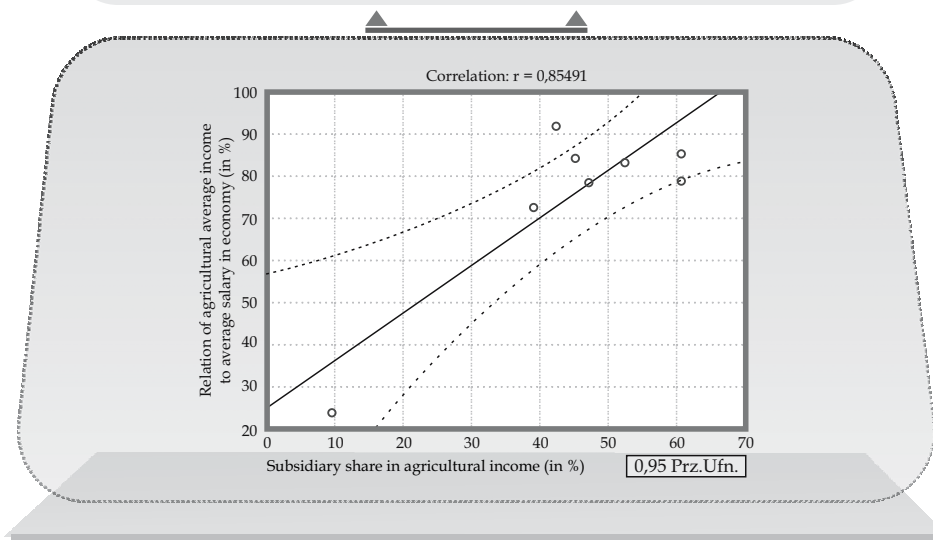
Relation of agricultural average income to average salary in economy (in %) = 25,012 + 1,1233 * Subsidiary share in agricultural income (in %)
R2=68%; estimation of rests normality – Shapiro-Wilk test p=0,8481>0,05
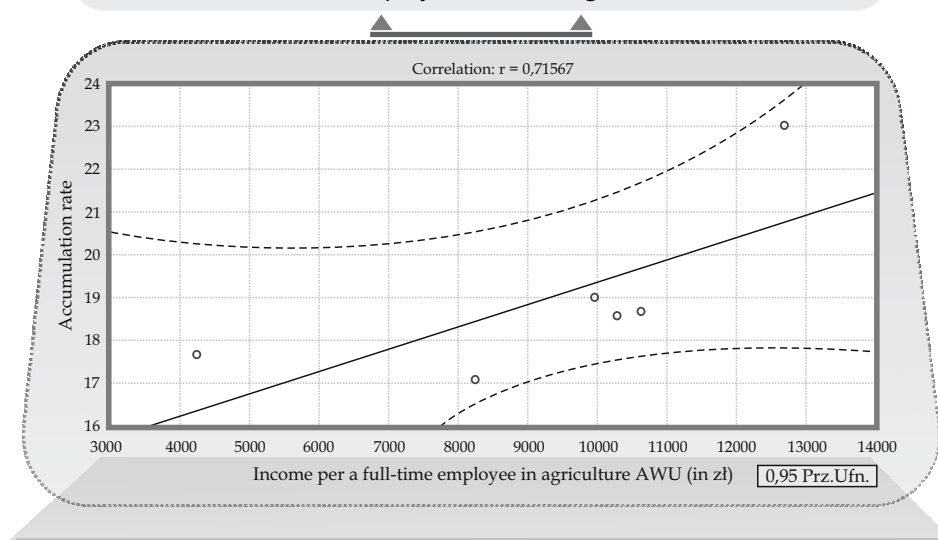
Source: as in diagram 1

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analysis of both variables indicates neither strong (0,25) nor statistically significant relation[5].

Table 3. Index of prices of agricultural sold products to the prices of products and services bought in Poland in 2000-2009 by farms (in %)

specification	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
	previous year = 100										
„price scissors"	103,0	97,5	90,9	97,5	102,6	96,0	102,0	106,5	91,0	95,0	107,2

Source: http://www.stat.gov.pl/cps/rde/xbcr/gus/PUBL_rl_rolnictwo_2009.pdf oraz A. Ławniczak, Odpowiedź podsekretarza stanu w Ministerstwie Rolnictwa i Rozwoju Wsi – z upoważnienia ministra – na interpelację nr 2406 w sprawie sytuacji w rolnictwie, http://orka2.sejm.gov.pl/IZ6.nsf/main/18472AB9 (25.11.2011 r.)

Diagram 3. Relation of accumulation rate (in %) to an income per a full-time employee (AWU) in agriculture (zł)
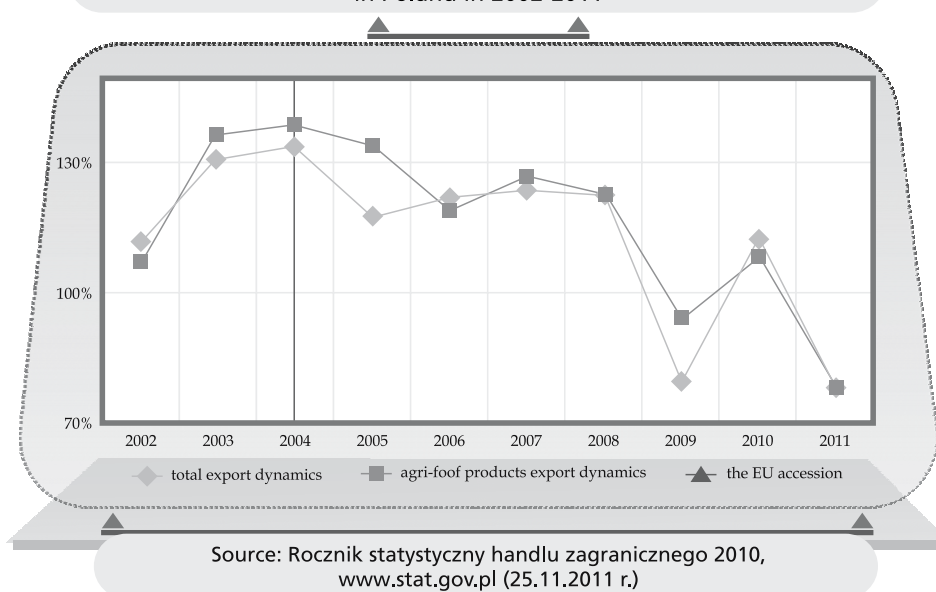
Correlation: r = 0,71567

0,95 Prz.Ufn.

Accumulation rate = 14,176 + 0,00052*income per a full-time employee in agriculture AWU (in zł)
R2=39%; estimation of rests normality – Shapiro-Wilk test p=0,1907>0,05

Source: as in diagram 1

5 Even assuming a longer analysis horizon, i.e. since 1994 in the view of 3-year-average (respectively – agricultural income parity and "price scissors" for the years 1994-1996: 85,07% and 102,23%; 1997-1999: 80,17% and 92,9%; 2000-2002: 76,11% and 100,3%) does not let to state that there is a strong interdependence. See A. Czyżewski, P. Kułyk, *Relacje między otoczeniem makroekonomicznym a rolnictwem w krajach wysoko rozwiniętych i w Polsce w latach 1991-2008,*"Ekonomista", KeyText, Warszawa 2010/2, p. 207.

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Diagram 4. Total export and agri-food products export dynamics
in Poland in 2002-2011

Source: Rocznik statystyczny handlu zagranicznego 2010,
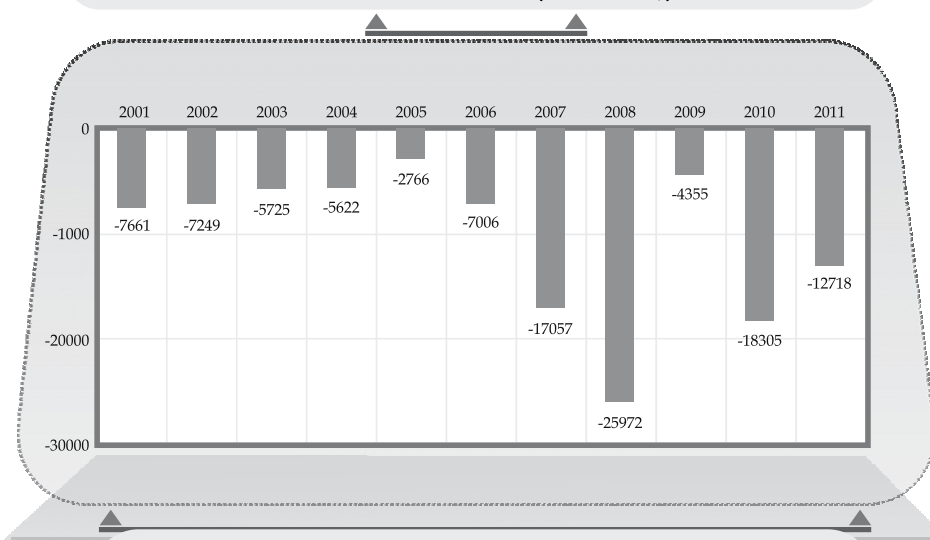www.stat.gov.pl (25.11.2011 r.)

It is admittedly positive which lets to interpret that growing dynamics of agricultural sold products prices to the prices of products and services bought by farms (closing the "price scissors") was accompanied by an improving parity of agricultural incomes. Facing this relatively weak connection it must be admitted that stabilising direct payments have a bigger influence on incomes, soothing repercussions from the market, which is observed in countries were CAP is carried for a longer period of time.

A third relation considers the connection of agricultural income parity to carried investments on farms and progressive accumulation rate. The correlation analysis showed only a positive direction of changes because the correlation coefficients appeared relatively low (approx. 0,3) and statistically insignificant even after taking into consideration postponing the investments effects which shows that the improvement of the farmers and non-farmers' income relation itself does not mean a growing tendency of farmers to invest. However it is interesting that there is a significant and strong relation between farm incomes calculated per a full-time employee and accumulation rate (see diagram 3)[6].
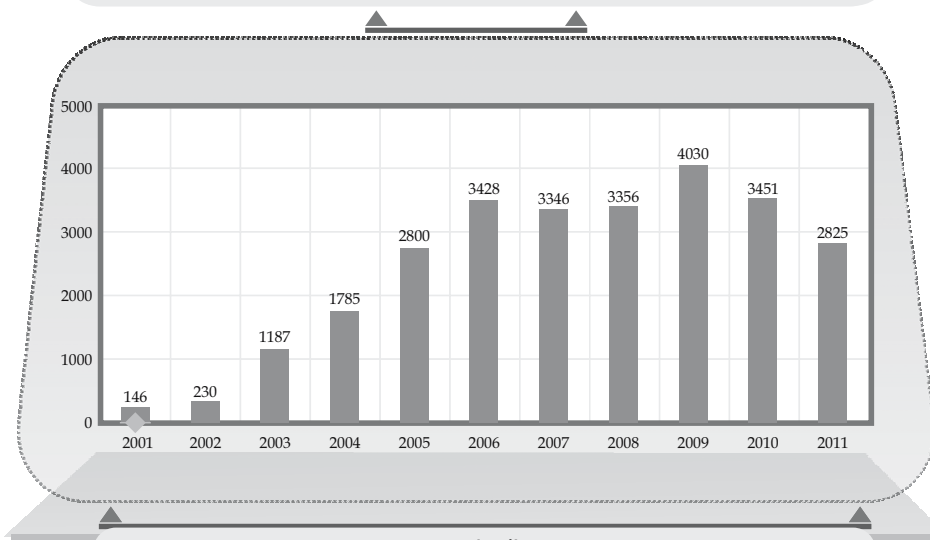
6   It was assumed that accumulative effects are postponed for a year in comparison to generated incomes. A relatively low determinant coefficient must be noticed R²=39%, which means a relatively low level of explanation of the variability feature of the explained variable.

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**Diagram 5. The balance of total international trade
in Poland in 2002-2011 (in million $)**

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
	-7661	-7249	-5725	-5622	-2766	-7006	-17057	-25972	-4355	-18305	-12718

Source: Analiza wybranych zagadnień i tendencji w polskiej produkcji
i handlu zagranicznym artykułami rolno-spożywczymi
w pierwszym półroczu 2011 roku, FAPA-FAMMU, Warszawa 2011

**Diagram 6. The balance of agri-food products trade
in Poland in 2002-2011 (in million $)**

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
	146	230	1187	1785	2800	3428	3346	3356	4030	3451	2825

Source: as in diagram 3

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On average the income growth of 1000 creates the growth of accumulation rate at a level of a half of percentage point.

This phenomenon must be positively interpret because when as the result of income growth the accumulative opportunities appear then it promotes the reproduction processes in farms.

4. Agri-food products international trade

Polish accession in the EU influence on agri-food products international trade must be assessed positively. First years of membership showed that Polish agri-food products are of comparative advantages within uniform market which probably was the strongest determinant of positive growth of agri-food products exchange balance. Just in period 2004-2006 only, the value of their export doubled and reached in 2006 about 8,5 billion euro. It is also noted that the export dynamics through almost all this time was higher than the export in general (see diagram 4). However the growth of import was much slower due to which the positive trade balance reached the level of approx. 3,4 billion $. What is interesting, the growth of export and positive balance was the highest in the trade with other new member states (Polski handel..., 2007). Good results in agri-food export in Poland in the last few years are. however, at least partly due to low salaries of employees in Polish agriculture and food industry (Poczta, 2009).

Other factor which has a good influence on a positive balance of agri-food products exchange could be the financial means from the EU which flow into the agricultural sector (see table 4)

Table 4. Polish and EU accounts in 2004-2011 (in million zł)

No	Specification	2004	2005	2006	2007	2008	2009	2010	2011
1	Financial means from the EU	1951,7	3499,0	1935,1	2036,0	1993,8	124,5	-	-
2	Financial means to pre-finance SPO and WPRiR	3405,5	5029,4	8992,4	9778,0	12934,0	16169,5	15993,4	22766,2
3	Co-financing and financing WPRiR in agri-food sector[a]	2211,4	1804,8	4821,2	4454,5	6766,7	5439,2	4774,3	4726,1

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| 4 | The EU own financial means – Polish fee in the EU budget[b] | 2389,1 | 10220,7 | 10322,3 | 10786,7 | 12080,1 | 12573,8 | 14082,1 | 15656,4 |
| 5 | Total means from the EU[c] | 5357,2 | 8528,4 | 10927,5 | 11814,0 | 14928,9 | 16293,9 | 19167,4 | 22766,2 |

[a] The needs of Ministry of Agriculture in the scope of expenditures in part 83 – Purpose reserves which cover means to co-finance and finance programmes with a share of non-returnable EU funds as well as area subsidies and other payments within WPRiR

[b] The fee calculated at an exchange rate 4,42 zł/euro in 2005, 3,97 zł/euro in 2006, 3,9 zł/euro in 2007, 3,79 zł/euro in 2008, 3,35 zł/euro in 2009 and 4,41 zł/euro in 2010, 3,75 zł/euro in 2011.

[c] The EU total means is the sum of position number 1 and 2.

Source: own calculations on the basis of projects of a budgetary bill opinions in parts concerning agriculture of A. Czyżewski published in monthly magazine „*Wieś Jutra*" 01/2004, 01/2005, 01/2006, 01/2007, 01/2008, 01/2009, 01/2010, 1-2/2011 and projects of a budgetary bill opinions for following years 2004-2010 published by Biuro Informacji i Dokumentacji Kancelarii Senatu, Dział Informacji i Ekspertyz; "Informacja o projekcie budżetu panstwa i budżetu środków europejskich na 2011 r. w zakresie rolnictwa, rozwoju wsi, rynków rolnych, rybołówstwa oraz pozostałych części dotyczących rolnictwa", MRiRW, Warszawa, październik 2010 r.

Admittedly the correlation analysis shows an average (0,49), positive, statistically significant coexistence, however, when searching for the reason-result correlation of improving, positive balance of international trade of agri-food products due to the EU financial means, one must be very careful. The estimated regression model appeared to be of a low adjustment which might show that it is not the only direct factor which determines the analysed phenomenon but one of many because of a bigger strength was for sure the EU integration fact and revealing the mentioned comparative advantages linked to that, as well as various macroeconomic determinants (growing NGP, exchange rate relations). However it can be assumed that the flow of the EU means into the agri-food sector positively influenced the manufacturing and productive sphere via the made investments which could indirectly cause the positive results in the exchange balance mentioned.

5. Conclusions

Coming to the conclusion it is worth emphasising that after the EU accession a visibly growing agricultural income parity is observed. The improvement of

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the farms' income situation was mostly influenced by the occurrence of direct subsidies. It is assessed that current market conditions, expressed by "price scissors", were of a smaller influence. Obviously the fact that after the EU accession there appeared they favourable closed more often. Therefore it can be deduced that via a specific agricultural policy it is possible to keep a stable agricultural income growth in the changeable economy conditions.

Another measurable positive phenomenon, especially in first years after the integration, was a increasing dynamics of investment inputs which undoubtedly improved the production standards and accumulation rate. Also favourable tendencies in agri-food international trade which probably are mostly the result of revealed comparative advantages of Polish agri-food sector.

Summary

The connection of income situation of farms and the reproduction processes in the view of the EU integration
The aim of the paper is to show the influence of the improving farms' income situation in Poland after the UE accession with their reproductive possibilities. To achieve this target it was defined whether the increasing agricultural income parity was a result of a changing market situation ("price scissors"), CAP subsidies or investment-accumulative processes. Also the connection of the EU financial means with the balance of agri-food international trade was analysed.

Bibliography

1. *Analiza wybranych zagadnień i tendencji w polskiej produkcji i handlu zagranicznym artykułami rolno-spożywczymi w pierwszym półroczu 2011 roku, (2011),* FAPA-FAMMU, Warszawa.
2. Czyżewski A., A. Grzelak, *Rolnictwo w Polsce na tle sytuacji ogólnoekonomicznej kraju w okresie kryzysu 2007-2009 (2011)* „Roczniki Nauk Rolniczych", Seria G, SGGW, Warszawa.
3. Czyżewski A., A. Poczta-Wajda, A. Sapa (2010), *Przepływy finansowe między Polską a UE w ramach WPR na tle wyników ekonomicznych rolnictwa,* „Wieś i Rolnictwo", Nr 2, Polska Akademia Nauk (PAN) - Instytut Rozwoju Wsi i Rolnictwa.
4. Czyżewski A., P. Kułyk, *Relacje między otoczeniem makroekonomicznym a rolnictwem w krajach wysoko rozwiniętych i w Polsce w latach 1991-2008,* "Ekonomista", Nr 2.
5. Goraj L. *Wpływ Wspólnej Polityki Rolnej na dochody polskich gospodarstw rolnych,* www.minrol.gov.pl (25.11.2011 r.).

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6. A. Czyżewski, A. Matuszczak (2011), *Krajowy i unijny budżet rolny dla Polski. Próba określenia proporcji, współzależności oraz efektów dla sektora rolnego*, w: B. Wieliczko (red.), *Ocena projekcji budżetowych UE dotyczących kolejnego okresu programowania w kontekście Wspólnej Polityki Rolnej*, Program Wieloletni 2011, IERiGŻ-PIB, Warszawa.

7. Ławniczak A., *Odpowiedź podsekretarza stanu w Ministerstwie Rolnictwa i Rozwoju Wsi - z upoważnienia ministra* - na interpelację nr 2406 w sprawie sytuacji w rolnictwie, http://orka2.sejm.gov.pl/IZ6.nsf/main/18472AB9 (25.11.2011 r.).

8. *Powszechny Spis Rolny 2010 r. – Raport z wyników*, http://www.stat.gov.pl/cps/rde/xbcr/gus/PUBL_rl_psr_raport_z_wynikow_PSR_2010_260711.pdf (25.11.2011 r.).

9. *Rocznik statystyczny handlu zagranicznego 2010*, www.stat.gov.pl (25.11.2011 r.).

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