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ECONOMIC SCIENCE FOR RURAL DEVELOPMENT

Proceedings of the International Scientific Conference

No. 30

Production and Cooperation in Agriculture

Finance and Taxes

Nordic Association of Agricultural Scientists

"ECONOMIC SCIENCE FOR RURAL DEVELOPMENT"

Proceedings of the
International Scientific Conference

No. 30

Production and Cooperation in Agriculture
Finance and Taxes

Jelgava
2013

TIME SCHEDULE OF THE CONFERENCE

Preparation – September, 2012 – April 20, 2013
Process – April 25-26, 2013

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Every article included into the Proceedings was subjected to a scientific, including international review.

All reviewers were anonymous for the authors of the articles.

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Foreword

Every year the Faculty of Economics, Latvia University of Agriculture holds the international scientific conference "Economic Science for Rural Development" and publishes internationally reviewed papers of scientific researches, which are presented at the conference.
This year researchers from Europe and Asia representing not only the science of economics in the diversity of its sub-branches have contributed to the conference; they have expanded their studies engaging colleagues from social and other sciences, thus confirming inter-disciplinary and multi-dimensional development of the contemporary science. The conference is dedicated to topical themes of rural development; hence, the research results are published in three successive volumes (No. 30, 31 and 32). Our first volume of scientific conference proceedings was published in 2000.
Professors, doctors of science, associate professors, assistant professors, PhD students, and other researchers from the following higher education, research institutions and enterprises participate at the International Scientific Conference held on April 25-26, 2013 and present their results of scientific research:

1. Latvia University of Agriculture, Latvia
2. Aleksandras Stulginskis University, Lithuania
3. BA School of Business and Finance, Latvia
4. Baltic Psychology and Management University College, Latvia
5. Banat University of Agricultural Sciences and Veterinary Medicine Timisoara, Romania
6. Bremen University of Applied Sciences, Germany
7. Daugavpils University, Latvia
8. Fulda University of Applied Sciences, Germany
9. Institute of Agricultural Economics and Information, the Czech Republic
10. Kaunas University of Technology, Lithuania
11. Khyber Pakhtunkhwa Agricultural University, Peshawar, Pakistan
12. Klaipeda University, Lithuania
13. "Latvenergo" JSC, Latvia
14. Latvian Rural Advisory and Training Centre, Latvia
15. Latvian State Institute of Agrarian Economics, Latvia
16. Lithuanian Institute of Agrarian Economics, Lithuania
17. Mykolas Romeris University, Lithuania
18. Pope John Paul II State School of Higher Education in Biala Podlaska, Poland
19. Poznan University of Economics, Poland
20. Poznan University of Life Sciences, Poland
21. Professional Association of Project Managers, Latvia
22. Rezekne Higher Education Institution, Latvia
23. Riga International School of Economics and Business Administration, Latvia
24. Riga Teacher Training and Educational Management Academy, Latvia
25. Riga Technical University, Latvia
26. Seinajoki University of Applied Sciences, Finland
27. Siauliai University, Lithuania
28. Slovak University of Agriculture in Nitra, Slovakia
29. State Regional Development Agency, Latvia
30. Szent Istvan University, Hungary
31. Latvian Rural Advisory and Training Centre, Latvia
32. Turiba University, Latvia
33. University of Latvia, Latvia
34. University College of Culture and Economics, Latvia
35. University of Agriculture in Krakow, Poland
36. University of Bremen, Germany

37. University of Economics in Prague, the Czech Republic
38. University of Helsinki, Finland
39. University of Social Science, Poland
40. University of Szczecin, Poland
41. University of Zielona Gora, Poland
42. Ventspils University College, Latvia
43. "Vides Centrs" Ltd, Latvia
44. Warsaw University of Life Sciences, Poland
45. West Pomeranian University of Technology in Szczecin, Poland
46. Wroclaw University of Technology, Poland

The following topical themes have been chosen for the conference:
— Production and Cooperation in Agriculture
— Integrated and Sustainable Regional Development
— Rural Development and Entrepreneurship
— Marketing and Sustainable Consumption
— Finance and Taxes
— Home Economics

The comprehensive reviewing of submitted scientific articles has been performed on international and inter-university level to ensure that only high-level scientific and methodological research results, meeting the requirements of international standards, are presented at the conference. All scientific articles are in English. Every submitted manuscript has been reviewed by one reviewer from the author's native country or university, while the other reviewer came from another country or university. The third reviewer was chosen in the case of conflicting reviews. All reviewers were anonymous for the authors of the articles. Every author received the reviewers' objections or recommendations. After receiving the improved (final) version of the manuscript and the author's comments, the Editorial Board of the conference evaluated each article. Altogether, 193 applications were received, 144 articles were submitted, and 113 articles were confirmed for publication.

All the papers of the international scientific conference "Economic Science for Rural Development" were arranged into the three following thematic volumes:

No. 30 Production and Cooperation in Agriculture
Finance and Taxes

No. 31 Integrated and Sustainable Regional Development

No. 32 Rural Development and Entrepreneurship
Marketing and Sustainable Consumption

The publishing of the Proceedings before the conference will promote exchange of opinions, discussions, and collaboration of economic scientists on the international level. The research results included into the Proceedings are available worldwide to any interested person.

The abstracts of the conference proceedings provided in English are submitted to the international databases:

AGRIS – International Information System for the Agricultural Sciences and Technology set up by the Food and Agriculture Organisation of the United Nations (FAO UN) (www.fao.org/agris/), and selected papers are submitted to especially comprehensive scholarly, multidisciplinary databases containing full research texts:

— (EBSCOHost Academic Search Complete) and
— CABI PUBLISHING databases: (http://search.ebscohost.com/login.aspx?authtype=ip,uid&profile=ehost&defaultdb=lbh as well as
— CAB ABSTRACTS (CABA) comprehensive bibliographic database.

The Conference Committee and Editorial Board are open to comments and recommendations for the development of future conference proceedings and organisation of international scientific conferences.

We would like to thank all the authors, reviewers, members of the Programme Committee and the Editorial Board as well as supporting staff for their contribution organising the conference.

On behalf of the conference organisers
Dr. oec. **Aija Eglite**
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Content

Production and Cooperation in Agriculture

Finance and Tax

"ECONOMIC SCIENCE FOR RURAL DEVELOPMENT"

Proceedings of the
International Scientific Conference

PRODUCTION AND COOPERATION IN AGRICULTURE

ADJUSTEMENTS OF DAIRY FARMS IN REGIONS OF THE EUROPEAN UNION AFTER YEAR 2005. ATTEMPT TO COMPARE

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Poznan University of Economics, Poland

Abstract: The main objective of this paper was to determine the considerations that influenced the most determinants of change and adjustment processes taking place in dairy farms in 55 regions of the European Union in 2005-2008. In the first part of the paper, the author has presented the assumptions and procedure of the factor analysis. It allowed isolating three factors, which explained about 70% of the common variation to both study periods. The presentation of the dynamic and factors determining shifts in a previously created groups of the regions of Europe in similar stage of development in terms of milk production, enabled the author not only to examine which factors have a decisive influence on the process of economic adjustment, but also to detect which regions of the EU developed most of all during the examined period. In scope of the research, the author also defined the position of the regions of Poland versus the EU, which allowed identifying the possible directions of their development and opportunities for the future
Keywords: factor analysis, dairy, regions of the European Union, milk market intervention
JEL code: Q1, R1

Introduction

The discussion was focused on investigation of the determinants that most of all affected the occurring processes of economic adjustments. The main objective was to determine the impact of the EU intervention on the effectiveness of dairy farms in the regions of the European Union. Based on the analysis of map showing the intensity of milk production per hectare of agricultural land in the EU regions, given by the FADN, 55 regions "specializing in the production of milk" were distinguished, and 54 different economic indicators in years 2005 and 2008 were tested in these regions. These years were chosen because of being the most effective, and in author's the opinion, provided the possibility of showing the impact of the EU intervention on economic results of the dairy farms. In order to present accurately the relationships between many different characteristics, it was decided to use the factor analysis.

To avoid author's subjectivity, there were scales used for the first and second factors. They divided the set of the 55 EU regions into 4 classes according to the value of the factor's criterion. It was assumed that the groups of dairy farmers in the regions of Europe created in this way were characterized by similar level of liquidity and comparable resource factors of production, and, hence, the similar type and stage of economic development. The third factor because of its nature was treated differently. The results were arranged in a descending order compared to the year 2008. In this way, it showed the list of the EU regions with the most favourable terms for production and economic activity.

Methods and procedures of the factor analysis

Phenomena in a particular field of research despite the diversity and variability are somehow related to each other and at least in part determined by a relatively small number of functional units, parameters, or factors. Hereby, the multivariate analysis finding similarities in the degradation of the individual variables suggests that some of them overlap, and, thus, differentiates cases in the same way. The existence of these correlations between variables allows formulating the hypothesis that structure that is more important is hidden under the variability of phenomena (Czyz T., 1971, Czyzewski A., 1983). The factor analysis is a linear mathematical model, so the solution is to instantiate the model, that is assigning numerical values of the parameters of equations, which will allow establishing if it has the factor structure (A. Sokolowski, 2010). There are two possible interpretations of the factor model: deterministic and probabilistic. The following research used deterministic approach because empirical studies are based on extensive data, the analysed population is finite, and the number of individuals belonging to it is relatively small (Domanski, R., 1965).

Since the cognitive value of the model depends on the proper selection of variables and their conceptual identification, the interpretation of factors is the most important part of the procedure of the factor analysis (Czyzewski A., 1976). This is the part, where it is difficult to conduct a methodical pattern. It is determined by the theoretical and conceptual design that the researcher believes to be the most appropriate, which features a large subjectivity. Principles of interpretation raises many questions and actually are based on arbitrary assumptions, and do not lead to concrete factors in a sufficiently accurate way.

Analysis of economic adjustments of dairy farms in the EU regions in 2005 and 2008

These studies are intended to provide economic adjustment of dairy farms after the enlargement of the EU. In order to show the changes in the factors affecting

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Table 1

Liquidity in dairy farms in the regions of Europe in 2005 and 2008 (construction of factor F1)

No.	Feature	Factorial load	
		2005	2008
1.	Farm Net Value Added / AWU*	0.9072	0.6996
2.	Farm Net Income / FWU**	0.8879	0.8270
3.	Farm Net Income	0.8773	0.9121
4.	VAT balance excluding on investments	0.6615	0.6328
5.	Milk field	0.5255	0.5104
6.	VAT on investment	0.4749	-
7.	Gross Investment	0.4543	0.8208
8.	Change in net Worth	0.4015	0.8497
9.	Net Worth	0.3493	-
10	Total Inputs	-	0.4125
11.	Total subsidies on livestock	-	-0.3448

*annual work unit, ** family work unit

Source: author's study based on the calculations made in the program Statistica , the FADN data

the development of dairy farms in the regions of the European Union, the author applied the factor analysis. Therefore, the starting point was to create a matrix of observation, which is a set of indicators taken from the FADN that illustrate various features of the dairy farms located in the regions of Europe between 2005 and 2008. The correlation analysis of variables showed that there are significant correlations between them, characterized by a high complexity. In order to extract the basic systems of interdependent features, the author used the method of grouping based on the criterion of maximum correlation. In terms of the factor analysis, economic adjustments after joining the European Union were determined by using 14 features selected out of 54 indicators analysed. Regarding the dairy farms surveyed in the regions of Europe, based on the screen plots for both 2005 and 2008, the study distinguished three independent factors explaining 70% of the volatility of the common stock for each of the analyses. It was detected that so high percentage of accumulated variation use allows basing the analysis only on these three factors. In order to narrow the range of factors, the solution was subjected to the procedure of rotation, thus, the analytical method Varimax raw version was used in further analysis.

Structure and spatial distribution of factor F_1

The structure of features forming the factor F1 and their assigned weights indicate that the financial liquidity of dairy farms in the regions of Europe was mainly conditioned by family farm income and family farm income per employed person. It is worth noting that during the period the impact of the balance of VAT (excluding VAT on investment) and milk yield of cows on liquidity was maintained at a relatively constant level. It should be noted that there was no significant correlation in 2008 between the VAT paid on investment and cash flow. This finding leads to the conclusion that the investment made at that time was not as large as it was a year after the 10 countries' accession to the European Union, when the conditions for milk trade and milk farms had to adapt to the conditions of the EU (Table 1) (Mickiewicz A., Mickiewicz B., 2009).

As the investment launched at the beginning of the examined period in 2005 changed in the net values, it gained the importance, and, thus, the total costs as well. It can be concluded that the positive impact on costs alongside with the positive balance of the VAT resulted from successful investments, which improved the efficiency of dairy cows. It leads to the conclusion that the production has changed its character from extensive to intensive, requiring more effort, however characterized by better efficiency and marketability. The negative factorial load subsidies to livestock production in 2008 may indicate that after the significant adjustment investment after the 10 countries' access to the EU subsidies did not play a significant role in improving liquidity, and even undermined the motivation (Czyzewski A., Post-Wajda A., 2009). Yet, it should be noted that the effect was not significant as evidenced by a low value of the factorial load.

The highest positions of liquidity achievement were detected on the dairy farms located in the northern and central Germany-Mecklenburg Vorpommem, Thueringen, Sachsen-Anhalt, Saxony, Schleswig-Holtstein, Niedersachsen and Nordhein-Westphalia, Italy Lazio, and Lombardy French (Table 2), which is the only region that improved its liquidity enough to be in the first group. The above-mentioned regions are relatively wealthy, are dominated by intensive dairy farming and high herds' performance with more than 100 cows on average.

In the Group I, the regions of Italy - Piemonte, Veneto, Emilia-Romagna and English-Wales, England, and North West England took the positions above the average. This group included more rapidly developing regions in this period such as the regions of Spain: Pais Vasco, Cantabria and Galicia, German Bavaria, and Luxembourg. All the regions of Poland (Wielkopolska and Slask, Pomorze and Mazury, Mazowsze and Podlasie, and

Table 2

High and low positions of farms in the EU regions by liquidity factor (F_1)

Development class	No.	The regions of Europe	The scale of factorial value	
			2005	2008
I (4; 07)	1.	(113) Mecklenburg-Vorpommern	2.692125	3.02934
	2.	(230) Lombardia	-	3.01837
	3.	(116) Thueringen	3.105879	2.06577
	4.	(115) Sachsen-Anhalt	1.816698	1.98757
	5.	(291) Lazio	-	1.65707
	6.	(114) Sachsen	2.057198	1.47358
	7.	(010) Schleswig-Holstein	-	1.41197
	8.	(030) Niedersachsen	-	1.30263
	9.	(050) Nordrhein-Westfalen	-	1.16867
	↓	(810) Slovakia	3.964060	-
		(370) Denmark	1.037823	-
IV (-0.7;-2)	↑	(380) Ireland	-0.803015	-
		(500) Galicia	-0.710658	-
		(505) Asturias	-0.714015	-
	44.	(690) Pohjanmaa	-	-0.80520
	45.	**(790) Wielkopolska and Slask**	**-0.823765**	**-0.84863**
	46.	**(785) Pomorze and Mazury**	**-0.855009**	**-0.86751**
	47.	(775) Lithuania	-0.818960	-0.87939
	48.	**(795) Mazowsze and Podlasie**	**-0.882223**	**-0.89898**
	49.	**(800) Malopolska and Pogorze**	**-0.909504**	**-1.02072**
	50.	(810) Slovakia	-	-1.99900
	51.	(780) Malta	-	-0.72113
	52.	(765) Eszak-Alfold	-	-0.74613
	53.	(770) Latvia	-0.742118	-0.92527
	54.	(620) Tras-os-Montes/Beira interior	-0.761070	-0.86511
	55.	(820) Slovenia	-0.772236	-0.96964

Source: author's study based on the factor analysis carried out in Statistica, the FADN data from 2005 and 2008

Table 3

Resource of production factors in dairy farms in the regions of Europe in 2005 and 2008 (construction of factor F_2)

No.	Feature	Factor load	
		2005	2008
1.	Total Utilised Agricultural Area	0.9518	0.9629
2.	Total labour input	0.9051	0.9561
3.	Total costs	0.9028	0.8460
4.	Net Worth	0.6192	-
5.	Gross Investment	0.5894	0.3934
6.	Change in net Worth	-0.3929	-
7.	Milk Yield	0.3671	-
8.	Total subsidies on livestock	-	0.7591

Source: author's study based on the factor analysis carried out in Statistica, the FADN data from 2005 and 2008

Malopolska and Pogorze) are in the Group IV with the lowest liquidity, and their position in the examined period has deteriorated. It may be caused by the quantitative restrictions on production, which became topical after unfavourable outcome of the Polish negotiations on the number of quotas (Kasztelan P., 2008) and the need to modernize farms and large investments associated with it. It should be noted that the group "under the average" includes households from the regions of the new member states, which testifies their backwardness and low competitive position versus the EU-15 countries (Czyzewski A., Stepien, S., 2011; Czyzewski A., Stepien, S., 2009; Smedzik K., 2009).

Taking into account the development of farms in terms of liquidity, it is clear that the regions of Germany and Spain had the best performance during the period, and they moved up to a few groups reaching a strong position on the top of the table. The positive factor undoubtedly is the fact that there has been no decline from the first to the second group, which means that the developed households, thanks to the high marketability of production and innovation applied, maintain a stable high level. The regions that had the worst performance in terms of liquidity during the period were Slovakia (810) and Denmark (370), which fell by two groups and were below the average. In the conclusion, it should be noted that the scale showed a measurable image of the above discussed issues. At the same time, it revealed the information about the dynamics of changes in various regions of the EU. Yet, the factor values are relative and may not be expressed in absolute values. Moreover, the general principles on taking high or low places are more important than the position occupied by the individual.

Construction and spatial distribution of factor F_2

In 2005, 25.17% of the common resource volatility accounted for the second of the separate factors (F2). In 2008, this share decreased slightly and accounted for 23.83%. It is represented by the resource variables of production factors in dairy farms in the regions of Europe, of which the greatest impact have: utilized agricultural area, closely related- total labour input and total costs (Table 3). The construction of F2 also shows that investment made in later years had a smaller impact on the stock of factors production, which confirms the previously formulated thesis of the increased fundamental investment in the accession period.

It is worth noting that in 2008 the subsidies for livestock had an impact on stock of production factors, which suggests that despite pre-existing, expressed also by changing the value of equity in 2005, the investment and modernization of dairy farms is not able to cope without the EU milk market interventions (Mickiewicz, B., 2009). In the examined period, the regions of Germany: Sachsen-Anhalt, Thueringen, Mecklenburg-Vorpommem, and Sachsen were among those dairy farms which had the highest stocks of production factors in terms of the best liquidity performance (F_1) (Table 4). Many agribusiness economists talk about the need to increase the herd for efficiency improvement. Only rich and liquid farms can afford such investment, which, thanks to financial resources, enables to manage investment costs, giving a real chance to improve long-term results (Czyzewski, B., Mrowczynska-Kaminska A., 2011).

It is surprising that during the period, 12 regions lost their positions in the "best" group, which might give evidence of the mentioned change in the structure of the effective production (Czyzewski A. Kulyk, P., 2010; Czyzewski Andrew S. Stepien, 2009). These figures show that most of the regions are under the average, which may indicate of a high diversity and strong differing of several leading edge regions from the rest of the field.

The shift of Pomorze and Mazury and Wielkopolska and Slask to the group III and a significant improvement of the situation of the Mazowsze and Podlasie and Malopolska and Pogorze located in Group IV are positive trends for Poland. Similar to the case of liquidity, the regions from EU-15 countries are above the average, which shows the existing gap in the development between the new and old member states. It is worth noting, however, that among the rising regions, the regions of the new member states dominated, which can be considered as an equalization of the production resource factors in different regions in order to achieve maximum production efficiency. The biggest drop recorded during the period was reached in: Lombardia (230), Luxembourg (350), the Netherlands (360), and Ireland (380) moving down for at least two groups. The regions that have most improved their situation in terms of resource production factors are Slovakia (810) and the Czech Republic (745) moving up from the Group IV to I, and Estonia (755), which jumped up three groups. The position of some regions in Germany also strengthened, among which the sharpest jump was experienced by Thueringen (116), Sachsen (114) and Sachsen-Anhalt (115) (Figure 2).

Construction and spatial distribution of factor F_3

After analysing the components of the factor F3, it was decided that the features contained in it could be defined as the conditions of production and economic activity in the dairy farms in the regions of the EU in 2005 and 2008. In 2005, the greatest influence on the conditions of production and economic activity was caused by subsidies to livestock production. However, the balance of penalties and subsidies for milk production also gained great importance. These characteristics did not play a significant role in 2008, which may indicate to the improvement of the households' economic situation (Table 5). An interesting phenomenon seems to be a sign of change caused by the impact of VAT on investment. In 2005, there was little motivation for production and economic activity, whereas in 2008, there was observed a powerful stimulus (0.6585). This may be owing to the fact that in many households extensive investments made the budget tight while investments in later years only provided a continuous sustainable development. Therefore, in 2008, net worth became importance, and as a result, the business net worth per fully employed person (Table 5).

The construction of comparative scale was based on the arrangement of the regions starting from those with the best conditions of production and economic activity and ending with the "worst" in terms of value for the year 2008. The average value was calculated in this part of the research. The arranged set of the dairy farms was divided into two groups with values above and below the average. It made possible to determine which regions have favourable conditions for production and economic activity and which are less favourable, which led to the conclusion that they might require more support (Sapa, A., 2009).

As it turned out, the regions of Luxembourg (350), the Netherlands (360), Ireland (380), Denmark (370), and England and Germany had the best conditions for the production and economic activity during the period. All the regions of Poland worsened their position

Table 4

High and low positions of farms in the EU regions by the stock of production factors

Development class	No.	Euro-regions	The scale of factorial value	
			2005	2008
I (6; 0.7)	1.	(810) Slovakia	-	5.895483
	2	(115) Sachsen-Anhalt	-	1.949486
	3.	(116) Thueringen	-	1.779909
	4.	(113) Mecklenburg-Vorpommern	1.78951	1.542390
	5.	(114) Sachsen	-	1.202715
	6.	(745) Czech Republic	-	0.722529
	↓	(230) Lombardia	3.04812	-
		(350) Luxembourg	1.99528	-
		(360) The Netherlands	1.78159	-
		(380) Ireland	1.38399	-
		(010) Schleswig-Holstein	1.12467	-
		(291) Lazio	1.11090	-
		(030) Niedersachsen	1.05769	-
		(370) Denmark	1.05363	-
		(341) Vlaanderen	0.92485	-
		(413) England-West	0.91530	-
		(222) Piemonte	0.87434	-
		(050) Nordrhein-Westfalen	0.80340	-
IV (-0.5,-3)	↑	(810) Slovakia	-2.94096	-
		(260) Emilia-Romagna	-0.51310	-
		(765) Eszak-Alfold	-0.65078	-
		(242) Alto-Adige	-0.72058	-
		(610) Entre Douro e Minho/Beira litoral	-0.82862	-
		(820) Slovenia	-0.95650	-
		(790) Wielkopolska and Slask	**-0.96194**	**-**
		(745) Czech Republic	-1.00971	-
		(775) Lithuania	-1.01601	-
		(755) Estonia	-1.02156	-
		(620) Tras-os-Montes/Beira interior	-1.06541	-
		(785) Pomorze and Mazury	**-1.07574**	**-**
		(770) Latvia	-1.08950	-
	45.	(243) Veneto	0.57621	-0.505548
	46.	**(795) Mazowsze and Podlasie**	**-1.06088**	**-0.517914**
	47.	(010) Schleswig-Holstein	1.12467	-0.539807
	48.	(050) Nordrhein-Westfalen	0.80340	-0.540432
	49.	(341) Vlaanderen	0.92485	-0.549959
	50.	**(800) Malopolska and Pogorze**	**-1.16399**	**-0.554221**
	51.	(090) Bayern	0.16553	-0.561586
	52.	(660) Austria	0.13989	-0.576566
	53.	(030) Niedersachsen	1.05769	-0.584948
	54.	(350) Luxembourg	1.99528	-0.637539
	55.	(291) Lazio	1.11090	-0.717937

Source: author's study based on the factor analysis carried out in Statistica, the FADN data from 2005 and 2008

Table 5

Terms of production and economic activity of dairy farms in the regions of Europe in 2005 and 2008 (construction of factor F_3)

No.	Feature	Factor load	
		2005	2008
1.	Total subsidies for livestock	0.9239	-
2.	Subsidies for dairying	0.8987	-
3.	Milk Yield	0.4699	0.4028
4.	VAT on investment	-0.4025	0.6585
5.	Net Worth	-	0.7580
6.	Farm Net Value Added / AWU	-	0.5553

Source: author's study based on the factor analysis carried out in Statistica, the FADN data from 2005 and 2008

Table 6

Position of farms in the EU regions according to the conditions of production and economic activity (F_3)

No.	The regions of Europe	The scale of factorial value	
		2005	2008
Values above the average for the test set of dairy farms in the regions of Europe			
1.	(350) Luxembourg	2.10690	2.80536
2.	(360) The Netherlands	-1.28609	2.54170
3.	(380) Ireland	1.43787	2.44863
4.	(370) Denmark	-0.20354	1.69206
5.	(341) Vlaanderen	-0.13174	1.54455
6.	(413) England-West	-0.09745	1.19829
7.	(411) England-North	0.41124	0.95792
8.	(010) Schleswig-Holstein	0.97121	0.95136
9.	(421) Wales	0.44056	0.82767
10.	(343) Wallonie	0.09059	0.81273
11.	(441) Northern Ireland	0.55400	0.80735
12.	(030) Niedersachsen	1.11888	0.77060
13.	(050) Nordrhein-Westfalen	0.83373	0.69321
14.	(690) Pohjanmaa	-3.46768	0.67642
15.	(710) Slattbygdslan	-0.76538	0.66941
16.	(660) Austria	0.94022	0.59652
17.	(113) Mecklenburg-Vorpommern	0.07530	0.58636
18.	(780) Malta	-1.38953	0.57233
19.	(670) Etela-Suomi	-2.54874	0.53934
20.	(720) Skogs-och mellanbygdslan	-0.64801	0.49979
21.	(810) Slovakia	1.39659	0.19478
22.	(515) Pais Vasco	-1.75436	0.06397
Values below the average for the test set of dairy farms in the regions of Europe			
23.	(162) Pays de la Loire	-0.80647	-0.11966
24.	(151) Lorraine	-1.08921	-0.18113
25.	(163) Bretagne	-0.75970	-0.18206
26.	(141) Nord-Pas-de-Calais	-1.09093	-0.20393
27.	(745) Czech Republic	0.21413	-0.21252
28.	(152) Alsace	-0.83552	-0.26061
29.	(090) Bayern	1.02931	-0.26501
30.	(620) Tras-os-Montes/Beira interior	0.40092	-0.29757
31.	(135) Basse-Normandie	-0.53189	-0.31683
32.	(755) Estonia	0.30222	-0.41198
33.	(133) Haute-Normandie	-0.43239	-0.46057
34.	(610) Entre Douro e Minho/Beira litoral	-0.19921	-0.48386
35.	(153) Franche-Comte	-0.41253	-0.48918
36.	(230) Lombardia	-0.56767	-0.56322
37.	(510) Cantabria	-0.07469	-0.60594
38.	(291) Lazio	0.68315	-0.64831
39.	(765) Eszak-Alfold	0.60837	-0.68068
40.	(820) Slovenia	0.58075	-0.74088
41.	(500) Galicia	0.12663	-0.75556
42.	(505) Asturias	0.07919	-0.77327
43.	**(790) Wielkopolska and Slask**	**0.87386**	**-0.81556**
44.	**(785) Pomorze and Mazury**	**0.96798**	**-0.86353**
45.	(115) Sachsen-Anhalt	0.22888	-0.91033
46.	(114) Sachsen	0.29117	-0.92688
47.	**(795) Mazowsze and Podlasie**	**0.96259**	**-0.95602**
48.	(770) Latvia	0.56004	-1.03463
49.	(243) Veneto	-0.00558	-1.06035
50.	(775) Lithuania	0.66633	-1.08247
51.	(116) Thueringen	0.25907	-1.20029
52.	**(800) Malopolska and Pogorze**	**0.99477**	**-1.21138**
53.	(242) Alto-Adige	0.47935	-1.21160
54.	(222) Piemonte	-0.12475	-1.22812
55.	(260) Emilia-Romagna	-1.46279	-1.29642

Source: author's study based on the factor analysis carried out in Statistica, the FADN data from 2005 and 2008

and, thus, in 2008 stayed much below the average for the test set. The worst conditions of economic and production activity among the regions of Poland were recorded in Malopolska and Pogorze (800) (Table 6), while the best – in Wielkopolska and Slask (790) and Pomorze and Mazury (785). This fact can also be explained by better natural conditions, less fragmentation of farms, and improved financial situation of households in those areas (A. Mickiewicz A., Mickiewicz B., 2010).

Conclusions

The foregoing findings lead to the conclusions that there is still a large variety of dairy development in the regions of EU-15 countries and the regions of the "new" member states. Farms in the regions of the old EU countries have a much better performance of liquidity, greater resource inputs, and better conditions for production and economic activity, as demonstrated by positions of having all the factors above the average in scope of the European Union. It is, however, worth noting that the regions from the new member states dominated among the rising regions, while the regions from the EU-15 countries were moving among the lower groups, which can be regarded as a levelling of milk farms in the EU. During the reporting period, the rise of the leading (largest percentage variation taken as a whole) liquidity factor (F1) was marked in the overall resource variability. Therefore, one could argue that the EU's intervention was crucial for the development of dairy farms, yet the negative charge on the impact of factorial load of subsidies on livestock production in 2008 gives evidence that they did not play a significant role in liquidity improvement and even reduced the motivation. Owing to successful investments improving the performance of dairy cows in 2008, the milk production in the regions of the EU has changed its character from extensive to intensive requiring more effort, though characterized by higher efficiency and marketability.

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THE CENTRAL BUDGET AND THE BUDGETS OF VOIVODES FOR EXPENDITURES ON THE AGRICULTURAL SECTOR IN POLAND IN THE LONG TERM[1]

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Abstract. The purpose of this article is to assess agricultural spending from the state – central budget and the budgets of voivodes. The analysis covers long period – years 2000-2012. Detailed considering is related to the term before and after Poland's accession to the EU in order to show the differences in financing various budget titles. The authors also used correlations between the selected expenditure budget to prove that one is dealing with both the substitutability and complementarity.
Key words: central budget, voivodes budgets, agriculture.
JEL code: H50, H60, H70, H72.

Introduction

The research task of this study will concern the evaluation of structures and dynamics of spending on the agricultural sector from the central budget and the budgets of voivodes as well as the links between individual budget headings. This could be the basis for proposing a possible "vertical" transfers of funds disbursed from the local level to the national level, or decentralisation, regionalisation of budgetary expenditure on the agricultural sector, justified by the CAP reform. The authors sequentially analysed relationships between the selected headings in the central budget and the budgets of voivodes. The mail goal of this research is to assess agricultural spending from the state – central budget and the budgets of voivodes. The analysis allows showing the trend as it concerns a long term, i.e. the years 2000-2012. As research methods, the authors used analysis of structures and dynamics in the budgetary expenditures and the correlations between the selected expenditure of central and voivodes budgets.

Central budget

Central expenditures on the agricultural sector are budgetary resources directed to the sector that remains under the authority of the Minister of Agriculture and Rural Development. The analysed time period is divided into three sub-periods: the first - determined by integration with the EU (2000-2003), the second covers the years after accession (2004-2009), and the third when *Bank Gospodarstwa Krajowego* (BGK) took over the operation of the established budget of resources (since 2010). Thus, since 2003 spending in the agricultural budget was exposed to pessimism. It was hard to recognise that agriculture was the preferred policy of the government - the share of spending on the agricultural sector in budgetary expenditure showed stagnation oscillating at around 2.2% of the total expenditure and registering dangerous drops, as in 2002 – to the level of less than 2% (Figure 1). One can also consider that the situation of the agricultural sector deteriorated since the beginning of the transformation of Polish economy, and negligence that took place over the years testify the progressive marginalization of the problems of agriculture, rural areas, and agricultural markets in subsequent state budgets. By 2003, the economic situation of farms in comparison to non-agricultural environment had not improved, on the contrary - civilization gap for most of them grew, and degradation deepened. Expenditure projected in the budget acts were not able to alleviate the fundamental problems of agriculture and Polish rural areas, such as disparity of income, education, or the condition of social infrastructure, despite the fact that together with expenditure on the social sphere – the Agricultural Social Insurance Fund *(Polish: Kasa Rolniczego Ubezpieczenia Spolecznego - KRUS)*, their share in the budget amounted on average to 10.8% (Czyzewski, Matuszczak 2011).

Since 2003, agriculture has clearly "bounced back", which was reflected in the sustained and real growth in budget spending on the agricultural sector and also change in the existing relationships and trends. The average share of spending on agriculture, rural development, and agricultural markets along with KRUS did not actually change (marginal decrease by 0.2 percentage point), but the relationship of development spending for social spending has changed. For the first time, there

[1] The paper uses excerpts of a wider expert opinion of the authors "Wydatki na sektor rolny w Polsce w budzecie centralnym i budzetach wojewodow w latach 2000-2012 oraz mozliwosci ich przesuniec w kontekscie przewidywanych zmian WPR 2014-2020" ("Spending on the agricultural sector in Poland in the central budget and the budgets of voivodes in the years 2000-2012 and the possibility of their displacement in the context of anticipated changes in the CAP 2014-2020") written within the framework of Multiannual Programme realised by IERiGZ-PIB in Warsaw.

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Table 1

Expenditure on agriculture, rural development, agricultural markets, and KRUS in the national budget in 2000-2012

Description	Before accession to the EU				
	2000	**2001**	**2002**	**2003**	**average**
Expenditure on agriculture, rural development, and agricultural markets (PLN, million)	3 760	3 470	3 261	4 429	**-**
Share of spending on agriculture, rural development, and agricultural markets in total budgetary expenditure (%)	2.43	1.9	1.98	2.29	**2.2**
Share of spending on agriculture, rural development, and agricultural markets and KRUS in total budgetary expenditure (%)	11.49	10.6	10.68	10.36	**10.8**
	After accession to the EU				
	2004	**2005**	**2006**	**2007**	**2008**
Expenditure on agriculture, rural development, and agricultural markets (PLN, million)	5 729	7 999	8 379	17 137	19 617
Share of spending on agriculture, rural development, and agricultural markets in total budgetary expenditure (%)	2.89	3.29	3.74	6.62	6.32
Share of spending on agriculture, rural development, and agricultural markets and KRUS in total budgetary expenditure (%)	10.69	10.22	10.43	12.47	11.4
	2009	**2010**	**2011**	**2012**	**average**
Expenditure on agriculture, rural development, and agricultural markets (PLN, million)	19 380	12 901	12 704	11 572	**-**
Share of spending on agriculture, rural development, and agricultural markets in total budgetary expenditure (%)	6.02	4.45	4.04	3.52	**4.5**
Share of spending on agriculture, rural development, and agricultural markets and KRUS in total budgetary expenditure (%)	11.32	9.83	9.09	8.34	**10.6**

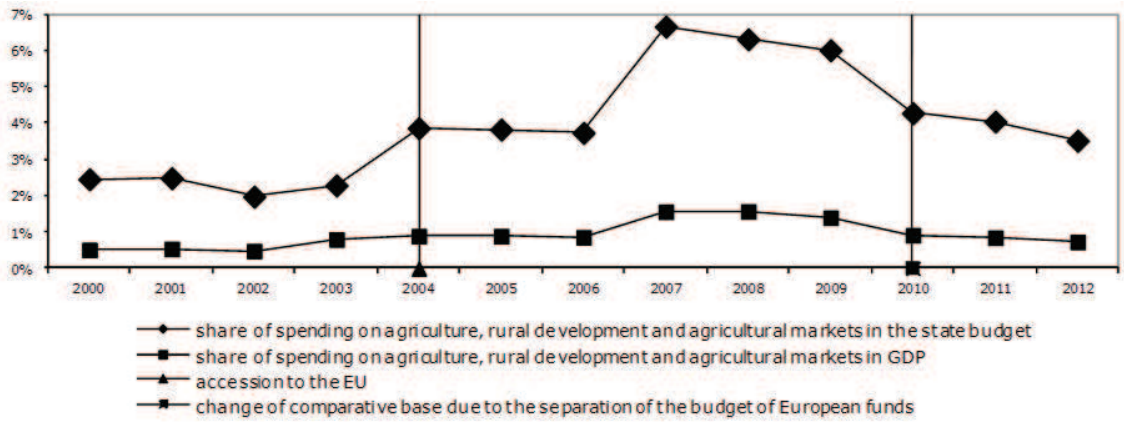
* thick line indicates the implementation date of the budget of European funds

Source: author's calculation based on annual agricultural budget opinions for 2000-2012, prepared by A. Czyzewski in the form of reports for the Chancellery of the Senate of the Republic of Poland based on the analysis of the drafts and implementation of budget acts for the relevant years; Budget Acts for years 2000-2012, The Polish Prime Misters' Office, Warsaw

has been a chance to improve directly the income of farmers and reproduction processes on their farms owing to more than doubled spending (4.5%) on agriculture, rural development, and agricultural markets from the national budget. Breaking through the recessionary situation in Poland was achieved by improving the macroeconomic conditions of economy, in which authors have seen a chance to halt the growing degradation of Polish agriculture and rural areas. Increased budgetary outlays were obviously not able to solve immediately the basic problems of the agricultural sector in Poland, as this required many years of consistent agricultural policy. Moreover, at this point one must also consider the support from the EU budget, whose main beneficiary is the agricultural sector - in 2006 - 43.3% of the EU funds supplied the discussed sector; in the following years it was respectively: in 2007 – 43.28%, in 2008 – 41.49%, in 2009 – 48.49%, in 2010 – 35.9%, in 2011 – 31.9%, and in 2012 – 29.8%. No doubt, it had a real impact on the development and accumulation processes of domestic farms.

After 2010, the situation has changed, but only from an accounting point of view - there has been a change in the functioning of the agricultural budget, as the Bank Gospodarstwa Krajowego (BGK) took over the operation of the European funds budget created on 1.01.2010, and thus became a central institution handling income and expenditures resulting in settlements with the EU. This has resulted in the separation of these funds from income, spending, and the deficit of the state budget. Thus, only in the accounting terms, there has been a drop in the share of spending on agriculture, rural development and agricultural markets after 2010 (Table 1), because the actual expenditure on these headings along with the budgets of voivodes and the specific provisions in 2010 were actually higher by 28.84% as compared to the previous year.

However, in 2011-2012, these funds decreased in real terms, respectively by 7.55% and 12.9% as compared to the previous year. However, these funds increased by expenditure on KRUS given in 2012 the share lower by 8.34% than in previous years, which amounted to 9.1% in 2011 and 9.83% a year earlier.



* comparisons to previous years relate to the provisions of the budget acts

** spending on the agricultural sector is spending on agriculture, rural development, and agricultural markets along with the budgets of voivodes and specific provisions, excluding funds for co-financing and pre-financing of the EU objectives and programmes as well as KRUS

Source: author's calculation based on annual agricultural budget opinions for 2000-2012, prepared by A. Czyzewski in the form of reports for the Chancellery of the Senate of the Republic of Poland, based on the analysis of the drafts and implementation of budget acts for the relevant years; Budget Acts for years 2000-2012, The Polish Prime Misters' Office, Warsaw.

Figure 1. **Share of spending on agriculture, rural development, and agricultural markets in the state budgets and GDP in 2000 - 2012 (%)**

Voivodes budgets in the agriculture department

The concept of voivodeship spending on the agricultural sector is understood as units and activities financed from the budgets of voivodes. Their general division applies to current expenditure, investment, and co-financing of projects from the EU funds[3]. Expenditures that are more detailed are those on institutions such as voivodeship agricultural advisory centres, voivodeship inspectorates for agricultural and food quality inspection, voivodeship inspectorates for plant health and seed inspection, voivodeship and *poviat* veterinary inspectorates, and the National Fisheries Service. As for the tasks to be undertaken within the budgets of voivodes, one may mention geodetic and management work for agriculture, water management, water law companies, plant protection, the fight against infectious diseases, and monitoring chemical and biological residues in animal tissues and products of animal origin, removal of natural disasters.

Analysing the relationship of agricultural spending from budgets of voivodes and agricultural expenditures from the central budget, one can see it has been deteriorating. In the pre-accession period, voivodes had similar nominal amounts each year (which means that in real terms they were getting lower), and after the integration one can observe that the average annual increase in agricultural expenditure was 11%. However, this was not enough with central expenditure on the sector growing faster to maintain their share in voivodeship spending at 1/4 - as indicated in Table 2, it decreased to 1/5. This may indicate a growing importance of objectives in the central budget under conditions of the CAP implementation. This should be considered a general trend in the EU. This can be observed when under the EU agricultural policy one has to do with its formal centralization (Directorate-General for Agriculture) and when, at the same time, there is a clear pressure to decentralize (Directorate-General for Regional Policy).

Agricultural policy is generally coordinated at the domestic level, especially under Pillar I, but still some competition is visible below the domestic level, which could be the basis for the inference that "the CAP seems to be an ideal candidate for regionalisation" (Trouve, Berriet-Sollec, 2010). It should be noted that such ideas appeared already in the 1980s, when the idea of a "Europe of the Regions" emerged. Unfortunately, the decision-makers at the national level fiercely defended their role as supervisors and agents in all regional relations in the EU, which does not mean that today it must reject the possibility of a co-ordination along the line region-state-European Union (Elias 2008; Keating 2008). This would result, *inter alia,* in a proposal for their reallocation as well as reallocation of resources to the regional (voivodeship, poviat) level, which is discussed in another part of the study.

By studying the structure of spending on agriculture in the budgets of voivodes, one can see that until the time of Poland's integration with the EU, spending volume on objectives envisaged for implementation in the budgets of voivodeships was characterized by stagnation. One may even recognise that although nominally the funds did not change, in real terms they were reduced. The situation was reversed after 2005, when from year to year a relatively high increase was noted. During eight years of Poland's membership in the EU, voivodeship budget expenditure almost doubled.

[3] This item is in the budgets of voivodes since 2004, since the Poland integration with the EU.

Table 2

Relationship of expenditure in voivodeship budgets in agriculture and hunting section to central expenditure* on the agricultural sector in 2000-2012

Description	Before accession to the EU				
	2000	**2001**	**2002**	**2003**	**average**
Relationship of expenditure in voivodeship budgets in agriculture and hunting section to central expenditure* on the agricultural sector	0.247	0.213	0.248	0.211	**0.23**
	After accession to the EU				
Description	**2004**	**2005**	**2006**	**2007**	**2008**
Relationship of expenditure of voivodeship budgets in the agriculture and hunting section to central expenditure* on the agricultural sector	0,251	0,276	0,451	0,113	0,046
	2009	**2010**	**2011**	**2012**	**average**
	0.112	0.156	0.170	0.198	**0.197**

*Relationship of part 85 to the sum of 32, 33, and 35 in budget acts

Source: author's calculation based on annual agricultural budget opinions for 2000-2012, prepared by A. Czyzewski in the form of reports for the Chancellery of the Senate of the Republic of Poland, based on the analysis of the drafts and implementation of budget acts for the relevant years; Budget Acts for years 2000-2012, The Polish Prime Misters' Office, Warsaw.

Table 3

Structure and dynamics of expenditure in budgets of voivodes in agriculture and hunting section in 2000 - 2012

Description	Before accession to the EU				
	2000	**2001**	**2002**	**2003**	**average**
Total expenditure (PLN, thousand), including:	679 680	662 002	623 569	632 752	
Dynamics	-	0.97	0.94	1.01	**0.98**
Structure, including: current expenditure	0.84	0.85	0.84	0.88	**0.85**
capital expenditure	0.16	0.15	0.16	0.12	**0.15**
	After accession to the EU				
	2004	**2005**	**2006**	**2007**	**2008**
Total expenditure (PLN, thousand), including:	668600	658212	900013	1152259	789741
Dynamics	1.06	0.98	1.37	1.28	0.69
Structure, including: current expenditure	0.86	0.91	0.78	0.57	0.88
capital expenditure	0.14	0.09	0.22	0.03	0.06
Co-financing of projects from the EU funds	-	-	-	0.40	0.06
	2009	**2010**	**2011**	**2012**	**average**
Total expenditure (PLN, thousand), including:	1 289 491	909 397	1 120 250	1 159 052	
Dynamics	1.63	0.71	1.23	1.03	**1.11**
Structure, including: current expenditure	0.62	0.87	0.71	0.69	**0.77**
capital expenditure	0.02	0.03	0.10	0.10	**0.09**
Co-financing of projects from the EU funds	0.36	0.10	0.19	0.21	**0.22**

Source: author's calculation based on annual agricultural budget opinions for 2000-2012, prepared by A. Czyzewski in the form of reports for the Chancellery of the Senate of the Republic of Poland, based on the analysis of the drafts and implementation of budget acts for the relevant years; Budget Acts for years 2000-2012, The Polish Prime Misters' Office, Warsaw.

The structure of expenditure in the budget of voivodes in agriculture and hunting section is also interesting, in which until 2005 there was a relatively stable division into current expenditures (85%) and relatively low capital expenditure (15%). Whereas, 2006 brought a radical change with increasing share of capital expenditures, and a year later the EU funds were involved in the financing of voivodeship budget headings, which resulted in a prominent increase in the share of investments. Therefore, one can refer to

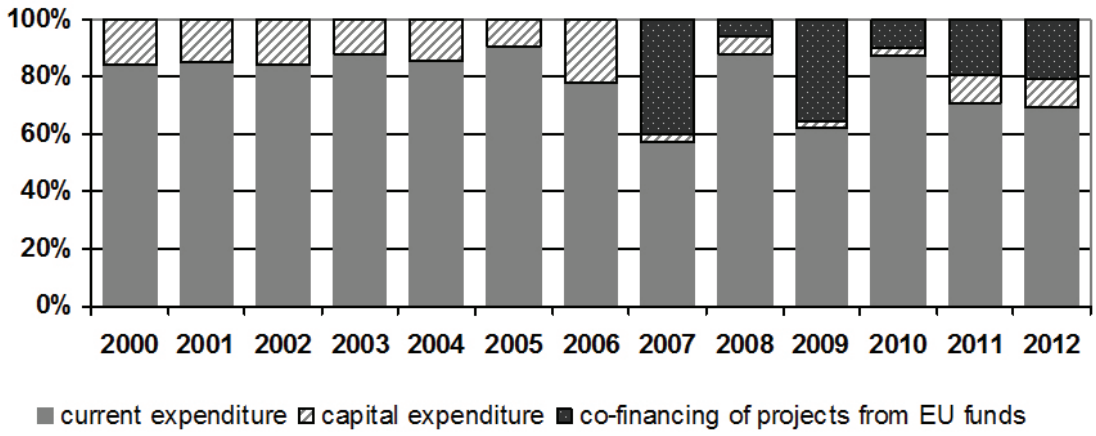


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Figure 2. **Structure of expenditure in the budgets of voivodes in agriculture and hunting section in 2000 - 2012**

a noticeable substitution of current expenditure with capital expenditure as well as some complementarity of domestic investment spending with the EU funds. Projects co-financed from the EU funds made it possible to implement a much greater number of projects in the field of geodetic and management works as well as land reclamation for agriculture. One should also note that the EU budget takes over implementation of some of the headings, which greatly relieves the national budget.

Considering the dynamics of the expenditure for the individual headings in the budgets of voivodes in agriculture and hunting section, it is noticeable that the most stable expenditures over the period in question are the expenditures on budgetary units and entities (Table 3). Heading, which needs to be distinguished due to the highest, doubled spending growth in the post-accession period; as compared to the time prior to the integration, is the financing of water law companies and management. Especially the latter has been significantly supported by the investments covered by both national resources and especially by the relatively fast-growing EU funds. The position of the other two important directions of financing from the budgets of voivodes seems unchallenged despite fluctuations in the level of expenditure, i.e. plant protection and animal infectious disease control and geodetic and management work for agriculture. Yet, there was no systematic increase in the expenditures for these purposes, but an abrupt growth in their level.

Notable is the fact that with the implementation of the CAP, the number of headings is increasing not only in the central budget, but also - although to a lesser extent - in the budgets of voivodes. The authors are talking primarily about the tasks carried out under the RDP (for voivodes, but carried out by the offices of the marshal, which include the consolidation of land and water resources management) and dealing with the consequences of natural disasters as well as financing through the EU projects.

Increasing bureaucracy can be considered as a disturbing trend; however, it should be reminded that during the period in question, the scope and value of the tasks operated by units subordinated to voivodes increased. Second, assuming the criterion of the volume of funds spent, is the item related to water management - their maintenance as well as investments in them, where one also observes an increasing share (from about 1/5 to 1/4). However, it took place mainly thanks to much fluctuating investments from the EU funds, which in a significant part substitute domestic investments in this area. It is also worth to mention the item associated with geodetic and management work for agriculture, for which the share of expenditure over the period in question remains at about 5%.

Another notable fact is that the responsibilities of voivodes include supervising and partly also spending on institutions carrying out tasks related to the agricultural sector. They include voivodeship agricultural advisory centres (AACs) (expenditures are included in the item budgetary units and entities), Agricultural and Food Quality Inspection (AFQI), Plant Health and Seed Inspection (PHSI), voivodeship veterinary inspectorates, *poviat* veterinary inspectorates. The PHSI expenditures have relatively greatest dynamics in agricultural budgets, which may be related to the extension of the powers and duties, e.g. on the implementation of and compliance with increasingly stringent environmental protection instruments, which can be seen in the announcements of the CAP reform in many of the proposed instruments, ranging from greening payments direct payments to the principle of cross-compliance.

As for the AACs, they foster the development of agriculture through their knowledge and consulting experience, including a comprehensive agricultural consulting. Moreover, they work with cooperatives, producer groups, agribusiness companies, manufacturers associations, and institutions of agricultural environment. All this provide that AACs can become in many cases

Table 3

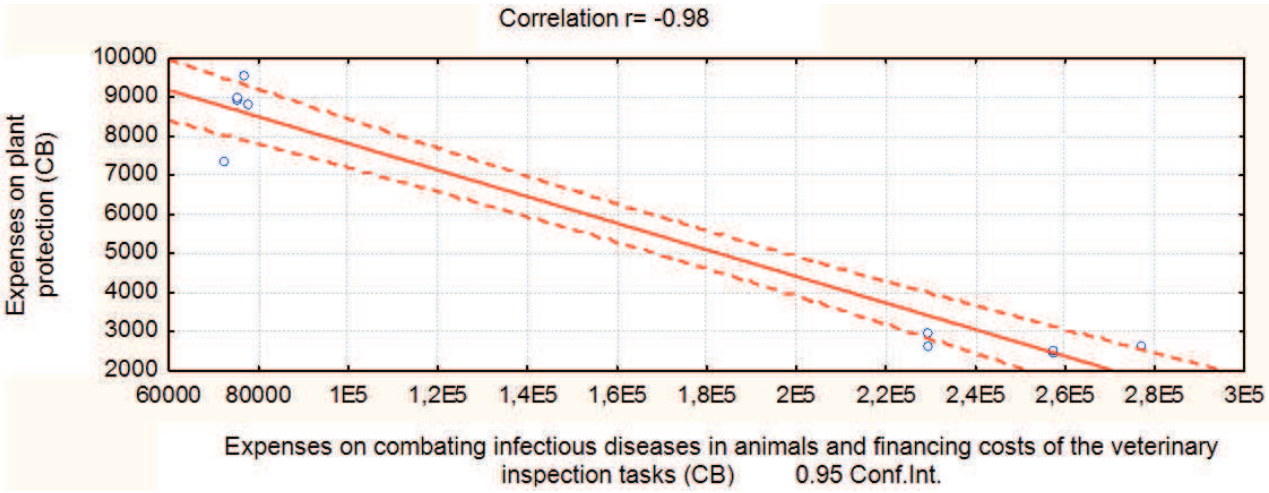
Dynamics of expenditure in budgets of voivodes in agriculture and hunting section in 2000 - 2012

Description	Before accession to the EU				
	2000	**2001**	**2002**	**2003**	**average**
budget units and entities	-	1.08	0.94	1.06	**1.03**
plants and animals-protection, fight against disease, consultancy	-	0.80	0.64	0.98	**0.81**
geodetic and management work for agriculture	-	0.76	0.67	1.00	**0.81**
management, water law companies	-	0.82	0.85	1.01	**0.89**
	After accession to the EU				
	2004	**2005**	**2006**	**2007**	**2008**
budget units and entities	1.44	1.04	1.01	1.00	1.06
plants and animals-protection, fight against disease	0.95	0.88	3.34	0.82	0.76
geodetic and management work for agriculture	1.01	0.87	2.44	0.32	0.78
management, water law companies	1.03	0.81	2.19	0.73	0.81
	2009	**2010**	**2011**	**2012**	**average**
budget units and entities	1.11	1.04	1.01	1.01	**1.08**
plants and animals-protection, fight against disease	0.67	0.87	0.88	0.95	**1.43**
geodetic and management work for agriculture	2.92	0.87	1.06	0.83	**1.03**
management, water law companies	3.42	0.76	4.31	1.07	**2.03**
RDP 2007-2013	-	0.96	1.19	1.10	**1.08**
dealing with the consequences of natural disasters	-	-	0.38	3.33	**1.86**

Source: author's calculation based on annual agricultural budget opinions for 2000-2012, prepared by A. Czyzewski in the form of reports for the Chancellery of the Senate of the Republic of Poland, based on the analysis of the drafts and implementation of budget acts for the relevant years; Budget Acts for years 2000-2012, The Polish Prime Misters' Office, Warsaw.

a decisive link in the development of agriculture in the region; they can also significantly overcome existing barriers in solving technological problems and essentially support agricultural producers. Their role related to the implementation of research, information and education programmes for agriculture and rural development is important as well as their broad activity in environment protection and rural landscape. In the light of the above tasks, the excessive fluctuation of budgetary expenditure on agricultural consulting is confusing, especially in the context of the new tasks arising from the evolution of the CAP. It is possible that this is an indication of change, as in highly developed countries; where for many years there has been a tendency to reduce the role of state consulting in favour of financial or commercial advice. Currently, advisory centres are financed from budgetary grants and income from business activities (e.g. bookkeeping, business promotion, publishing, rental of premises) and revenue from other sources. The relatively stable budget subsidies do not prevent increased revenues from other activities. One can also consider that these units are forced to demonstrate thrift and initiative in raising funds. Besides, consulting in rural areas, in addition to AACs, is provided by many other institutions, such as chambers of agriculture, cooperative banks, associations and research institutes and private consulting firms. Number of pieces of advice provided by these companies significantly increased, especially since 2002 with the advent of the EU funds and the need to prepare relevant applications for the EU subsidies. It should be noted that the new CAP reform will increase the role of AACs because of the need for the implementation of measures under priorities relating to the implementation of the Europe 2020 strategy in the agricultural sector, which include: promotion and transfer of knowledge and innovation, promotion of competitiveness, organisation of the food chain, or promotion of social inclusion and economic development in rural areas.

Another institution, the Agricultural and Food Quality Inspection, under the official control of food in Poland protects not only the interests of consumers and food producers, but also participates in the implementation of national food policy. Commercial quality control of products is an important element of the system to guarantee the quality of food placed on the market and the economic security of consumers and producers. The AFQI activities mainly include consumer protection and the fight against faking food products, elimination of unfair competition, and promotion of high quality Polish food through the promotion of quality marks and certificates. The dynamics of spending related to the quality of raw materials and of agricultural products ensured by the AFQI collapsed after the integration with the EU. Until accession, since 2000, spending showed a relatively high growth rate. This may be associated with an increase in funds for veterinary inspectorates, including voivodeship and *poviat* units, which took over part of the competencies of the above institution (e.g. checks associated with the implementation of



Source: author's calculation based on annual agricultural budget opinions for 2000-2012, prepared by A. Czyzewski in the form of reports for the Chancellery of the Senate of the Republic of Poland, based on the analysis of the drafts and implementation of budget acts for the relevant years; Budget Acts for years 2000-2012, The Polish Prime Misters' Office, Warsaw.

Figure 3. **Spending on combating infectious diseases and co-financing of veterinary inspection tasks (CB) versus expenditure on plant protection (CB) in 2000-2012.**

quality assurance systems in agribusiness enterprises). However, there is no justification for restricting funds for this objective in the face of increasing prevalence of food quality safety hazards and the expected expansion of tasks in relation to veterinary inspections, e.g. as a part of implementation activities or cross-compliance control.

In the light of this analysis, the authors conclude that there is a need to increase expenditures primarily for those purposes in the agricultural sector, which have the largest reception area and longest effects. Thus, the following "vertical" shifts should take place that concern the increase at the regional level of:

— resources for regulation of water, according to the emerging growth trend seen for several years;
— spending on geodetic and management works, which could have a positive impact, especially on rural development;
— resources to voivodeship and *poviat* veterinary inspectorates, whose role, especially controlling, under the directives on animal welfare is growing.

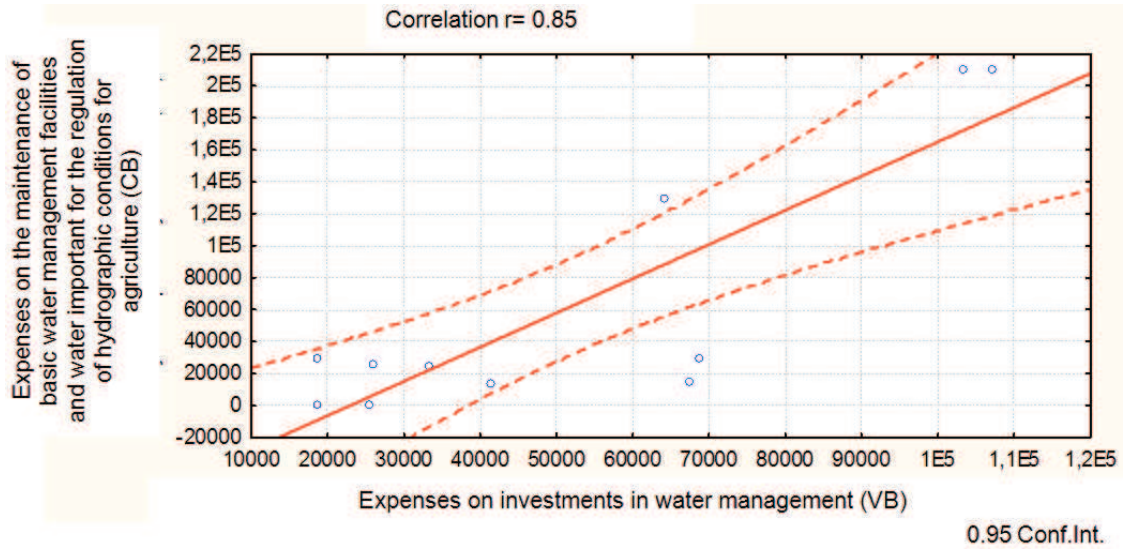
Authors' research experience in the assessment of agricultural budgets indicates that the increase in spending on these objectives could be financed from specific provisions and the Agricultural Property Agency (from the Agricultural Property of the Treasury).

Relationships between the selected headings in the central budget and the budgets of voivodes

The next step of the analysis was to verify, whether there are correlations between headings financed from the central budget and the budgets of voivodes. The first significant correlation concerned the long-term relationship between funds for fighting against infectious diseases financed from the central budget (CB) and the protection of plants funded from the same source (CB), where the correlation ratio was -0.97 (Figure 3). This may indicate the fact that budget designers treat these two headings as substitutes in financial terms, although they refer to different actions. In the analysed period, there was a significant decrease in expenditures related to the protection of plants in favour of significant increase in funds for combating infectious diseases and co-financing for veterinary inspection tasks. In the light of the financial competitiveness of budgetary objectives and under conditions of limited resources associated with the current needs, this can be a result of task preferences, e.g. prevention and control of bird flu, BSE, and other zoonotic diseases, which Poland and other EU countries have to deal with.

A similar relationship also referred to the relationship of expenditure on combating infectious diseases (CB) and plant protection financed from the budget of voivodes (VB), where the correlation rate was - 0.95. These situations put a prerequisite that plant protection was marginalized for a long time, both at the level of central and voivodeship expenditure.

Another important and highly correlated (0.85) relation is found in expenditures for investments in water management devices (VB) and the maintenance of basic water management facilities and water important for the regulation of hydrographic conditions for agriculture (CB) (Figure 4). Both targets have been recognised for years, and spending for them increased. This should be viewed as a positive development, since the ordering of matters relating to the regulation of hydrographic conditions and investment in water management facilities in the face of more frequent flood events has become a matter of pressing concern.



Source: author's calculation based on annual agricultural budget opinions for 2000-2012, prepared by A. Czyzewski in the form of reports for the Chancellery of the Senate of the Republic of Poland, based on the analysis of the drafts and implementation of budget acts for the relevant years; Budget Acts for years 2000-2012, The Polish Prime Misters' Office, Warsaw.

Figure 4. **Investment in water management (VB) versus maintenance of basic water management equipment and waters essential for the regulation of hydrographic conditions for agriculture (CB) in 2000-2012.**

A similar correlation (0.73) one finds in relation of spending on water law companies (VB) and the maintenance of basic water management facilities and water important for the regulation of hydrographic conditions for agriculture (CB), which can also be justified by a complementarity of funds from both the central budget as well as the budgets of voivodes.

Conclusions

These considerations give rise to the following statements:

— long-term trends in expenditures on the agricultural sector in the central budget and the budgets of voivodes to a relatively large extent correspond to the directions of the proposed amendments to the Common Agricultural Policy in 2014-2020, which is reflected, for instance, in the increasing importance of objectives in the central budget and the increasing number of headings in the budgets of voivodes. These expenditures (e.g. related to the regulation of hydrographic conditions) are often complementary to the EU funds flowing to the agricultural sector for investments, they are also often substituted by funds from the EU;

— another directional convergence of national funds is also visible in their increase and adaptation related to expansion of powers and responsibilities of the institutions responsible for the implementation and compliance with environmental protection instruments, which are present in the announcements of the CAP reform in many areas from the greening of direct payments to the principle of cross-compliance;

— in the face of the reformed CAP, one can observe an increasing role of AACs because of the need for the implementation of measures under priorities relating to the implementation of the Europe 2020 strategy in the agricultural sector, which include promotion and transfer of knowledge and innovation, promotion of competitiveness, organisation of the food chain, or promotion of social inclusion and economic development in rural areas;

— there has been a significant convergence between the level of expenditure on specific headings financed from the national and the EU budget, which are expected to be continued – this concerns above all actions financed by the EU;

— it is suggested that the following "vertical" shifts concerning the increase at the voivodeship level should take place: funds for regulation of hydrographic conditions, according to the trend of growth observed for the last several years; spending on geodetic and management works, which could have a positive impact, especially on rural development; funds for voivodeship and *poviat* veterinary inspectorates, whose role in controlling the compliance with the directives on animal welfare is growing.

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CREDIT GUARANTEE SCHEME FOR THE SME SECTOR IN POLAND AGAINST THE BACKGROUND OF THE SELECTED EU MEMBER STATES

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Abstract. The aim of the study is to evaluate the credit guarantee scheme in Poland and compare it with the schemes in the selected European Union countries. The paper presents models of guarantee schemes in the EU on the example of Germany, Italy, Portugal, and Poland. There were described definitions of credit guarantees as well as a role of guarantee institutions. Furthermore, the study provides an evaluation of a role of the credit guarantee scheme in raising external co-financing by the SME sector. Guarantee schemes in different countries can be characterised by various levels of development and acquired experience. The study displays disadvantages of the Polish credit guarantee scheme, which should be improved thanks to the experience and reliable solutions used in other European Union countries.
Key word: guarantee funds, guarantees, SME.
JEL code: G23

Introduction

Entrepreneurs, especially in the sector of micro, small, and medium enterprises, often have difficulties with access to credits and loans. This problem has become more significant recently, in the time of the economic crisis. Considerable risk of investments or a lack of suitable security instruments many times makes it impossible to raise external co-financing. Here, it should be mentioned that micro and small enterprises are perceived as the economic backbone because of their important role in the economic development, both on the local and regional level, and creation of employment (Green A., 2003). Therefore, public support has enabled, also in Poland, to establish organisations, which aim at facilitating access to external financing for the SME sector. This objective is implemented through credit and loan guarantees, using the strategy of risk sharing between banks or other financing institutions and guarantee funds, which guarantee a credit or a loan.

The aim of the paper is to evaluate the credit guarantee scheme in Poland against the background of the selected EU Member States: Germany, Italy, and Portugal as well as to determine development perspectives. Credit guarantee schemes can be characterised by various levels of development. Each of them uses different instruments to achieve the same goal – support of micro, small, and medium enterprises through improvement of access to external sources of financing. Does the Polish credit guarantee scheme fulfil its role? What kind of experience of other countries can be used in Poland? This study takes up an attempt to answer these questions. The first research task is to present the selected guarantee schemes in the EU and the data concerning their activity. The second task is to evaluate the functioning of guarantee funds and their role in external co-financing of SMEs. Foreign and domestic secondary sources, including research results and reports as well as information acquired from supervising institutions or bodies cooperating with guarantee funds in Poland and the European Union were used in the paper. Every year the data on functioning of guarantee funds are collected by the National Association of Guarantee Funds and the Polish Agency for Enterprise Development and then they are published in the annual report. The attempt to evaluate the schemes in Poland was taken by J. Prochniak in 2010 in the study "The Evaluation of the Activity of Guarantee Funds in Poland".

1. Guarantee and re-guarantee schemes in the EU Member States

Credit guarantees are one of the traditional financial instruments facilitating development of the sector of small and medium enterprises. A history of this instrument comes from the time when money became a legal tender. Issuing guarantees became institutionalised at the end of 19th century. First institutions, which issued guarantees commercially, were established in Belgium and France. Establishment of credit guarantee schemes in other countries took place in the 1950s as a result of growth of demand for credit money (Badach A., 2011).

The European Commission defines a guarantee as a legal commitment of the third party for paying outstanding part of a credit or a loan, with unpaid interest, in the event of a default by a borrower (Prochniak J., 2010). Credit guarantee funds are sources of long-term financing and an instrument of indirect fulfilling of capital needs of enterprises. An institution, which issues a guarantee, facilitates entrepreneurs' access to credits and loans through overtaking the guarantee of paying of credits and loans in the case of a default by an enterprise. In such situation, a fund compensates a loss for a bank or a credit fund to a value indicated in a guarantee agreement. In Poland, funds issue small and medium entrepreneurs a guarantee to 70-80% of a credit or loan value of maximal amount from PLN 50 to 300 thousand. An entrepreneur has to pay a commission expressed as a percentage value of a guarantee (Gajewski M., 2000).

In the European countries, there were evolved two basic ways of guaranteeing: mutual and issued by specially established funds of credit guarantees. In the so-called old EU (EU-15), these two ways are used for guaranteeing function, whereas in the Central

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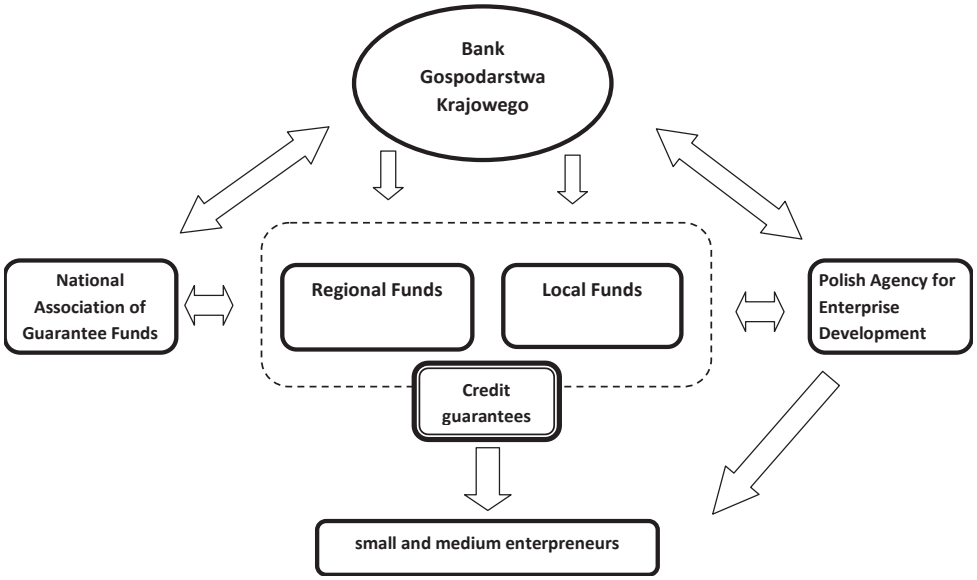


Source: authors' construction based on Prochniak J., 2010

Fig. 1. **Scheme of the guarantee system in Poland**

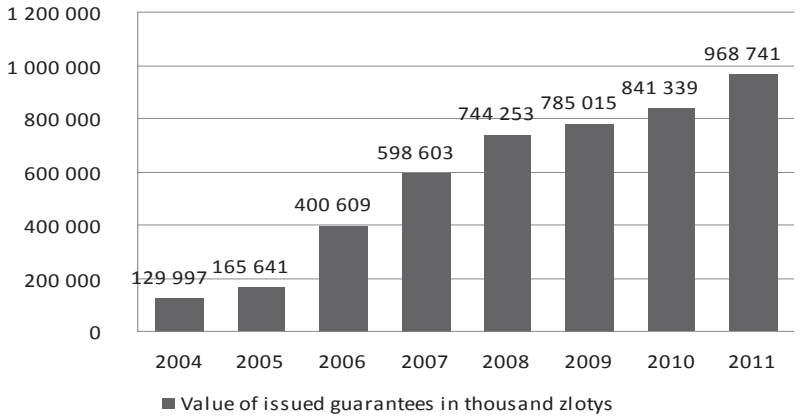
and Eastern Europe funds were established using public resources as well as within international support programmes. In the Northern EU-15 countries, public programmes dominate; whereas, mutual guarantee funds dominate in the Southern countries. Within mutual guarantees, there can be distinguished three basic models: Italian, French, and Spanish (Prochniak J., 2010). In the Italian model, when entrepreneurs want to use guarantee services they become partners, they contribute financially establishing capital and become shareholders. The French system was established as a result of initiative of cooperating entrepreneurs who created a cooperative of credit guarantees fulfilling needs of their founders. Contemporary in the French model, enterprises are beneficiaries of guarantee services and they do not participate in the management and recapitalisation of guarantee bodies, which fully or partly use public resources. The Spanish model connects direct mutuality and strong participation of public institutions. Entrepreneurs who want to use a guarantee pay a fee and become shareholders.

Credit guarantee funds establish associations and organisations. There is at least one organisation joining local and regional guarantee funds in each country. They mainly represent credit guarantee funds towards the socio-economic environment. In the European countries, national associations of credit guarantee funds apply for membership in the European Association of Mutual Guarantee Societies (AECM). It is an organisation supported by the European Commission (Gajewski M., 2000). In 2012, the AECM had 38 member organisations operating in 20 EU Member States, Montenegro, Russia, and Turkey. In 2011, the AECM member organisations had a total guarantee volume in portfolio of over EUR 77.4 billion and issued a total volume of over EUR 28 billion of new guarantees (AECM, 2012). Two Polish institutions are members of the AECM: Bank Gospodarstwa Krajowego and the National Association of Guarantee Funds.

2. Guarantee scheme in Poland

The network of guarantee funds in Poland has developed since the 1990s together with introduction of the market economy. However, there were not classical credit guarantees for the SME sector in Poland till 1994 (Gajewski M., 2000). A preliminary period can be characterised with spontaneity of their establishment, a lack of a framework of system functioning as well as a lack of sources for guaranteeing operation (Prochniak J., 2010). The state programme "TOR#10" Project of Small Entrepreneurship Development and the "PIL" Programme – the Programme of Local Initiatives were bases of the system of the credit and guarantee scheme in Poland. The first guarantee funds in Poland were established within this second programme with use of the European sources (PHARE). The next group of funds got support within the help from the governments of Canada and the United Kingdom (Raport o stanie funduszy..., 2012). The most significant increase in a number of new funds was recorded in Poland in the period of 2002-2004; they were established as initiatives of regional and local authorities. At that time, the Bank Gospodarstwa Krajowego (BGK) supported capital development of local and regional funds; it implemented assumptions of the state programme of development of guarantee funds *Capital for entrepreneurs*. At the end of 2004, sixty-one local and regional guarantee funds operated, so nearly twice as at the end of 2001. Further changes could be observed from 2004, for example, mergers of funds, increase and concentration of their capital (Badach A., 2011).

A programme implemented by the Polish Agency for Enterprise Development within the Sectoral Operational Programme Improvement of the Competitiveness of Enterprises in the period of 2004-2007 was very important for building of the scheme of guarantee funds in Poland. At that time, there was an increase in the number of funds and rise of capital used by funds for guaranteeing activities. The next period of increase in the



Source: authors' construction based on the data from Raport o stanie funduszy..., 2012

Fig. 2. **Value of issued guarantees by 51 guarantee funds in Poland in the period of 2004-2011**

Table 1

Risk of guarantees payment in the group of 51 guarantee funds

Specification	Total value	% of funds capital
Funds capital	1 035 386.6	100%
Value of guaranteed commitment	1 002 719.4	97%
Value of guaranteed credit/loans	2 474 037.5	239%
Guarantees paid in 2011	23 253.4	2%
Guarantees paid in the period of 2000-2011	67 935.3	7%
Value of debt collection in the period of 2000-2011	9 814.1	1%

Source: authors' calculations based on the data from Raport o stanie funduszy..., 2012

value of capitals took place from 2007 to 2011 thanks to support from Regional Operational Programmes.

Processes of transformations through consolidation, including takeovers of smaller funds by stronger ones or establishment of new entities, have been still possible for notification (Raport o stanie funduszy... 2012). In 2010, fifty-four guarantee funds operated in Poland.

The National Association of Guarantee Funds is an important organisation joining guarantee funds; it has been operating since 1996. The association gains information about functioning of 51 funds in the entire Poland.

A value of capital placed in particular funds is much differentiated. There are very small funds with the capital below PLN 1 million, and in contrast, there exist also very big ones with the capital higher than PLN 12 million. Despite these differences, guarantee funds in Poland operate basing on similar rules. There is, at least, one regional fund in the majority of Polish regions (voivodships) and 1-3 local funds located in the most significant cities of a region. Funds cooperate with banks and credit funds concluding an agreement on cooperation (Badach A., 2011). Data on functioning of guarantee funds is collected by the National Association of Guarantee Funds and the Polish Agency for Enterprise Development. The analysis of data from 2011 includes 51 guarantee funds in the entire Poland.

In 2011, the number of issued guarantees equalled 6 118, and it decreased by 14.4% compared with 2010. It is a first decline in increasing year-by-year value of issued guarantees; it results from the increase in credit risk and stricter rules in allocating bank credits. On the contrary, the value of capitals in guarantee funds has increased since 2004 and in 2011, it exceeded PLN 1 035 million. In the period of 2004-2011, there was also an increase in the value of issued guarantees, with the level of PLN 967 million in 2011 (Figure 2). The most significant increase in the value of issued guarantees was noticed in the period of 2006-2007, which was connected with initiating of the Sectoral Operational Programme Improvement of the Competitiveness of Enterprises and Regional Operational Programmes, which enabled considerably to capitalise guarantee funds. Increase of the total value of issued guarantees is connected with increase in the value of capitals in funds, which changed by 9% compared with to the year 2010. There was also a rise of an average value of issued guarantees, which was nearly PLN 160 thousand in 2011 (Raport o stanie funduszy..., 2012).

It can also be noticed that risk connected with guarantees issuing has increased. Guarantees paid in 2011 constituted about 1% of the value of guaranteed capitals and about 2% of the funds' capital. Guarantees paid since the beginning of funds' operation have reached nearly PLN 68 million, in 2011 - more than PLN 23 million - it constituted one third of the whole amount. About 15% of debt was collected so far. Risk

increase was influenced by a significant growth rate of credits for SMEs in the previous years as well as the macroeconomic situation of Poland (Raport o stanie funduszy..., 2012).

Guarantee scheme on the example of Germany, Italy, and Portugal

The German guarantee scheme is based on a system of credit guarantee funds through operation of guarantee banks - Bürgschaftsbanken. In this country, the scheme is well organised, developed, and efficient. Guarantee banks established after the end of the second World War were a strategic instrument in stimulation of microenterprises' development and growth of employment. The system was deeply reorganised in the 1980s through resignation from sectoral specialisation of banks and aiming at strengthening them through widening of a scope of their operation. Moreover, after German reunification, the system of guarantee banks was developed for new areas, where new banks were established within the existing model. A re-guarantee system is the main instrument of support for public system of mutual guarantees (De Vincentiis P., 2008). Re-guarantees are issued by the central government as well as particular Lander (States of Germany) and have a character of public support. They work as re-guaranteeing credit guarantees for entrepreneurs using public resources and enable to lower risk and to multiply capital.

There are 17 guarantee banks in Germany, one per a state except Bawaria, where two banks operate because of the level of economic development. These specialised banks are independent and private; however, they have a license allowing issuing guarantees through working no for profit. At the same time, these banks cannot give credits and collect deposits. They are represented by the Association of German Guarantee Banks. It gathers guarantee banks but it does not run guaranteeing activity itself (internal sources of the Polish Agency for Enterprise Development).

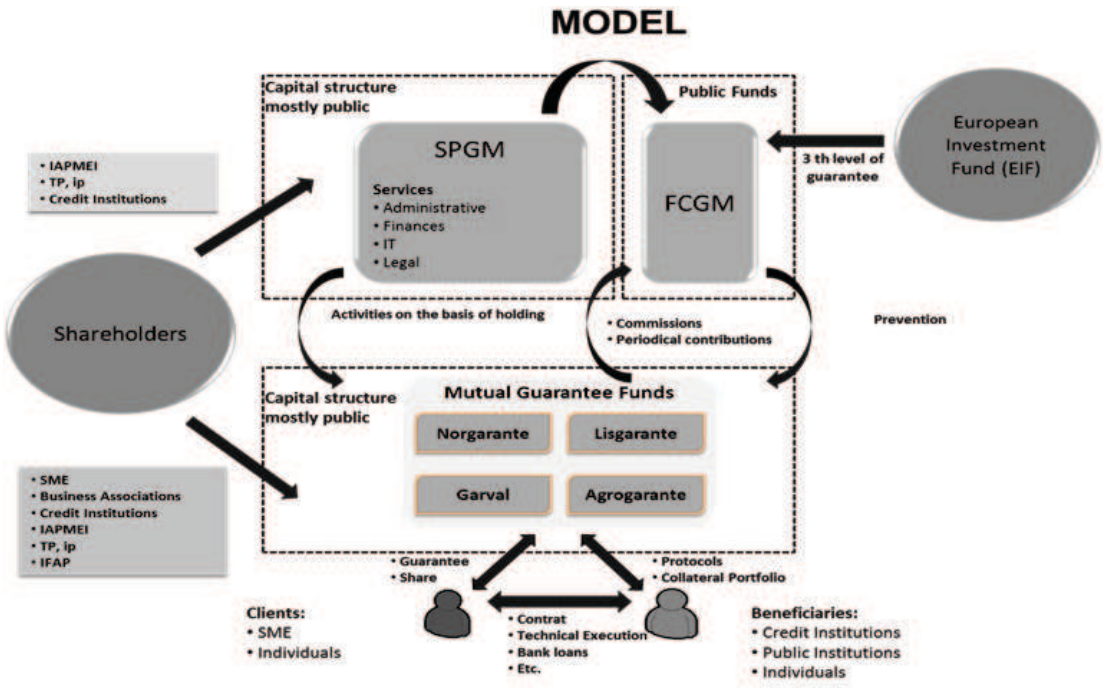
Guarantee banks in Germany guarantee 80% of the credit value. A guarantee bank has re-guarantees of the state and divides risk as 26% for the State of Germany and 39% for the German Federation in the case of old Lander (Western Germany). In the case of new Lander (previously, Eastern Germany), the government undertakes bigger risk – 32% for the State of Germany and 48% for the German Federation. Guarantee banks charge one-time processing fee at the level of 1.0-1.5% of guaranteed amount and a yearly commission: 0.8-1.2% of the credit value. Standardisation of rules of cooperation between banks, which gives credits and those, which issue guarantees, is an important feature of the German system. A credit bank does not conclude an individual agreement on cooperation with a guarantee bank, which is a simplification for a costumer and saves one's time. Moreover, all credit banks, which provide services for customers, are in the system. Apart from guarantee activities, guarantee banks offer also other services for small and medium enterprises, as advisory in elaboration of business plans or risk management. In 2010, the system of German guarantee banks issued 8000 guarantees for the total value of EUR 1.8 billion.

The mechanism of guarantees in Italy is based on the scheme of mutual guarantees, the so-called CONFIDI – consortia of mutual credit guarantees. The system was established in 1957 as a spontaneous reaction of micro and small enterprises, when external financing was granted only by banks and application for it was connected with many barriers. The aim of its establishment was to connect strengths, exchange of resources and experiences through creation of cooperatives and consortia in order to fulfil requirements of the banking system. Mutual guarantees based on the agreements of united entrepreneurs became an instrument of communication with banks, and allowed to obtain higher credits with lower levels of interests and commissions. At the same time, the system was very fragmented and not regulated. Just in 2003, there were created legal frameworks for the Italian scheme CONFIDI. Particular institutions have to fulfil some requirements in this system, as, for example, running non-profit activities in issuing mutual guarantees, SME enterprises are shareholders, minimal capital is EUR 100 thousand (De Vincentiis P., 2008).

Nowadays, the Italian scheme of mutual guarantees plays a significant role in Europe through functioning of about 500 guarantee institutions uniting nearly 1 million of SMEs (De Vincentiis P., 2008). The exact number of institutions is not known; some institutions are so small that they are not included in the official statistics. The number of institutions is also differentiated regarding particular regions; they are more numerous in the Northern part of the country and they are better capitalised there. Majority of them specialises in particular range, for example, industry, agriculture, or craft. The CONFIDI's activity is connected with a structure of credit guarantee funds, which usually consists of money and guarantee funds. The money fund has capital generated by member fees and charges of external organisations, for example, state, or regional institutions. Italian funds use national and international re-guarantee programmes, which consolidate their reliability and allow partly covering losses. Funds guarantee usually about 50% of the credit value. They charge fees for issuing guarantees on the level of 0.5-1.6% of their value and a security deposit on the level of 4-6% (De Vincentiis P., 2008).

Eurofidi is the largest in Italy and one of the largest guarantee funds in Europe. Its share on the market of Italian guarantee funds is on the level of 25%. Eurofidi operates mainly on the area of Northern and Central Italy, although a part of its activity concerns also foreign markets (Massimo C., 2010). Since 2010, it has been under the full control of the banking supervision, which efficiently increases its reliability towards the banking sector and allows partly covering losses. The fund tightly cooperates with a group of 130 banks and a portfolio of its costumers is more that 44 thousand of enterprises. The value of active guarantees exceeded EUR 5.2 billion at the end of 2009. In 2010, the fund issued guarantees valued EUR 1.62 billion. A maximum guarantee for an enterprise is EUR 4.4 million. The fund issues credit and loan guarantees, offers also guarantees for leasing and factoring transactions, and issues also bank guarantees (internal sources of the Polish Agency for Enterprise Development).

The Portuguese model of mutual guarantee scheme was based on the Spanish, French, and German models.



Source: authors' construction based on http://www.spgm.pt/ (25.11.2012)

Fig. 3. **Model of the Portuguese mutual guarantee scheme**

In 1994, the company Sociedade de Investimento SA (SPGM) was established as a result of pilot activities of the IAPMEI – an institution supporting small and medium enterprises in Portugal. This public initiative was the first step in promoting a scheme of mutual guarantees in Portugal. The next step was to overtake activities by the private sector, mainly entrepreneurs and associations of entrepreneurs, so those who were mostly interested in the operation of this system. At the beginning, the SPGM aimed at checking interest in this system on the Portuguese market, so establishment of the mutual guarantee scheme and their issuing, research how such systems operate on other European markets as well as submission of proposals for the Portuguese government concerning new system solutions in this field.

Basing on the experience of other countries, legal bases and a holding structure were initially established in Portugal; the guarantee scheme was built and developed basing on this structure. Three funds of mutual guarantees (Mutual Guarantee Societies - MGS) were established using the capital of SPGM after publishing legal regulations concerning the scheme of mutual guarantees in 2003. The funds Norgarante and Lisgarante i Garval operate in three regions of Portugal. They aim at popularisation of the guarantee scheme and advantages of its use among SMEs as well as continuation of SPGM work in the field of guarantee services. In 2007, the fourth fund of mutual guarantees Agrogarante started its operation; it functions in agriculture.

Public resources for financing of the scheme of mutual guarantees were used mainly in the preliminary phase of the SPGM establishment. Nowadays, mutual guarantee funds are joint companies with public-private capital functioning on the base of the banking law. At the same time public funds (domestic as well as the European funds) play a significant role in the system of re-guarantees; this system allows sharing risk as well as multiplying capital, which can be guaranteed by funds.

The Portuguese model of the mutual guarantee scheme was built on three pillars:

— guarantees for SMEs and entities who represent them (from 2007 also for students, unemployed, and natural persons who want to start business and start-ups),
— a part of risk of mutual guarantee funds (MGS) is taken by a mutual re-guarantee fund, owing public resources for this purpose;
— the scheme of mutual guarantees is coordinated and managed by the mutual re-guarantee fund (SPGM), which creates and develops mutual guarantee funds as well as takes care about the product image.

The SPGM company, which operates as a holding company of the scheme, offers also administrational, accounting, and IT services for funds in highly competitive prices. Four funds of mutual guarantees (MGS) are the most visible element of the mutual guarantee scheme for costumers, as small and medium enterprises. Mutual guarantee funds do not do administrational or management activities for a company (these tasks are performed by the SPGM); they only obtain and service costumers, mainly SMEs. They directly communicate with entrepreneurs and entities, which take advantages from system functioning (financial institutions, public organisations, for example, IAPMEI).

Funds are built mainly basing on private capital and are under the bank law regulations. Structural funds financed from the EU support are additional sources of

their capital. In order to obtain a guarantee, a costumer (an entrepreneur) has to buy shares of particular company – fund valued 2% of an amount one wants to obtain as a guarantee. Entrepreneurs are 20% of shareholders of the system, the SPGM has about 10-15% of shares, the rest is owned by banks and public institutions. The amount of EUR 2.5 million is a capital necessary to establish a mutual guarantee fund. Moreover, entrepreneurs have to pay commissions, which are paid in advance per year on the level 0.5-4.5% of the guarantee value (2% on average). Because of the financial crisis, the Portugal government co-finances commissions, which have to be paid because of an obtained guarantee. A maximum value of a guarantee has been EUR 2.5 million since the beginning of system functioning.

Apart from credits, activities implemented with use of the European resources like bid securities in tenders are also guaranteed. What is important, credit funds do not operate in Portugal, so credits can be given by banks or leasing companies. Depending on the type of a sector, a guarantee can be on the level of 50-90%. The scheme has 76 guarantee lines, including 11 for agriculture. Since the beginning of the scheme operation, fifty-nine thousand of SMEs was supported (internal sources of SPGM).

In the case when entrepreneurs do not repay credits, which happens more often in Portugal because of the financial crisis, mutual guarantee funds are obliged to pay guarantees for banks. In order to prevent it, employees of funds contact costumers once a month. In a situation of recognition of problems, they analyse the financial situation of an enterprise and risk of guarantee payment; if it is necessary, they prepare an annex to an agreement and agreement with a bank and instead of full payment, they lead to part guarantee payment.

Conclusions

1. Micro, small, and medium enterprises have significant difficulties with access to external financing due to the financial crisis. Thereby, credit guarantees are so essential instrument of support for their functioning.
2. Credit guarantee schemes in the European Union countries are on different levels of development. At the same time, the period of functioning of particular systems does not decide on efficiency of guarantee activities facilitating access of SMEs to external sources of financing.
3. The Polish credit guarantee scheme is fragmented and not homogenous compared with systems operating in Germany or Portugal. Taking into account a chaotic character of the system, it mainly resembles the Italian system with many differences on the contrary.
4. A comparison of data on the number and value of guarantees can result in a conclusion that the Polish credit guarantee scheme fulfils its role. However, it requires many improvements, which can be implemented with the use of experience and good practices of other European Union countries.
5. A lack of commonly accessible re-guarantees is a basic disadvantage of the Polish system causing that the highest risk of guarantee payment is kept by a fund. The instrument of re-guarantees is widely used in the European Union countries. It is necessary to introduce a system of re-guarantees in Poland to reduce the risk for functioning of guarantee funds.
6. A very important disadvantage of the Polish system is a lack of detailed legal regulations. Functioning of guarantee funds is not subject of any legal regulations so these institutions are not partners to financial institutions. It is necessary to create detailed legal regulations allowing guarantee funds to be an equal partner to banks.
7. Introduction of homogenous standards of running guarantee activities as well as a rating methodology for funds would allow increasing their reliability towards cooperating banks.

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OPTIMAL DISTRIBUTION OF THE AMOUNT OF WORK AMONG THE TRACTOR AGGREGATES CONSIDERING SET AGROTECHNICAL TERMS

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Abstract. The article deals with an economic-mathematical model of optimal distribution of the amount of work among the tractor aggregates considering the fixed agrotechnical terms for the execution of production processes in the field crop cultivation. A method of linear programming is applied to solve this task. A theoretical relationship is presented between the rated costs per hectare and the performance characteristics of the tractor aggregate. This is shown by an example of a calculation of the optimal distribution of the amount of work among four tractor aggregates performed in ploughing and sowing. The developed model provides an opportunity to make a motivated conclusion how to perform the work with optimal variable expenses reducing the losses of crops after harvest owing to fixed agrotechnical terms as well as to justify the structure of the technical provisions of the production processes.
Key words: amount of work, specific costs, tractor aggregate, economic-mathematical simulation.

Introduction

At the present time, there is a wide choice of sets of machines and tractors on the market of agricultural machinery with various energy capacity and efficiency. Therefore, it is important for the producer of agricultural products to know what circumstances determine efficient use of agricultural machinery, and methods of its choice. The choice of a tractor aggregate must proceed from a condition that it should meet the production requirements and economic efficiency. Similar conclusions were made also by other scientists (Thornley J. H. M., France J., 2007). The solution of this issue is possible when economic-mathematical methods are applied which allow to obtain an answer to the questions how the particular amount of work is distributed among the tractor aggregates, which of the selected variants is optimal, and to take into consideration all the economic and agrotechnical conditions by using mathematical models and solving them as a task of linear programming.

Materials and methods

The aim of the paper is the development of an economic model for the choice of an optimal distribution variant of the amount of work among the tractor aggregates keeping to set agrotechnical terms, the optimality criterion being variable costs that reflect the level of the current expenses and capital investments.

Application of the model will enable the producer of agricultural products to make motivated conclusions on the efficient implementation of the production processes.

Theoretical foundations of mathematical simulation of the production processes in agriculture are used to solve the advanced task. The economic and agrotechnical conditions are expressed by means of linear inequalities and equations, applying economic-mathematical methods (Asejeva A., Kopiks N., Viesturs D., 2006; Pavlov B. V., Pushkareva P. V., Scheglov P. S., 1982; Taha, Hemdi A., 2005; Frans G., Torili G. H. M., 1987). The functional dependencies are established using the theoretical foundations of completing machine-and-tractor aggregates. The mathematical model was calculated using the superstructures of the MS Excel software.

Research results and discussion

Usually any farm employs various machines which differ by their efficiency and variable costs, although, they carry out the same amount of work. Their efficient use when performing the assigned amount of work and keeping to fixed agrotechnical terms requires finding of optimal distribution among the tractor aggregates. A preset amount of work may be carried out by tractor aggregates in different configurations.

Let us discuss an example of an economic model for optimised choice of the distribution of the amount of work among the tractor aggregates keeping to set agrotechnical terms. A grain producing farm has to carry out the following amount of work: to plough and to sow 150 ha of land. This work has to be completed within 10 days – ploughing in five days and sowing in the same period of time. The farm has tractor aggregates which are presented in Table 1. (According to the data of the Central Statistical Bureau of the Republic of Latvia, tractors with a capacity of 80kW and more than 100kW are generally used on the farms with areas under crop 150 ha and more). The work shall be carried out to a preset extent by means of the aggregates indicated in the table with minimum variable costs and in fixed agrotechnical terms as any deviation from them influences the crop capacity.

The determination of optimal distribution of the assigned amount of work among the tractor aggregates presented in Table 1 which ensure minimal costs and completion of the work in fixed agrotechnical terms requires minimisation of the target function.

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Table 1

Information on the tractor aggregates

Aggregate	Working width, m	Costs* LVL/ha	Price of the aggregate		Efficiency of the aggregate, ha/h
			Agricultural machine, LVL	Tractor, LVL	
Ploughing aggregates					
MTZ 1025+Kverneland ES-80 200	1.5	16.21	5378	11381	1.2
John Deere 8200 + Kverneland DC-100	3	18.12	11407	66249	2.4
Sowing aggregates					
MTZ 1025 + Amazone AD 252	2.5	17.94	8894	11381	2.75
John Deere 8200 + Amazone AD 452	4.5	26.20	19239	66249	4.95

* Repair and maintenance costs are not considered since in this case they do not depend on efficiency and differ in proportion with the performed work.

Source: authors' calculations based on "Armus" Ltd

$$C_{\min} = \sum_{i=1}^{m} \sum_{i=1}^{n} c_{ij} x_{ij} \quad (1)$$

where:

c_{ij} - costs per hectare of the i-th type of work (ploughing, sowing) performed by the tractor aggregate, j-th configuration of the tractor aggregate;

x_{ij} - amount of the i-th type of work performed by the j-th configuration of the tractor aggregate;

m - number of the types of work to be performed;

n - number of the types of work performed by aggregates of different configurations.

This amount of work shall be carried out on condition:

$$\sum_{i=1}^{n} x_{ij} = a_1 ; \sum_{i=1}^{n} x_{ij} = b_1 \quad (2)$$

where:

a_1 - amount of the ploughing operation;

b_1 - amount of the sowing operation.

All the operations shall be completed in fixed agrotechnical terms

$$\sum_{x=1}^{n} d_{ij}^{-1} x_{ij} \le t_{ij} \quad (3)$$

where:

d_{ij}^{-1} - daily output of a tractor aggregate in the j-th configuration;

t_{ij} - fixed agrotechnical term for the i-th kind of work performed by a tractor aggregate in the j-th configuration.

The variables may not have negative values:

$$x_{ij} \ge 0 \quad (4)$$

The presented mathematical model for the determination of the optimal distribution of a particular amount of work among the existing tractor aggregates and its execution in a fixed agrotechnical term is treated as a task of linear programming. The results obtained for the optimal distribution of a particular amount of work which ensures minimal costs are presented in Table 2.

It is evident from Table 2 that the ploughing aggregate MTZ 1025+Kverneland ES-80 200 has to carry out 40% of the amount of work intended for ploughing but the aggregate John Deere 8200 + Kverneland DC-100 - 60%, respectively. Execution of this amount of work takes place in a fixed agrotechnical term. The sowing aggregate MTZ 1025 + Amazone AD 252 fulfils 91.7% of the amount of work allotted for sowing, while the aggregate John Deere 8200 + Amazone AD 452 - 8.3%, respectively.

This distribution of the tractor aggregates by the types and amount of the work to be completed in a fixed agrotechnical term is optimal for which the variable costs constitute LVL 5396.73.

The results also show that the aggregate John Deere 8200 + Kverneland DC-100 performing the amount of the ploughing work has a reserve of time equalling 1.25 days but during the sowing period it has 4.75 days of the calculated period of time. It means that in any other configuration the particular aggregate can make use of this time doing other types of work but it can be redistributed among other aggregates at insignificant temporary load (less than a day's output).

Table 2

Optimal distribution of a particular amount of work among the tractor aggregates

Aggregate	Amount of the performed work, ha	Duration of the performed work, days	Number of the working days in the period	Variable costs, LVL
Ploughing				
MTZ 1025+Kverneland ES-80 200	60	5	5	972.50
John Deere 8200 + Kverneland DC-100	90	3.75		1630.64
	150			
Sowing				
MTZ 1025 + Amazone AD 252	137.5	5	5	2466.07
John Deere 8200 + Amazone AD 452	12.5	0.25		327.52
Total	150		10	5396.73

Source: the data of Table 2 are based on the authors' calculations

Table 3 shows individual scenarios from the calculated distribution process of the amount of the above-mentioned work to be completed in fixed agrotechnical terms, and the changes in variable costs.

Table 3 outlines that in various scenarios of the distribution of the amounts of work to be completed (and there are lots of them) the variable costs are different from the optimal value presented in Table 2; neither fulfilling the imposed restrictions. Therefore, a condition is not fulfilled in Scenario 1 to complete the preset amount of the ploughing and sowing operations in fixed agrotechnical terms. It is implemented by 20% less. In Scenario 2, a condition is not fulfilled to complete the preset amount of the ploughing work.

Consequently, the particular model for the determination of the optimal distribution of a particular amount of work among the existing tractor aggregates and its execution in fixed agrotechnical terms allows an optimal distribution of the work among the existing tractor aggregates in order to finish it in a preset agrotechnical term with minimal costs.

The optimal variable costs will change if the same aggregates carry out the total amount of work with variable values of imposed conditions. Besides, the value of the amount of the work to be completed by the tractor aggregates of each configuration has a limit of its efficient execution. Figure 1 shows variations in the optimal variable costs depending on the established amount of the work to be performed and its distribution among the aggregates.

It is apparent from Figure 1 that the optimal variable costs increase with the increase of the amount of the work. If the amount of work is 100 ha (ploughing, sowing), it is distributed among the aggregates in the following way – during ploughing the aggregate MTZ 1025 + Kverneland ES-80 200 shall carry out 60% of the amount of work, while the aggregate John Deere 8200 + Kverneland DC-100 - 40%. During the sowing operation, the aggregate MTZ 1025 + Amazone AD 252 shall perform 100% of the amount of work, while the aggregate John Deere 8200 + Amazone AD 452 – 0 %, the optimal variable costs constituting LVL 4430. When the amount of the ploughing operation is 200 ha, these aggregates cannot manage the amount of work due to the violation of the imposed condition (the agrotechnical term). Execution of the amount of work in a fixed agrotechnical term by two ploughing aggregates makes 90%, since their capacity and the established length of the working day (T_{work}.-10 h) does not allow fulfilling such an amount of work. During the sowing operation both the aggregates finish the amount of work completely, 50% each. It is possible to fulfil the preset amount of the ploughing work without keeping to set agrotechnical terms; however, this leads to a decrease in the crop capacity.

The limit of the amount of the work to be performed for the particular configuration of the tractor aggregates is 180 ha at the above mentioned limitations (type of work, amount of work, agrotechnical terms). At such an amount of work its distribution among the tractor aggregates is the following: the ploughing aggregate MTZ 1025 + Kverneland ES-80 200 shall carry out 33%, while the aggregate John Deere 8200 + Kverneland DC-100 - 67%. During the sowing operation the aggregate MTZ 1025 + Amazone AD 252 shall perform 76% of the amount of work, while the aggregate John Deere 8200 + Amazone AD 452 – 24 %, the optimal variable costs constituting LVL 6029.10.

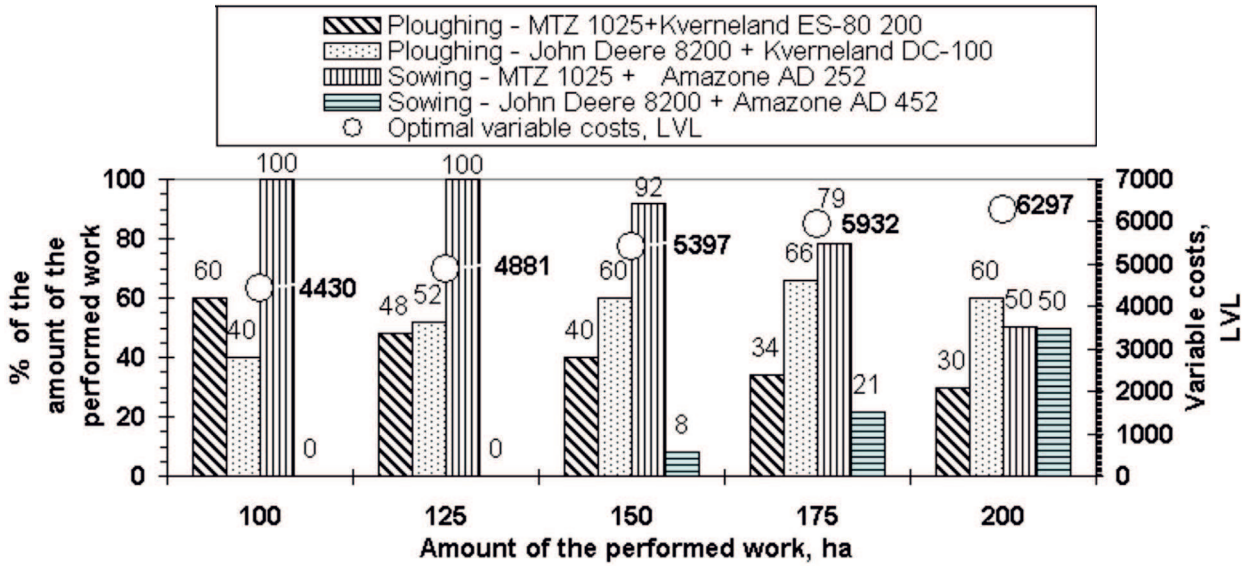
The value of the variable costs depends on the other factors as well. The optimal costs change with the changes in the target function (Equation 1) coefficients reflecting the costs of the unit of the performed work with its variables x_{ij} for each aggregate. For example, if coefficients c_{ij} in the previous case, when the optimal distribution (150 ha) of the work to be performed (ploughing and sowing) is determined, are

Table 3

Individual scenarios for the distribution of the above-mentioned work to be completed in fixed agrotechnical terms, and the changes in variable costs.

Aggregate	Amount of the performed work, ha	Duration of the performed work, days	Number of the working days in the period	Variable costs, LVL
Scenario 1		Ploughing		
MTZ 1025+Kverneland ES-80 200	60	5	5	972.50
John Deere 8200 + Kverneland DC-100	60	2.5		1087.10
	120			
		Sowing		
MTZ 1025 + Amazone AD 252	60	2,18	5	1076.10
John Deere 8200 + Amazone AD 452	60	1.21		1572.09
	120		10	4707.79
Scenario 2		Ploughing		
MTZ 1025+Kverneland ES-80 200	60	5	5	972.50
John Deere 8200 + Kverneland DC-100	75	3.13		1358.87
	135			
		Sowing		
MTZ 1025 + Amazone AD 252	75	2.73	5	1345.13
John Deere 8200 + Amazone AD 452	75	1.52		1965.12
	150		10	5641.62

Source: the data of Table 3 are based on the authors' calculations



Source: the data of Figure are based on the authors' calculations

Fig. 1. **Variations in the optimal variable costs depending on the established amount of the work to be performed and its distribution among the aggregates**

replaced by a value which corresponds to the 200 ha amount of the performed work (150 ha – ploughing 16.21 and 18.12 LVL/ha, sowing 17.94 and 26.20 LVL/ha; 200 ha - 14.73 and 14.95 LVL/ha, sowing 15.42 and 20.77 LVL/ha), then the optimal costs decrease by 15%, constituting LVL 4610.15 at the previous optimal distribution of the amount of the executed work which corresponds to a condition when the distribution is 150 ha. This indicates that the value of the coefficients mentioned is of great importance for the calculation of the minimal costs as their values depend on the price and technical parameters of the aggregate. Another very important factor for the execution of the i-th kind of work is the value of the fixed agrotechnical term t_{ij} (Kopiks, N., Viesturs, D., 2010).

The example of the discussed model shows that the application of economic-mathematical methods makes it possible to obtain an optimal value for the distribution of a preset amount of the work among the tractor aggregates allowing to use efficiently the technical means and solve the production tasks.

This method may be applied also to an entire complex of previously planned agricultural operations performed by various tractor aggregates keeping to set agrotechnical terms violation of which may affect the crop capacity.

Conclusions

Optimal distribution of the amount of work among individual tractor aggregates is necessary In order to minimise the rated costs.

The presented economic-mathematical model provides a possibility to calculate an optimal variant for the distribution of the amount of work among the tractor aggregates considering the fixed agrotechnical terms, and to determine an optimal structure of the technical provision of the production processes.

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ECONOMIC ANALYSIS AND DEVELOPMENT PROSPECTS OF THE CROP FARMING SECTOR IN LATVIA

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Abstract. Agricultural companies are important for creating a stable agricultural industrial complex. Companies are dependent on grain purchase prices and dictate their rules; they should provide a production storage system to reduce these factors maximally. Businesses should also follow very conservative borrowing policies resulting in effective protection against a variety of external factors such as price changes, weather conditions, and national economic policy. The aim of the research is to perform an economic and financial analysis and to assess crop industries as well as to explore their development perspectives. It is possible to increase the area sown with grain in Latvia; mainly in less intensively exploited areas like Pieriga, Kurzeme, part of Vidzeme, and Latgale. Besides, there is a significant potential for increasing crop yields in Latvia compared with the other EU Member States. It is also necessary as far as possible to seek for lower costs to reach the highest possible outcome. The company major risk factors include adverse climatic conditions, unprotected domestic market, unpredictable current asset prices and price increase as well as grain purchase prices – a factor unknown at the time of sowing.
Key words: crop farming sector, financial analysis, grain, rapeseed.
JEL code: Q11, G3

Introduction

Agricultural industry is closely related with other industries, and it depends on prices of inputs needed for production: fertilisers, pesticides, fuel and machinery, and prices of services. It is also affected by the world demand for agricultural products; while supply, in its turn, to a great extent depends on the weather conditions in various regions of the world which unfortunately is a factor not to be influenced.

Agricultural enterprises have to produce their products under tough competition, and market studies are one of the most important procedures before making any financial or economic decision. The company managers have to possess reliable, sufficient, and timely information to reduce the company's risk. It is very dangerous for the company existence and further sustainable operation to rely, on market conditions, only on the intuition and previous experience of managers and specialists.

The **research aim** is to perform an economic and financial analysis and to assess crop industries as well as to explore their development perspectives.

Research tasks:

— to investigate and characterise the crop farming sector and the supply of crop farming products to the domestic market in Latvia;
— to identify development perspectives for the industries of grain and rapeseed.

The following research **methods** were employed in the present paper: the monographic method, the graphic method, calculation and constructive methods, the abstract and logical methods, statistical data analysis, analysis of causal relationships, and data generalisation.

Research results and discussion

1. Characteristics of the crop farming sector of Latvia and the supply of crop farming products to the domestic market

Unlike other industries of the national economy, crop farming has several peculiarities, thus, it is one of the most complicated industries of the national economy requiring extensive knowledge on the growth and development of plants, the specifics of any individual crop, plant nutrition, and the environment where the process of crop yield formation takes place, i.e. soil (Latvian Ministry of Agriculture, 2006).

As of 1 January 2011, the agricultural area was 2423231.1 ha or 37.6% of the total area of the country (State Land Service, 2012). In 2010, the Rural Support Service visually surveyed units of agricultural land and identified the agricultural area that was not maintained in good agricultural and environmental condition in Latvia. According to the survey the unfarmed area equalled to 368900 ha in 2010 or 16.0% of the total surveyed area in Latvia. There were surveyed 2352159 ha of agricultural land (Latvian Ministry of Agriculture, 2011).

Agricultural land occupies 77% of the territory of Zemgale region which is 26.1% of the agricultural area of Latvia. Soils in Bauska county are ones of the most fertile soils in Latvia; in some places, qualitative estimates of agricultural land exceed 60 points. Besides, the relief and climatic conditions are favourable for intensive use of agricultural land there (Bauskas novada dome, 2012). The Cabinet Regulations No. 977 "Regulations on Agricultural Territories of National Importance" of 1 January 2011 specify the agricultural territories of national importance and the terms of their exploitation. The agricultural territories of national importance are concentrated in Zemgale region, besides,

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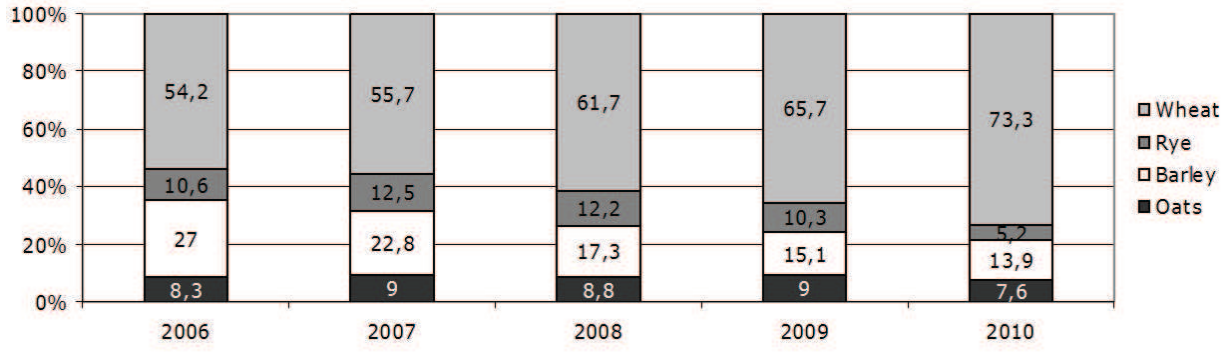
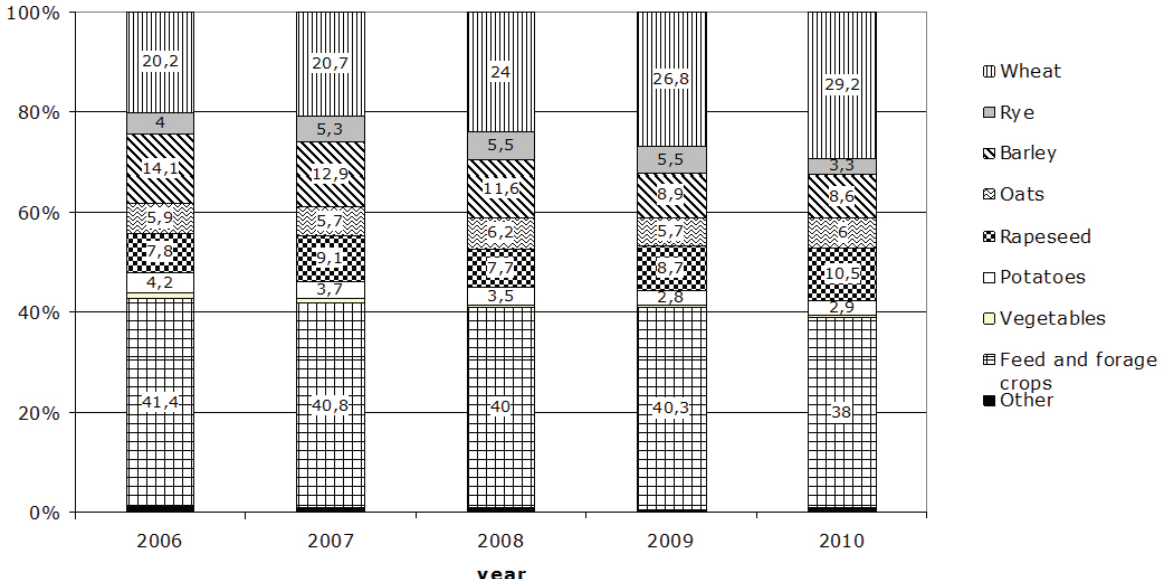


Source: authors' construction based on the CSB data, 2012

Fig.1. **Percentage distribution of the grain output in Latvia in 2006-2010**



Source: authors' construction based on the CSB data, 2012

Fig.2. **Percentage distribution of the sown area in Latvia in 2006-2010**

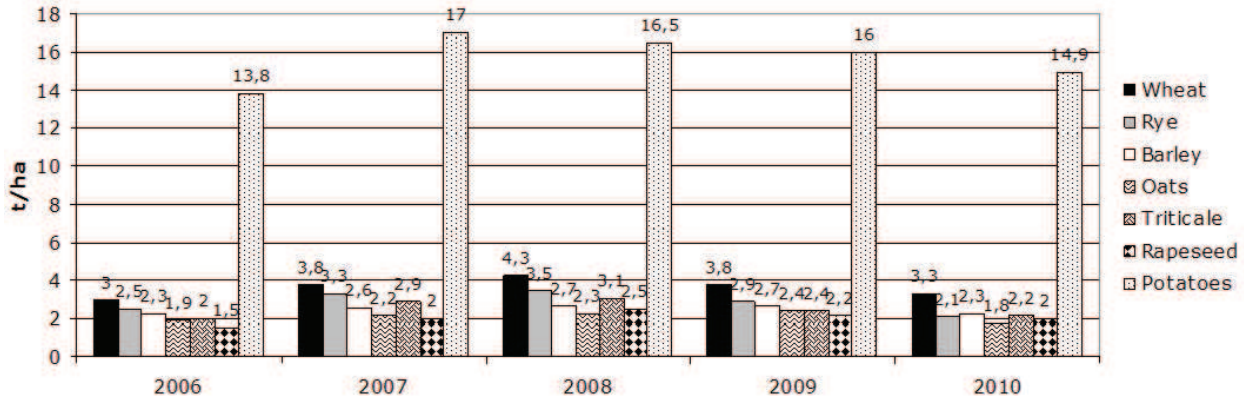
it is estimated that the agricultural territories of national importance located in Zemgale might account for 3% of the total agricultural area in Latvia (Bierande R., 2010).

In 2010, the most popular crop products were grain in Latvia, accounting for 33.3% followed by potatoes with 11.2%. However, in 2010, the largest increase in output was observed for rapeseed when it rose by 1.1 percentage points compared with 2008.

The proportion of wheat in the total output of grain has consistently increased, accounting for the largest share or 73.3% in the total quantity of grain produced; the proportion of wheat has risen by 19.1% over five years. The growth was due to an increase in the sown area, which, in its turn, was stimulated by the effect of prices, particularly wheat prices which were higher. The proportion of other grain decreased with the increase of wheat proportion in the total output of grain. In 2010, oats accounted for 7.6%, barley – 13.9%, and rye – only 5.2% of the total grain output. The increase in the production of wheat was also stimulated by a stable increase in the export of wheat.

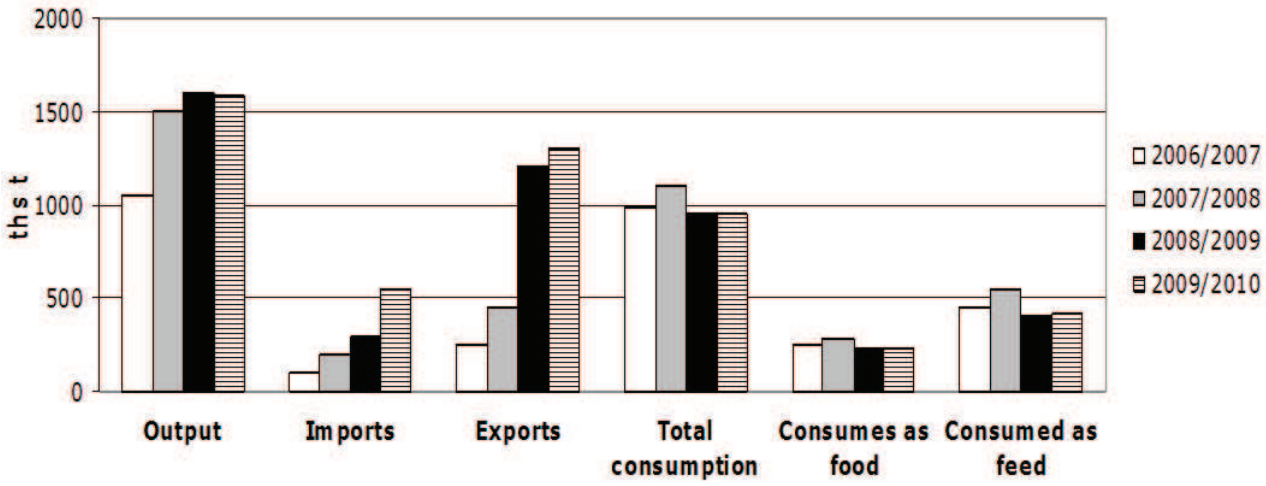
In 2010, feed and forage crops occupied the largest proportion or 38% of the total sown area; yet, it tended to decline. The area sown with wheat, on the contrary, has steadily increased since 2006. It has increased by 9 percentage points; whereas the area sown with barley has steadily declined – by 5.5 percentage points over five years. The area sown with potatoes has also decreased; whereas the rapeseed area has increased by 2.7 percentage points over five years, reaching a proportion of 10.5% of the total sown area in Latvia in 2010. It is important to analyse the average yield of crops to draw conclusions on the causes of and correlations in changes in the sown area and total output.

According to the data of selected farms, the average yield of wheat decreased in 2009 and 2010, yet, it was 3.3 t/ha in 2010 which was 0.6 t/ha more than the average yield in the country. The same situation was observed for other grain, except oats, the yield of which



Source: authors' construction based on the FADN data, 2012

Fig.3. **Average yields of crops on the FADN farms in 2006-2010, t/ha**



Source: authors' construction based on Latvian Agriculture, 2011

Fig.4. **Grain balance by season in Latvia in 2006-2010, thou. t**

slightly rose by 0.1 t/ha in 2009 compared with 2008. The yield of rapeseed decreased, and, according to the data of selected farms, it was 2 t/ha in 2010 which was 0.1 t/ha less than in the country on average. The yield of potatoes has decreased by 2.1 t/ha over three years and was 14.9 t/ha in 2010. Yet, it has to be noted that the average yields in the largest group of farms, according to the FADN classification, were higher for the majority of crops which may be explained by their ability to provide appropriate conditions for growing crops. One can conclude that the year 2010 was equally unfavourable for all crops which resulted in lower average yields in Latvia.

The grain balance shows that the output of grain totalled 1.663 mln t in Latvia in the season 2009/2010, of which 1.334 mln t were exported and 0.983 mln t were consumed domestically. The majority or 0.467 mln t of domestic grain consumption consisted of feed grain, and 0.276 mln t were consumed as food grain. Both the exports and imports of grain have significantly increased since the season 2008/2009; yet, the total grain consumption decreased after the season 2007/2008. Of the total grain quantity of 1.663 mln t produced in the season 2009/2010, 1.036 mln t were wheat which accounted for 62% of the total grain volume; 1.135 mln t of wheat were exported comprising 85% of the total grain exports. The majority of wheat was consumed as food, while the consumption of feed grain fluctuated which may be explained by the quality of grain in a season, i.e. if the quality of wheat is poor and it corresponds to the standard of feed, the price of grain is lower and more wheat is consumed as feed.

Food and agricultural produce were the second most important export industry in Latvia in 2010. The exports of these products accounted for 17.9% of the total value of exports in Latvia in 2010. The exports of wood and its products ranked first accounting for 19.3% of the total value of Latvia's exports. Yet, the imports of agricultural produce comprised 16.3% of the total value of Latvia's imports, and the imports of agricultural produce still exceed the exports of these goods. However, there was a positive trend, since the negative trade balance in agricultural goods fell to LVL 124.2 mln. It means that goods produced domestically were consumed more in Latvia

than it was done during the previous years. A foreign trade balance between exports and imports shows that Latvia is able to produce the necessary quantity of agricultural goods for its own consumption. In 2010, the most important food exports traditionally were non-alcoholic and alcoholic beverages, while grain ranked second with 17%, of which 30% was exported to Lithuania. The large proportion of export related to new Lithuanian companies that entered the Latvian market in 2010 and purchased grain at a higher price than local companies. The grain was exported to Lithuania, as the output of grain was lower there. A significant 18% increase in imports was observed for grain in 2010 compared with 2009. An analysis showed that both the exports and imports of grain increased. It may be explained by the fact that Latvian enterprises offered a lower sale price of grain in 2010, which boosted exports. Yet, understanding that no more grain could be purchased in Latvia, Latvia businessmen were forced to import grain, thus, artificially creating an increase in expenses.

2. Development possibilities for the industries of grain and rapeseed

It was concluded in a research on the development problems of agricultural production and business in Latvia that all the existing possibilities in the national economy had to be exploited to approach the average EU socio-economic level, and there were possibilities to expand economic activity in agriculture in Latvia, since a large area of agricultural land was not utilised and crop yields were also low (Zvirgzdina R., et al., 2009).

Based on the data of Section 1, the authors conclude that crop farming produces the most significant crops as wheat and rapeseed. It is important to identify the prerequisites and possibilities for increasing their output in Latvia.

The area sown with wheat in the Northern Europe tends to increase and to decrease in the Southern Europe; yet, the average wheat yields rise in the entire Europe (Kobus V., 2010). The low yield and purchase price is also mentioned in various studies as one of the grain production problems in Latvia (Brakmanis A. et al., 2010).

According to the authors, one of the most essential problems in the industries of grain and rapeseed is the inability to predict the price. It has to be admitted that the situation in the world determines the demand for grain and rapeseed. As soon as the news on natural disasters in a region is received, the price goes up at a commodity exchange or vice verse – the price falls if there is a forecast on higher yields. The prices of grain and rapeseed, which slightly change depending on the terms of delivery and the region, published by the largest grain purchasers prove it.

"Various factors affect the prices of grain in the world, for instance, yield, inventory, sown area, grain consumption, price change in correlating goods, and other factors. The information on the weather conditions either favourable or unfavourable for growing/harvesting grain and forecasts issued by local statistical bureaus, ministries of agriculture, or grain agencies may also affect the prices of grain" (Graudu cenu..., s.y.).

The low prices for grain produced in Latvia in 2009/2010 insignificantly affected the sales of grain in other countries. According to the information provided by the European Commission, Latvia was the fifth largest grain exporter in the EU (in 2009). In the middle of January of 2010, a cargo with 28 500 tonnes of wheat was shipped to Indonesia for the first time by the cooperative of agricultural services "Latraps" and "Baltie Agro" Ltd. In the 2009 season, "Latraps" purchased more than 275000 tonnes of grain from farmers, of which 183000 tonnes were sold to other countries (Graudins U., 2010).

The forecasts of various institutions and departments on grain yields and reserves in the world mainly affected the prices of grain in 2011. In 2010, however, one of the most significant factors affecting the grain prices was Russia's grain export ban and a report on the world decrease in the yields and reserves of wheat, which started a price hike from 135 EUR/t in July reaching the highest level of 265 EUR/t in the beginning of 2012. It has to be noted that the latest news on lower yields for almost all crops is published every day. The information is publishing in relation with the weather conditions; hence, directly influencing the prices of grain.

The market of rapeseed differs from that of grain, as it has no strong association with price changes of other crops. The price of rapeseed started to increase already in November of 2009; though, it started to increase significantly only in June of 2010.

Another important factor, which affected the convergence of the Latvian market prices of grain and rapeseed with the prices on commodity exchanges, is the fact that many farmers concluded fixed price contracts in 2009 for the supply of grain in 2010. A penalty included in the contracts required a compulsory fulfilment of the contract terms, and these farmers were forced to sell their grain at significantly lower prices. Yet, it has to be noted that the quality of grain in 2010 was lower than expected, and, thus, farmers could not avoid paying penalties which considerably reduced their income gained from selling grain. Farmers continued concluding such contracts with purchasers of grain and rapeseed in 2011; however, many farmers did not conclude forward contracts anymore.

An overall estimate of the world wheat market indicates that the consumption of wheat exceeded the output of wheat in the seasons 2006/2007 and 2010/2011; the shortage was compensated by grain reserves from the previous years. According to a forecast, the total balance of grain will be positive.

Price hikes of other raw materials may be expected along with an increase in grain prices. Prices of spare parts and machinery have also increased. All these factors can significantly affect the cost of commodities produced in the coming year and simultaneously may leave a considerable impact on those farmers who prefer concluding fixed price contracts, as the real price might turn out to be higher.

"More and more speculators engage in grain markets through various exchanges and funds. The large fluctuations still depend on yields and climatic conditions in the main grain production regions; whereas, the small ones that push the overall price curve upwards just like in cardiograms, according to E. Ruza, are determined

by speculators. Grain contracts are traded instead of real grain. Grain producers in Latvia are influenced in a way that a price change of 30 LVL/t results in a daily loss of LVL 30 000 for a farmer who intentions to sell 1000 tonnes in the autumn and who has already concluded a forward contract" (Klavis A., 2010).

According to E.Ruza, the key factors affecting the economic efficiency of rapeseed production are as follows: changes in oilseed rape productivity and productivity levels, regional aspect like growing conditions, size and specialisation of a company, and market prices. It has to be also noted that small and medium enterprises are not able to use technologies efficiently and professionally and they are not ready technologically to produce rapeseed professionally. At the same time, the higher is the yield on a farm, the more sensitive it is to meteorology (Ruza L., 2009).

Appropriate soil and weather conditions for growing winter rapeseed are specific to Latvia, especially its central part. The demand for rapeseed used for biofuel production increases. The rising rapeseed prices are one of the key prerequisites for an increase of the sown area in Latvia. Nevertheless, there is still a great possibility to increase the output of rapeseed (Balodis O., 2009).

Price stabilisation measures are topical due to the instability of the world grain prices.

"The only price stabilisation instrument in the EU is the intervention price which is set at 101.3 EUR/t. Price regulation is not allowed on the free market" (Latvian Ministry of Agriculture, 2008). "The European Commission has waived its initial requirement to introduce a tendering procedure for wheat (bread) interventions in downward bidding at the bid rate starting at 101.31 EUR/t, thus, allowing the Member States to purchase 3 mln tonnes of wheat according to the existing procedure. The tendering procedure is applied exceeding this quantity" (Latvian Ministry of Agriculture, s.y.).

Presently, the intervention price is lower than the market price which does not stimulate intervention purchases; though, on the contrary, this price serves as the lowest limit below which the grain price should not fall, of course, if no measures are undertaken to reduce the price through bidding.

The Ministry of Agriculture has elaborated a medium-term policy planning document "Rural Development National Strategy Plan of Latvia for 2007-2013" based on the "Community Strategic Guidelines for Rural Development 2007-2013". The purpose of the document was to promote balanced and sustainable national development and to increase the competitiveness of Latvia among other countries.

The Plan states that there are both strengths and weaknesses in the development of agriculture.

According to the authors, the Rural Development National Strategy Plan of Latvia for 2007-2013 is orientated towards the welfare of individuals in rural areas but it does not set a certain goal for developing agriculture. The Plan does not focus on agricultural production; it admits that agricultural output significantly contributes to the value added of the national economy. The Plan emphasises the role of education in agriculture, yet without mentioning certain measures for enhancing. It has to be noted that agricultural companies may not rely on financial support for agriculture and the contribution of education system to this industry, since the future is not presently clear. The agricultural companies, instead, have to analyse the changing situation on the world market themselves.

A. Veveris concludes in his research on the potential of grain production in Latvia and the economic prerequisites for achieving it that it is possible to increase the area sown with grain in Latvia; mainly in less intensively exploited areas like Pieriga, Kurzeme, part of Vidzeme, and Latgale. Besides, there is a significant potential for increasing crop yields in Latvia compared with the other EU Member States. Grain presently occupies 37% of the total UAA in Zemgale, of which 68% is wheat. The researcher points that grain is already presently grown in Zemgale as a monocrop, which, of course, may have a negative effect on the soil and increase the risk of spreading diseases (Veveris A., 2011). From this viewpoint, an increase in the area sown with rapeseed has positive aspects.

In general, one can conclude that a decrease in the demand for grain is expected neither in 2012 nor in the future; yet, the price change forecasts are different. It means that agricultural companies have to follow the market situation, make optimal business decisions, and draw a conservative financial policy, so that they are able to work efficiently and maintain the price as well as avoid the influence of weather conditions on their financial results.

Conclusions

1. Grain farming in Latvia, during its previous stages of development, was one of the leading and strategic agricultural industries, and it has a great possibility for development determined by appropriate natural conditions, traditions, and multifunctional use of grain products. Grain has become a significant export product in the country, accounting for 17% of the total exports in 2010 in the group of agricultural and food products.
2. Grain farming is the most important industry in the crop farming sector which is well-developed in Zemgale and is the key provider of food in Latvia.
3. Land is one of the main resources in Latvia. Zemgale is the country's granary, and 77% of the region's territory or 26.1% of the agricultural area of Latvia is the UAA there. The entire agricultural territories of national importance are concentrated in Zemgale region.
4. The area sown with rapeseed and the output of this crop tended to increase in Latvia; the area has increased by 27.4 thou. ha over the period of five years; although, the average yield has slightly decreased in 2010 equalling to 2.1 t/ha. The total output of grain tended to decrease at the same time. The year 2010 was unfavourable for all crops and the average yield decreased in Latvia.
5. According to the percentage distribution of the grain output, the share of wheat steadily increased, accounting for the largest part or 73.3% of the quantity of grain produced in 2010; it was due to an increase in the sown area, which, in its turn, was stimulated by the effect of prices.

6. The grain market price is volatile, as it reacts on changes in total output, yields, sown area, quality, expectations, and the price of correlating goods in the world. It is difficult to predict the main factors affecting agriculture which hinder financial planning and the prediction of performance results.

Proposals

1. The Ministry of Agriculture, while elaborating consecutive planning documents for agriculture, has to envisage certain to be undertaken by the government institutions and businessmen in the fields of both private business and government administration, which would direct the development of the grain industry. Besides, it should clearly define the industries that have to be strategic in Latvia and envisage certain measures for their development.
2. Grain and rapeseed producers should have storage facilities for their products, thus, providing a possibility to choose the time and market price for sales of grain.
3. Any agricultural producer has to follow changes on the market to be able to choose the time for selling their products, produce their products at as low cost as possible. This may be achieved by following prices of commodities and forecasting increase and decrease in prices, thus, accumulating inventories or doing exactly the opposite – waiting until the price falls, following the financial indicators and observing caution as well as taking into consideration the fact that several financial indicators have to be higher than in the industry on average.
4. Grain processing companies have to be established and developed for the sustainability of grain industry. They could enhance supplying various final grain products to the world market and find possibilities for multifunctional use of grain products, thus, regaining the domestic market.
5. Businessmen have to invest in company establishment in the industries of grain and rapeseed, being aware of two major risks in the agricultural industry – weather conditions and price changes. When recruiting an employee, his/her qualification, knowledge, and accountability level have to be carefully evaluated, and the wage should be based on the quality of work performed. If financing deals of extreme and high risk, money reserves have to be accumulated for emergency situations due to unpredictability of risks caused by the nature.

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CHANCES AND RISKS FOR POLISH EXPORT OF AGRI-FOOD PRODUCTS

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Abstract. The aim of the paper is to present the benefits that the Polish economy gains from export of agri-food products. For this reason, the author performed the analysis of data that were related with the value and structure of Polish export in the years 2005-2012. The changes in widely understood food economy, income of employees, prices and export were also taken into consideration during this analysis. It became obvious that this required also the estimation of potential risks both for Polish export in general and export of Polish food. The article employed the use of different documents such as Polish and foreign publications, the results of analysis of secondary research and the author's own research on 87 Polish exports of agri-food products performed at the end of 2011. Thanks to this, the result was visible in full picture of profits, chances, risks, and difficulties in current and future distribution of Polish agri-food goods. The research also showed the export direction with the development perspectives. The research covers the period of 2005-2012.
Key words: the economy, export, agricultural and food products
JEL code: F19, Q1

Introduction

The modern economy bases on the mutual exchange of goods and services between countries. Thanks to these relations, the companies can benefit both from export (financial income) and import (extended availability of goods). One of such beneficiaries is the country, which can estimate profits and losses in co-operation with other countries.

From 2004, namely, since its accession to the EU, Poland has produced positive changes especially in the area of exchange of agri-food products. Even the year 2008, which in relation with the global crisis brought a decrease of economic conditions, did not make drastic changes in this area. It is true that there was a decrease of export by 1.3% and import by 9.7% in 2009 but finally the balance was improved and it achieved a positive level equal to EUR 2.2 trillion (Concise Statistical Yearbook of Poland, 2012)

The aim of the paper is to present benefits that the Polish economy gains from export of agri-food products. For this reason, the author performed the analysis of value of Polish export and its structure in 2005-2012. The research also considers the changes in employment in widely understood food economy, income of employees, prices of products and export directions. The research also defined possible dangers and risks for Polish export in general as well as for the export of Polish food

The additional value of this paper is the presentation of research results on 87 Polish exporters of Polish agri-food products performed at the end of 2011. This resulted in the improved view of benefits, chances, risks, and difficulties in current and future distribution of the Polish agri-food goods. The author presents the directions of export with the development possibilities.

Research results and discussion

1. Participation of agri-food export in general Polish export

The value of export and import of goods and services, together with relations that are visible between these flows is the base to set up the trade balance and current account.

The current account is one of base pillars of the country balance of payments (next to the capital account and sources of financing deficits). All these economic resources linking a particular country with foreign countries become expressed in the balance of payments. In Poland, the balance of payments is presented to the Parliament by the National Bank of Poland (Macro- and Microeconomics, 2007). The balance of payments is a very important indicator for the condition of the economy.

The base form of economic relations between different countries is the exchange of goods and services. The data presented by the Central Statistical Office of Poland (years 2006-2012) outline that the trade balance of goods and services has a negative current balance. Table 1 shows the data related with the current trade account in the years 2006-2012.

Most often Polish goods and services were exported to the EU countries, especially to Germany and France. In 2006, out of 100% value of Polish export 63.2% went to the EU countries, the so-called "EU-15". In 2007, this share increased to 64.2%, while in 2008 and 2009, it decreased to 61.9% to hit the value of 59.5% in 2010. In the first half of 2012, out of 100% value of Polish export 25.6% were traded with Germany, 6.7% – with the United Kingdom, and 6.3% were directed to France (Analysis of the Polish Economy I-VI 2012, 2012). Focusing on the structure of goods in Polish export it is necessary to emphasise the growing share of export of agri-food goods. Table 2 presents the value of export and

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Table 1

Trade balance of goods and services for Poland in the years 2005 - 2012

Year flow	2006	2007	2008	2009	2010	2011	2012*
	in mln EUR						
import	100784.1	120389.5	142447.9	107528.9	134188.4	150401.9	62000 (144 200)
export	87925.9	101838.7	116243.8	98218	120373.1	135700.0	57000 (157 100)
balance	-12858.2	-18550.8	-26204.1	-9310.9	-13815.3	-14701.9	-5000 (-12 900)

* given estimates for Q1 and Q2 of 2012 and in brackets estimates for the whole 2012

Source: author's research based on Rocznik Statystyczny Handlu Zagranicznego, 2011 (The Yearbook of Foreign Trade Statistics 2011) and Analiza sytuacji gospodarczej Polski w okresie I – VI 2012 (Analysis of the Polish Economy I-VI 2012)

Table 2

Results of international trade of agri-food products (in mln EUR) in the years 2005-2012

	2005	2007	2008	2009	2010	2011	2012*
	in mln EUR						
Export of the agri-food goods	7 028	9 942	11 422	11 278	13 507	15 196	15 500
incl. to the EU-27	5 191	8 001	9 218	9 067	10 706	11 397	11 625
Share of agri-food products in the entire export, %	no data	9.8	9.8	11.5	11.2	11.3	13.6
import of the agri-food goods	5 374	7 972	10 089	9 111	10 921	11 961	12 200
incl. to the EU-27	3 388	5 347	7 023	6 320	7 482	8 373	9 028
Share of agri-food products in the entire import, %	no data	6.6	7.1	8.5	8.1	8.0	9.8
Trade balance	1 654	1 970	1 333	2 167	2 586	2 600	3 200

* estimated data of IERiGZ are used for the year 2012

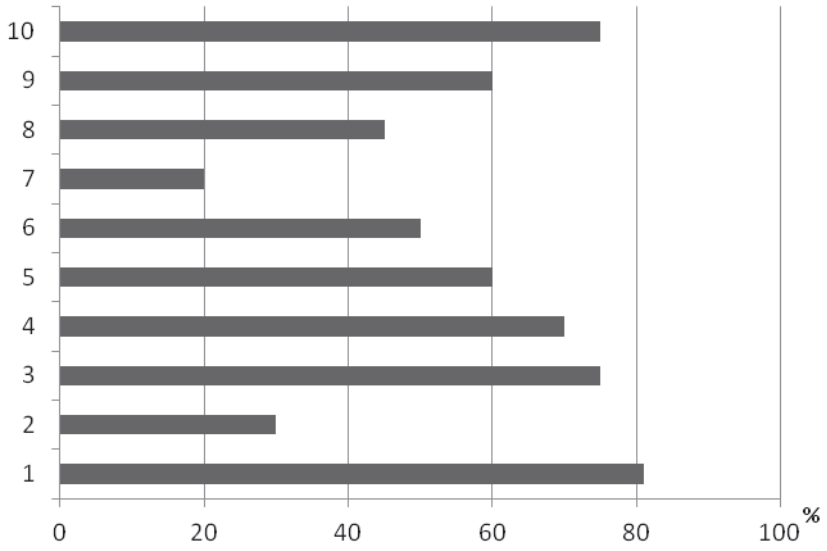
Source: author's research based on Monitoring i ocena konkurencyjnosci polskich producentow zywnosci (1)(Monitoring and Evaluation of the Competitiveness of Polish Food Producers), 2011 and on Rocznik Statystyczny Handlu Zagranicznego 2011 (The Yearbook of Foreign Trade Statistics 2011)

import of agri-food goods and their share in global trade of Poland in the years 2005-2012.

If the statistics confirm the forecast that Polish export of agri-food goods reached the level of EUR 15.5 trillion at the end of 2012 (Polish foods sold on foreign markets, 2012), then it is clear that food export would amount to approx. 13.5% of the total export value of Poland. It is then obvious that every 10th euro from export comes from the export of agri-food goods. Besides, the balance of these products has permanently been positive and has systematically grown since 2008. Thanks to the expansion of Polish food, the general Polish trade balance even if it is negative is seen well, meaning if the growth continues with the high speed of export then the negative difference between export and import would decrease continuously. Just in 2007-2012, the value of Polish exports of agri-food goods increased by 40%. If the figures are taken with the data range from before the EU accession to the end of 2011, then it is easy to see that the export of Polish agri-food goods has increased three times. At the end of 2011 (based on the Yearbook of Foreign Trade Statistics 2012, 2012), the value of export of agri-food good increased to PLN 52.98 trillion and the estimations for 2012 are even more optimistic and target to PLN 62.4 trillion. This confirms that the Polish food economy is well prepared for new challenges and problems. Cigarettes, pork, poultry, chocolate and cocoa products, bread, milk products, vegetables and fruit are the most popular export goods. In first half of 2011, the sales value of pork was over EUR 388.3 mln (in 2010, it was EUR 271.9 mln), poultry - EUR 376.7 mln (2010 – 311.4), chocolate – EUR 363.5 mln (2010 – 300.2), and bread – EUR 281 mln (2010 – 241). Until August, milk products were over EUR 856 mln and it was by 13.3% more compared with the value of 2012. Similar case was observed with the export of juices and fruit, which exceeded EUR 700 mln in the same time (Polish Foods are Going …, The Balance of Trade…, http: www.portalspozywczy.pl...2012).

2. Chances and risks for Polish export

Export is related with the inflow of financial resources in the country exporting goods and services abroad. The forecast for Poland was that it would receive approx.



1 – New markets - higher profits
2 – New consumer needs, development and quality of products
3 – Export is engine for the development of a company (new experience and trade contacts)
4 – Risk of decreasing the sales is spreading to many markets
5 – Bigger production means less share of own costs
6 – Export reduces negative results of seasonal changes on local market
7 – Less aggressive competition on some markets positively influences the development of a company
8 – Export extends the life cycle of product
9 – Export activity strengthens the image of company
10 – Export activity means more jobs in the local country

Source: author's research based on the answers of 87 exporters

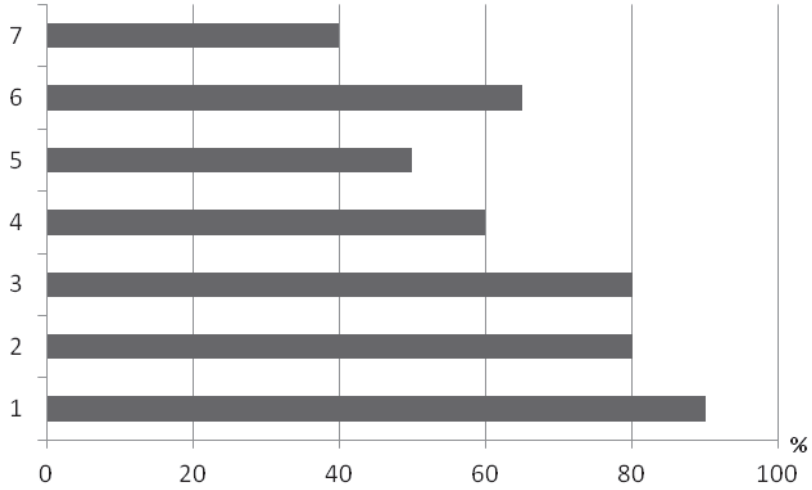
Fig. 1. **Distribution of answers of Polish exporters of agri-food products (related with benefits from export), %**

EUR 14.8 trillion from export of food in 2011. This does not include export of other agri products that are not mentioned for food production. Meanwhile, the reality was much more surprising than expected. The value of food export was closed EUR 15.2 billion in 2011 (Information from the Ministry of Economics of the Republic of Poland). Such positive dynamics of the Polish export value is based on the following influencing factors:

— high price of agri-food products on foreign markets;
— creation of positive image of quality and taste of the Polish food in foreign consumers chain;
— decreasing foreign exchange value against euro; increased sales profit;
— strong expansion of Polish food companies abroad; they look for new markets, for example, market in China for pork sales, Turkey - beef, Algeria, Senegal, or Egypt - milk products;
— increased demand on Polish food, with a special focus on ecological food;
— existence of international trade companies like Tesco and Lidl on the Polish market;
— positive actions of the Ministry of Agriculture in promotion of Polish food, for example, implementation and financial support of the programme "Poznaj Dobra Zywnosc" (Know the Good Food), promotion of logo ensures guarantee of good quality, support of food exhibition both in Poland and abroad;
— export of Polish food is speeded up by the EU financial support, for example, Brussels support export to the countries outside the European Union.

Peter Dicken provides one more argument that Speer European and American export of agri-food products. He believes that two-third of growing countries or more than 50% get addicted to export of goods (food and agriculture of non-food products like non-ferrous metal, industrial materials). This factor gives unlimited place for the development of Polish companies that export food and agri-products (Dicken P., 2007).

The supportive circumstances presented above are only few from the most important and the most mentioned by economists; however, detailed analysis of local conditions that support export shows that there are much more. In the research covering 87 exporters of Polish agri-food products, the most popular answer related with the benefit from export of food products was that higher profit from foreign sales compared with Polish prices, has been a strong opportunity to expand the markets. Information that growing production and export



1 – Hiring qualified people who know languages and export regulations
2 – Finding proper counterpart and distributors abroad
3 – Complicated documentation related with the international trade
4 – Getting payment from abroad
5 – High level of financial costs related with receiving payment from foreign partners
6 – High costs of travels and visits abroad to supervise distributions, meeting the clients (current and potential), participate in exhibitions
7 – Hard to forecast profit due to changing exchange rate

Source: author's research based on the answers of 87 exporters

Fig. 2. **Distribution of answers, from Polish exporters of agri-food products related with export problems, %**

increases the employment of people from rural areas and towns is a very interesting point having social aspect. A detailed profile of answers is shown in Figure 1.

It is not possible to mention all future risks for Polish export of agri-food products. The most frequently mentioned are as follows:

— decreasing prices of agri-food products in the world;
— strengthening of positive opinion about the Polish economy done by international institutions;
— increased demand for Polish food can be blocked, since the European markets are saturated with producers from the so-called new Union (meaning Bulgaria, Romania) that offer goods with cheaper price than the Polish one;
— missing of concrete consolidation actions in food industry (also by farmers and other small food producing companies);
— missing of active promotion of Polish products abroad;
— financial problems of the EU countries (based on the global financial crisis) weaken the purchase power of societies, including the purchase of Polish food products. In 2011, the total sales value was EUR 1.5 trillion; interest is also focused on the United Kingdom (EUR 488 mln), the Czech Republic (EUR 470 mln), and France (EUR 418 mln).

In addition, the biggest dangers related with further development of export of Polish agri-food products based on the opinion of the Polish Federation of Food Industry are as follows:

— missing long-term and multi-faceted strategy for the support of Polish export;
— sudden price increases for agri-products in the EU;
— fast growing general production costs (energy, cost of work, transportation);
— higher inflation in the country that is a root cause for price increase of agri-food products, and because of that exporters losing their dominance compared with other EU Member States and other countries.

Exporters , which were covered by the research, assumed that the biggest problems in international exchange were: lack of qualified employees that could run the business on behalf of the company (90% of answers), very complicated procedure of filling in trade documents (80% of answers), and finding a trustee counterpart abroad that would represent business abroad (80%). The other answers are presented in Figure 2.

The international forum includes at least 80% of export managed by the credit system (delayed payment even of few months) of export insurances, tax reliefs for exporters due to investment, insurance against foreign exchange rate, bank and government guarantees, financial support to credits, and simplified tall procedures. In contrast, there is an increasing pressure from countries like USA, Argentina, Brazil, or Australia, which expect liberalisation of trade and free competition. Some countries are also showing trends of future main players on the international market. According to Dunning, these countries will be China, India, the South Korea, Russia, Brazil, Mexico, and Australia (Dunning J., Lundan H.,

Sarianna M., 2008). Poland will have no other choice than adapt to the changing situation and find its proper place in the New reality.

3. Positives and negatives of Polish export of agri-food products

The growing export of agri-food products solves issue of overproduction in farming. Polish farmers could have serious problems with selling their products, in case they lacked a possibility to use open foreign markets. For the past three years, the sales of food in Poland are slowly growing (from 2008). This growth is not strong enough to cover full agricultural production. The export also supports the employment situation in rural areas and small cities. In 2005, the average unemployment rate was 17.7% of which 16.1% were observed in rural areas. In 2010, it was 9.6% and 9.8 respectively (according to the Concise Statistical Yearbook of Poland 2011, 2011). Currently, the unemployment value slowly grows (in October 2012, it was approximately 13%, and in rural areas – 13.8%) but this is not related with people hired in export production (there is still not available research in this area). However, there is a decrease of employment in food market and stabilisation of farming; one can observe an increase of productivity of employees in other areas. The average salary in farming has increased from PLN 2387 (in 2005) to PLN 3885 (in Q1 of 2012). In food industry, the change was from PLN 2099 to PLN 3071 (based on the Employment and Payment in National Economy for Q1 of 2012, 2012). Unfortunately, there is an increase of production costs, which decreases the competitiveness of Polish exporters.

It is worth to underline that the value of sold production in food industry has increased by ¾ in the years 2000-2010, i.e. from PLN 92.9 trillion in 2000 to PLN 162.3 trillion in 2012. This increase was the result of extended export of agri-food products from Poland (especially after 2004) and increased internal demand (Adaptation Processes of the Polish Food Industry to the Changing Market, 2011). In companies of food production, the value of sold production has increased by ¾ from PLN 84.5 trillion in 2000 to PLN 151.1 trillion in 2010. Majority of sectors (except wine, cigarettes, and confectionary) managed to increase income from sales in this time (Adaptation Processes of the Polish Food ..., 2011). So far, there are no published data for 2011 but it is already known that in Q1 and Q2 of 2011, the value of the sold production of food industry went over PLN 78.9 trillion (Food Sector in Poland, 2011).

The GDP contains added gross value that is created in every sector of the national economy. The same case is seen in food industry - the value added is generated. The share of value added in the GDP for Poland was 2.7% at the end of 2010. In the past decade, the added gross value of food industry (including tobacco) increased by more than ¾ from PLN 22.3 trillion to PLN 39.3 trillion. In reality, this growth was below 50%. The companies preparing financial reports showed that the value added has increased by 78% from PLN 18.1 trillion (in 2000) to PLN 32.2 trillion (in 2010), while in reality, (in prices of 2010) it has increased by 35% from PLN 23.8 trillion to PLN 32.2 trillion. Dynamic growth of value added in this sector was observed after 2003. The average growth of value added in 2003-2010 was 7.6% a year, and real speed was below 1.9 percentage points. All sectors of industry, except the potato one, have increased the gross value added in that period (Adaptation Processes of the Polish Food ..., 2011).

At the same time for Polish society, the increase of export of Polish agri-food products means higher price for these products in stores. According to the Central Statistical Office of Poland (GUS), the increase of the average price of food and non-alcoholic drinks was 5.6 (for food - 5.8%) in the period of January-October 2011 compared with the same period of 2010 and it was higher than the inflation rate (4.2%). The biggest price change was observed in the price of apples and sugar (over 50%), marmalades and sweet products (14%), potato and bakery (13%), fruit (12%), and poultry (11%). There was also a decrease in the price for citrus fruit (12%), bananas and eggs (3%), and vegetables (1%). In 2012, the price of pork and milk products would surely increase with the receipt of the veterinary approval for export of food to China. The research done at the beginning of this year by ING Bank Sląski outlined that the costs of food spending have increased by 24%. This means that less part of home income remains for other goods and services. If food prices continue their growth with such speed, the spending on other goods will slow down the economy and its growth.

Conclusions

The 2012 is the year, which outlines positive forecasts for Polish export compared with the previous years. Probably there will be higher dynamics of export growth compared with import. This was already noticed in 2011. According to the Central Statistical Office (GUS), the export in January of 2012 reached EUR 9 trillion 337 mln and increased by 17.3% during a year. At the same time the import reached EUR 9 trillion 443 mln. This result is better by 9% compared with 2010.

The main sectors that generate high value of Polish export are the following three: motor, agri-food, and RTV. An interesting aspect is that the increase of agri-food export is surprising comparing it with the data of 2004 when it was said that production was old-fashioned and non-effective. There were worries that Poland's accession to the EU would flood Polish market with products from the European Union. Meanwhile, the reality is different. Currently, the sales of Polish agri-food products have a significant influence on the export profit, it has increased the living standard of societies residing in towns or rural areas. From marketing perspective, it can be said that the Polish export of food can be compared with a good instrument that promotes Poland on the international area. More and more people in the world know and accept the good quality and price of Polish agri-food products. Ecological rural products play a special role in the export and it continuously grows and has a bigger influence on the Polish economy.

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ASSESSMENT OF MICROECONOMIC IMPACTS OF INVESTMENTS ON AGRICULTURAL BIOGAS PLANTS

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Abstract. As the consumption of renewable energy sources increases, the relatively high public support of bioenergy projects supplements the goals of energetic self-sufficiency of the countryside. This paper answers two main questions. Firstly, how the effects of the investment support from the Rural Development Programme (RDP) can be quantified considering the EU evaluation guidelines. Secondly, which economic effects of the support of the agricultural biogas plants are significant. The objective of the paper is to assess the economic effects of the investment support of the agricultural biogas plants from the RDP in the Czech Republic. The counterfactual approach is adopted and investigates what would have happened if the supported producers did not participate in the programme. It then compares the result indicators. Propensity score matching (PSM) with Mahalanobis distance is used to create treatment-control matches based on propensity scores and/or observed covariate variables. Mann-Whitney U test calculates statistical significance of the selected indicators between supported and non-supported agricultural enterprises. In regards to the economic performance of agricultural enterprises, the analysis reveals that investments and investment subsidies targeted at biogas plants have a positive effect on EBIT, cash flow, and value added per hectare of agricultural enterprises as well as on labour productivity. Investments in biogas plants also significantly alter capital structure because of the commercial credit indispensable for financing investment expenditures.
Key words: agricultural biogas plants, counterfactual analysis, investment support, propensity score matching, Rural Development Programme.
JEL code: Q10, O13, Q18

Introduction

This paper assesses economic effects of the investment support of agricultural biogas plants from the Rural Development Programme (RDP) in the Czech Republic, specifically, Measures 311 and 312. According to the EU evaluation guidelines, the impact assessment of the RDP public support requires processing by all EU Member States. However, little attention has been paid to the quantitative evaluation of actual effects of the corresponding support programmes. Medonos et al. (2012) highlight two serious problems of the Common Evaluation Monitoring Framework (CEMF). These include the EU evaluation guidelines which eventually might lead to incorrect conclusions on the success of the programme: i) it is impossible to associate the result and impact indicators (as GVA/GDP) only with policy intervention. In addition, there is a number of other circumstantial factors affecting the results; ii) usually, policy measures either target or are exploited by only some groups of producers/ regions etc., which makes simple comparisons between supported and non-supported groups methodologically problematic (Michalek, 2007). The counterfactual approach is used to deal with these shortcomings. According to the EC Guidelines, questions and indicators have to be answered that compare the supported with non-supported farms (counterfactual situation), and the previous situation with the resulting situation after the support (Cueto, 2006).

The Ministry of Agriculture (MoA) provided the data on the investment projects in biogas plants. The MoA database comprises information on the 142 individual applications approved between 2007 and 2011. The data-warehouse is equally connected with the Soliditet – Albertina database. The latter contains data from financial statements of Czech companies as well as an overview of the corporate headquarters, industry sector, number of employees, and total turnover. The Land Parcel Identification System (LPIS) database specifies the area of agricultural land; hence, gathering the basic information on the 119 companies whose applications were approved for investment between 2007 and 2011.

For the counterfactual analysis, it is necessary to have one sample of the supported agricultural enterprises and a sample of agricultural enterprises with similar structural characteristics not supported by the Rural Development Programme (2007 – 2013). As accounting data are available with a lag of t-2, it is possible to use data only for the period 2007 - 2010. A total of 56 out of 119 supported applicants received payments between 2007 and 2010. These are considered as supported enterprises and that the investment was operative until 2010. Nevertheless, complete accounting data in 2007 and 2010 are available only for 38 enterprises. This is because the basic set of supported subjects for counterfactual analysis labelled as "participants".

In addition, the analysis included the identification of 551 agricultural enterprises without RDP investment support between 2007 and 2010, with complete accounting data in both years. From this group of nonparticipants, it is necessary to select enterprises with similar structural characteristics as supported enterprises. The following available structural indicators for matching participants and nonparticipants are selected:

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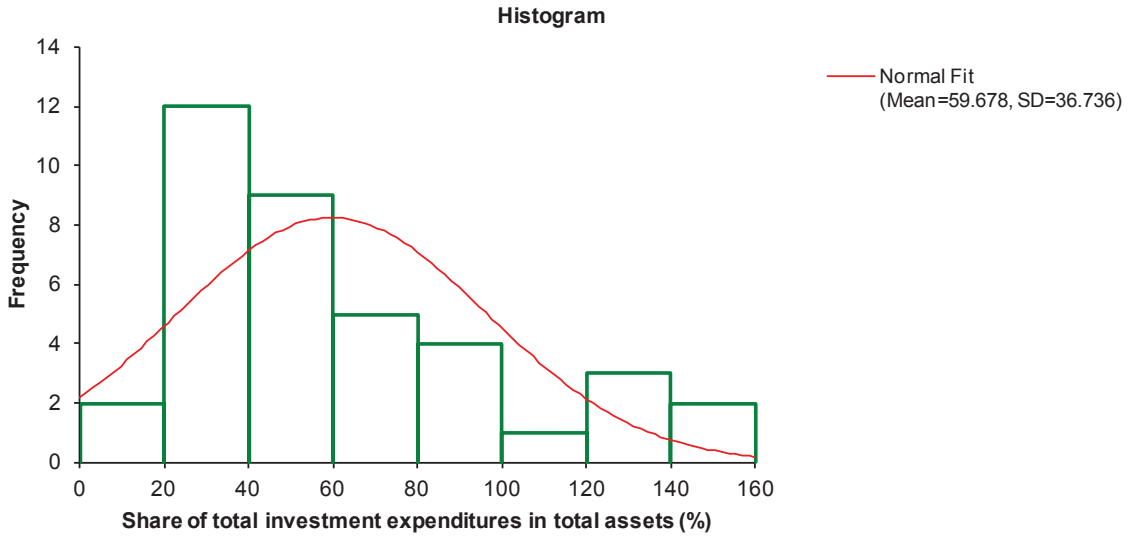

Source: author's construction

Fig. 1. **Relative importance of investment expenditures in the supported enterprises**

Table 1

Impact of investments on the utilised agricultural area and fixed assets

Indicator	Units	Year	Median (Y= 1)	Median (Y = 0)	Mann Whitney Z-value	p-value	Reject H_0 at 0.05
Agricultural area	ha	2007	1 948	1 915	0.4519	0.6513	No
		2010	1 924	1 968	0.6908	0.4897	No
Fixed assets per hectare	CZK	2007	45 614	45 080	0.9298	0.3525	No
		2010	70 011	44 903	4.1607	0.0000	**Yes**

Source: author's calculations

— agricultural land under LPIS (ha) as an indicator of farm size;
— share of permanent grassland as an approximation of natural conditions;
— asset turnover as an indicator of business activity;
— staff costs (thousand CZK) as an indicator of the use of paid labour;
— depreciation and amortization (thousand CZK);
— credit debt ratio as the share of bank loans and financial accommodations to total assets (indicator representing capital structure).

The data matching procedure is used to create treatment-control matches based on propensity scores and/or observed covariate variables. The Propensity score matching (PSM) constructs a statistical comparison group based on a model of the probability of participation in the treatment, using the observed characteristics (Khandker et al, 2010). The propensity score was introduced by Rosenbaum and Rubin (1983, 1985). Various approaches can be used to match participants and nonparticipants on the basis of the propensity score. Greedy data matching is used for propensity score data matching procedure in this paper (Bozik, 2011, 2012). Mahalanobis distance within propensity score calipers (no matches outside calipers) is used in this paper as the distance calculation method (Gu, Rosenbaum, 1993).

After the participants group creation (38 agricultural enterprises) and nonparticipants (38 agricultural enterprises), the next step is to perform the counterfactual analysis. This phase comprises an impact evaluation of investment and investment support in biogas energy. First, the relevant indicators are selected. This permits a complex impact evaluation primarily based on financial statements, using well known indicators of profitability, liquidity, activity, capital structure, value added, and productivity suitable for counterfactual analysis.

The Mann-Whitney U test compares the above mentioned indicators between two groups – participants (Y = 1) and nonparticipants (Y = 0). The null and alternative hypotheses are: H_0: Median (Y = 1) = Median Y (Y = 0), H_A: Median (Y = 1) ≠ Median (Y = 0). A normal approximation method is used for the distribution of the sum of ranks which corrects for ties and does have the correction factor for continuity. The null hypothesis is tested at the significance level of 0.05.

Research results and discussion

The results of the counterfactual analysis present the comparison of indicators between similar groups

Table 2

Impact of investments on profitability indicators

Indicator	Units	Year	Median (Y = 1)	Median (Y = 0)	Mann Whitney Z-value	p-value	Reject H_0 at 0.05
ROA	%	2007	5.53	5.45	-0.4207	0.6739	No
		2010	4.92	2.92	1.0337	0.3013	No
ROCE	%	2007	6.47	6.46	-0.2649	0.7911	No
		2010	5.51	3.28	1.0025	0.3161	No
ROE	%	2007	7.13	8.13	0.4727	0.6364	No
		2010	8.50	3.29	1.7505	0.0800	No
EBIT per hectare	CZK	2007	3 837	3 256	0.4623	0.6439	No
		2010	4 773	2 370	2.5089	0.0121	**Yes**
Cash flow per hectare	CZK	2007	9 073	8 771	1.1791	0.2384	No
		2010	12 125	7 160	3.1218	0.0018	**Yes**

Source: author's calculations

of participants (n = 38) and nonparticipants (n = 38). The extent of economic effects of investment support depends on the relative importance of investments in the supported enterprises.

As Figure 1 depicts, about 55% of the participants have total investment expenditures between 20 and 60% of total assets. There are also participants with total investment expenditures exceeding 100% of total assets. The mean share is 60%. The question is how significant these very important investments can affect economic results of the agricultural enterprises. It may be assumed that investment in new technology/biogas plant significantly increases long-term fixed assets and depreciation. It is also interesting to expose any impact on the utilised agricultural area. Table 1 illustrates the medians of agricultural area and fixed assets in 2007 and 2010.

There is no significant difference in the total agricultural area between participants and nonparticipants. The participants reduce the total agricultural area whereas, nonparticipants extend their acreage. Nevertheless, neither the investment support nor the investment in biogas plant has any impact on the acreage of agricultural enterprises.

Investments in new biogas plants are relatively high and increase the value of fixed assets. This assumption is confirmed through the statistical analysis. Participants have significantly higher fixed assets per hectare in 2010 when biogas is in operation. On the contrary, the value of fixed assets per hectare in nonparticipants is not significantly modified.

It is possible to describe the results thanks to the availability of data on the plan of newly created working positions. Approximately 85% of the applications (approved between 2007 and 2011) suggest that investment will not be associated with the creation of new working positions; 12% planned one new working position. More than one new working position is rare as the specifics of operating biogas plants requires monitoring by at least one worker. It is evident that most agricultural enterprises are able to use the available labour force for biogas plant operation. Therefore, investments in biogas plants do not focus on increasing employment in the country but on maintaining employment and maximising working capacity usage.

Table 2 provides information about the effects of investment support on profitability and cash flow indicators.

Investments in biogas plants do not significantly impact ROA, ROCE and ROE. However, the decline of these indicators between 2007 and 2010 is greater in the sample of nonparticipants. Significant effects of investment are observed relating the economic results with the total agricultural area. Investments in biogas plants have a positive effect on EBIT and cash flow per hectare. While the median of EBIT and cash flow per hectare increases in the group of participants, it decreases in the sample of nonparticipants. Hence, there is only positive effect of investments on profitability indicators related with the agricultural area; none with the assets and capital employed. It can be justified by different impact of investments on agricultural area and fixed assets (Table 1).

Table 3 summarises the output of statistical analysis of the differences in value added determinants and depreciation between participants and nonparticipants.

As seen in the table, investments in biogas plants have significant impact on the value added per hectare in addition to labour productivity expressed by the indicator value added per staff cost. The group of supported agricultural enterprises increases the value added and labour productivity after establishing the investment, unlike nonparticipants. This is a very important finding that could impact the economic competitiveness of agricultural enterprises.

Regarding cost and yields, results are not clear as in the case of the value added. Investments have no significant impact on cost of sales per hectare. It is somewhat surprising given that the biogas plant heats some buildings and operations within the farm. This leads to savings of purchased heat. Some more noticeable

Table 3

Impact of investments on value added indicators and depreciation

Indicator	Units	Year	Median (Y = 1)	Median (Y = 0)	Mann Whitney Z-value	p-value	Reject H_0 at 0.05
Value added per hectare	CZK	2007	14 379	13 551	0.0883	0.9296	No
		2010	15 227	10 577	3.0387	0.0024	**Yes**
Value added per staff costs	CZK	2007	1.18	1.13	0.8425	0.3995	No
		2010	1.36	0.97	4.0640	0.0000	**Yes**
Sales of production per hectare	CZK	2007	42 029	39 379	0.4831	0.6290	No
		2010	42 227	33 826	2.2388	0.0252	**Yes**
Cost of sales per hectare	CZK	2007	28 712	24 824	0.8986	0.3689	No
		2010	26 269	23 323	1.4181	0.1562	No
Cost of sales per sales of production		2007	0.68	0.67	0.4822	0.6297	No
		2010	0.64	0.70	-2.7182	0.0066	**Yes**
Depreciation per hectare	CZK	2007	5 248	5 375	0.4623	0.6439	No
		2010	7 196	5 467	2.3738	0.0176	**Yes**

Source: author's calculations

Table 4

Impact of investments on liquidity, turnover, and capital structure

Indicator	Units	Year	Median (Y = 1)	Median (Y = 0)	Mann Whitney Z-value	p-value	Reject H_0 at 0.05
Current ratio		2007	4.12	2.47	1.2934	0.1959	No
		2010	2.56	3.07	-1.2622	0.2069	No
Cash ratio		2007	0.51	0.41	0.6908	0.4897	No
		2010	0.30	0.53	-1.3921	0.1639	No
Long-term asset turnover		2007	0.90	0.94	-0.3896	0.6968	No
		2010	0.56	0.84	-3.2570	0.0011	**Yes**
Inventory turnover		2007	2.63	2.54	-0.3020	0.7626	No
		2010	2.71	2.21	1.2830	0.1995	No
Debt ratio	%	2007	36.25	37.15	-0.6857	0.4929	No
		2010	47.25	32.60	3.1115	0.0019	**Yes**
Credit debt ratio	%	2007	11.70	11.10	0.5818	0.5607	No
		2010	30.20	10.40	5.0282	0.0000	**Yes**

Source: author's calculations

savings in sales cost are obvious in the sample of participants. The difference towards nonparticipants is not statistically significant. Higher depreciation per hectare in the group of participants is related with higher value of fixed assets as the consequence of the investment in biogas plant.

In the group of participants, the median of sales of production per hectare in 2010 is at the same level as in 2007; whereas, the nonparticipants have lower sales. Thus, support of biogas plants fulfils its mandate: diversification of farm income and stabilisation of farm income.

Table 4 contains ratio indicators of liquidity, turnover, and capital structure.

Investments in biogas plants have no significant impact on liquidity ratios. The current and cash ratios are lower after investment apparently because participants have to repay investment loans. Nevertheless, no statistically significant differences are found. Questionable are the effects of investments on turnover ratios. Some significant differences are revealed only in the long-term asset turnover as a result of higher fixed assets after setting up biogas plants.

On the contrary, clear effects of investments are observable in the capital structure. Since such financially demanding investments as biogas plants need to be co-financed through commercial credit, the debt ratios significantly increase in the participants group. The median level of debt ratio is still under the recommended level of 50% in 2010 which indicates no severe debt problems of supported agricultural enterprises. It also depends on the future development of the economic situation of agricultural enterprises.

The results conform to the findings by Medonos et al. (2012) and Bozik (2011). Their quantitative assessment shows significant benefits from investment support in terms of business expansion (Gross Value Added, GVA) and productivity (GVA/labour costs) improvements. These results were confirmed by the qualitative survey. Thus, public support enables farms to achieve their strategic objectives.

Conclusions

As mentioned previously, the objective of this discussion was to assess economic effects of the investment support of agricultural biogas plants from the Rural Development Programme (RDP) in the Czech Republic. The analysis of the approved applications suggests that biogas plants are built mainly by large agricultural companies. They are for the most part, located in the production-intensive areas with sufficient own raw material for operation of biogas plants. Furthermore, they are equipped with sufficient capital for a relatively large investment expenditures associated with the construction or improvement of the biogas plants. According to the RDP strategic framework, the production of energy from renewable sources and use of renewable energy sources within diversification of agricultural activities is a promising activity. It contributes to both the alleviation of climate change and support of the rural economy. The analysis of the economic impacts reveals some significant ex-post effects of investments in agricultural biogas plants.

— Investments and investment subsidies targeted at the biogas plants have a positive effect on EBIT, cash flow, and value added per hectare of agricultural enterprises. The launch of biogas plants increases fixed assets, depreciation, and capital employed. It does not lead to a significant change of farm agricultural area. Subsequently, there is no significant impact on ROA, ROE and ROCE even if these indicators have been considered as key indicators of companies' economic performance.
— Support of the biogas plants significantly increases labour productivity. The creation of biogas plants does not create any new working positions in most cases as the operation of biogas plants is mostly ensured by available workers.
— Biogas plants have rather a revenue stabilisation effect than cost savings effect. Investment support for the construction and modernisation of biogas plants achieves one of the goals of the RDP aimed at the farm income stabilisation.
— Investments in biogas plants significantly change capital structure due to commercial credit, indispensable for financing investment expenditures.

The paper also presents one possible methodical approach to quantitative impact evaluation of the RDP investment support. However, some disadvantages of such counterfactual analysis are identified using PSM. The above processed analysis is based on financial indicators only. For a better understanding of all potential effects of the investment support, case studies are appropriate. Long-term organisational viability and competitiveness should not be evaluated solely in terms of financial measures. The case studies can help evaluate the nonfinancial aspects of rural development. It is a great challenge for future research. Another problem of the PSM is to locate similar groups of nonparticipants as it is not possible to find comparable companies. The results of the counterfactual analysis based on propensity score matching is biased to a certain extent. Nevertheless, the above described propensity score matching is a suitable basis for quantitative impact evaluation.

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ISSUES OF SHAPING THE AGRICULTURAL MARKET IN POLAND ON THE EXAMPLE OF MILK AND SUGAR MARKETS[1]

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Abstract. The paper presents the development of the agricultural market in Poland, taking into account two periods of its existence. In the first period, encompassing the years from 1989 to 2004, the Agricultural Market Agency was the institution responsible for agricultural markets with an obligation of stabilising the market and protecting agricultural incomes. Following the accession to the EU, the Agency was granted new competencies and it received a status of a payment agency, which meant that the Agency was put in charge of regulating all agricultural markets. The article discusses the issues of milk quotas, introduced for the purpose of concentrating milk production in certain voivodeships, while at the same time achieving a reduction in the number of wholesale suppliers by 52.1%, and a decrease in the number of direct (individual) suppliers by 69.7%. Sugar market regulation resulted in a reduction of sugar plants from 78 to 18 (by 76.9%) and limiting the areas of sugar beet cultivation to selected regions.
Key words: agricultural market, milk quotas, sugar market, Agricultural Market Agency.
JEL code: Q18

Introduction

There are a number of products and entities in the agricultural market operations, which need to be coordinated in order to achieve organisational order. Such operations require legal regulations and the application of market intervention instruments aimed at bringing about a desired market result. Depending on the nature of agricultural production and a spectrum of commodities, different countries implement various market policies to satisfy comprehensive consumer needs of the society. Among the many factors influencing agricultural markets, agricultural produce prices are one of the fundamental instruments of support. The prices have a stabilising effect; they are to counteract their seasonal fluctuations and to contribute to ensuring adequate income to agricultural producers.

Agricultural market is linked with the specificity of production process in agriculture, supply and demand seasonality, agricultural turnover, high degree of risk, short-term market volatility, and limited mobility of production factors (Tluczak A., 2010).

Aim and scope of the research

The fundamental aim of the study was to analyse the agricultural market through the prism of legal enactments influencing the shape of agricultural produce market. Two periods of agricultural market functioning were observed from 1989. The first one encompassed a time before Poland's entry into the European Union (2004), and it characterised with the national intervention in agricultural markets, executed on the grounds of national regulations. A full implementation of the EU legislation occurred and market principles of the entire European Community were adopted after the accession (Mickiewicz B., 2012).

The Agricultural Market Agency played a leading role in the process and it was established in 1990 precisely for that purpose. In pursuance of the Agricultural Market Agency Act, the organisation of some agricultural markets of 2004 and in accordance with the statute granted under an ordinance of the Minister for Agriculture and Rural Development, the Agency was pursuing a state intervention policy aiming to stabilise food and agricultural produce markets within the framework of the Common Agricultural Policy. The agency provides support to 20 commodities groups within the scope of 50 intervention instruments, including establishment of quotas for the production of selected commodities, subsidising agri-food processing, implementing subsidies to purchase prices and many other forms of support. The study focuses on presenting a general overview of the agricultural market development, with a particular highlight of the issues of milk quotas and sugar market reform. These markets were analysed in the context of changes that had occurred in Polish agriculture with regard to the result of agricultural censuses of 2002 and 2010. The changes have been presented for individual voivodeships.

Agricultural markets operation following Poland's accession to the European Union

The accession to the EU meant that Poland was included into the single agricultural market area. Consequently, the existing trade barriers between Poland and the remaining Member States in the form of custom duties and other barriers were removed. Free movement of goods was and has remained one of the fundamental principles of the Union operation. Owing to the fact that the EU-10 states that acceded the EU in 2004 were granted a transitional period in seeking full direct

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subsidies, additional support from national budgets was provided in order to ensure production competitiveness on the condition of the single market. Including Poland into the area of the single market had a very limited impact on production market situation of the Polish agriculture due to the fact that a significant part of trade had already been conducted under duty-free principles (Kowalski A., Rembisz W., 2010).

Poland's entry into the EU meant adopting the Common Customs Tariff. Hence, the Community tariffs started to be applied in trade with the third countries. Customs tariffs were significantly reduced or even removed for import from the third countries with regard to such commodities as tobacco, rape, hop, beer, and spirits. Irrespective of the above, Polish market was protected with specific mechanisms, such as entry prices or minimum import prices with respect to certain fruit and vegetables. It resulted from the fact that a system of protecting Community market against excessive imports and unfair competition functions effectively in the EU. Protection or anti-dumping procedures were applied as per request of individual countries.

Upon Poland's accession to the EU, Polish agricultural export to the third countries' markets received subsidies and financing from the EU budget. The above-mentioned phenomenon significantly contributed to the allocation of commodities surpluses on the third countries' markets. All trade agreements, including the ones concluded within the framework of the WTO and agreements on free trade zones were negotiated on behalf of the Member States by the European Commission on the grounds of a mandate approved by the EU Council. Thereby, it was possible to secure Poland's interest in trade negotiations and to increase substantially its export capabilities (Czyzewski A., Stepien S., 2010).

Under the Act of of 2002 on administering foreign trade, Poland aligned its legislation with the EU Common Trade Policy. The act introduced all the instruments and mechanisms applied in agricultural trade in the EU. Those instruments and mechanisms included inter alia import and export licenses along with the requirement of paying a guarantee security, the method of dividing tariff quotas, establishing a minimum and maximum tranche per one license, and mechanisms of export subsidies division through tender procedures or other instruments. Because of that, the act had entered into force already in the pre-accession period, no serious changes of mechanisms and instruments occurred in foreign trade of agricultural produce in relation to the previous state. Changes in foreign trade of agricultural produce did take place within the scope of negotiations conducted with the WTO, for instance, with regard to sugar quotas (the Act, 2002).

Intervention aimed at guaranteeing farmers constant sales prices ensuring the profitability of agricultural production was an immensely important mechanism of supporting agriculture within the scope of the Common Agricultural Policy. As a result of implementing the CAP market intervention mechanisms, prices were stabilised, which allowed for better planning of agricultural activity and increasing farmers' credit worthiness towards the banks. It became possible as a result of implementing a system of minimum and intervention prices as well as a result of increasing the level of subsidies granted to the producers of most important agricultural products. Initially, the level of support provided to agricultural producers was higher in the EU than it was in Poland. Later those differences were levelled off until subsidies reached the level of the common agricultural market (Rembisz W., 2010).

High complexity of the CAP mechanisms and extremely high degree of agricultural market regulation in the European Union used to characterise the EU legislation. The major objective was to ensure the protection of the EU market against imports from the third countries. A system of quotas and high customs duties rendered the EU markets of agricultural products to be virtually closed to any external import. Market interventions included expert subsidies for the commodities exported to the third markets. The negotiations conducted within the framework of the World Trade Organisation (WTO) facilitated international trade of agricultural products (Czyzewski A., Stepien S., 2010).

Issues of milk production quotas

The milk and dairy products market in the European Union received the greatest support while being the most regulated at the same time. A system of milk quotas (individual reference volumes) and market intervention mechanisms were introduced from 1984. Limiting milk production was intended as a measure ensuring specified level of dairy produce manufacture and consumption. Each EU Member State could produce and bring into the market a specific amount of milk and dairy produce defined in the so-called "national quota". Overproduction and exceeding the limit of milk sales by authorised producers resulted in the imposition of fines that had to be paid to the EU.

The European Community established and implemented a wide scope of precise legal regulations regarding all agricultural markets. A substantial part of these regulations concerned the conditions of cattle breeding (ruminants), milk production and processing, and the trade in raw milk and dairy produce. The European Union regulations permitted the sales of only the milk that contained no more than 100 thousand microorganisms and no more than 400 thousand body cells per 1 millilitre. Milk had to originate from farms that remained under constant veterinary supervision and satisfied structural sanitary requirements.

The implementation of programme tasks which received subsidising for loan interests from the Agency of Restructuring and Modernisation of Agriculture (ARMA) still prior to Poland's accession resulted in the modernisation of the facilities for milk processing and processing farms as well as the introduction of quality and health standards in the market trade. Within the scope of aligning, the milk market to the European Union standards, legal, technical, and technological norms was introduced and adjusted to the Accession Treaty requirements.

The Veterinary Inspectorate (District Veterinary Surgeon) played a fundamental role in evaluating the degree to which veterinary conditions and quality requirements had been fulfilled. Since a significant group of farms introducing milk to the market as well

Table 1

Changes in wholesale milk quotas and livestock population in the years of 2004-2010

Voivodeship	Wholesale milk quota in thou. ton		Number of wholesale suppliers		Difference 2010/2002 in %	Livestock population in thou.		Difference 2010/2002 in %
	2004	2010	2004	2010		2004	2010	
Dolnoslaskie	165.4	152.3	4815	1318	27.3	55.7	47.0	84.4
Kujawsko - pomorskie	580.7	694.3	16250	8654	53.3	160.7	177.0	110.1
Lubelskie	615.0	524.1	49909	20144	40.4	233.4	187.3	80.2
Lubuskie	91.6	90.7	1587	626	39.4	28.9	28.4	98.3
Lodzkie	742.6	757.6	47627	24731	51.9	235.8	216.1	91.6
Malopolskie	170.1	143.0	22371	7953	35.5	170.2	112.6	66.1
Mazowieckie	1713.6	1896.6	75834	37606	49.6	565.7	543.4	96.1
Opolskie	205.1	210.4	4313	1651	38.3	51.2	48.3	94.3
Podkarpackie	128.7	102.5	18348	6075	33.1	129.5	74.6	57.6
Podlaskie	1500.6	1788.9	42679	24870	58.3	376.9	457.7	121.4
Pomorskie	225.1	237.9	4230	2411	56.9	78.6	75.8	96.4
Slaskie	180.5	182.6	10000	4931	49.3	70.5	53.9	76.4
Swietokrzyskie	186.5	165.5	19826	7151	36.1	105.8	79.4	75.1
Warminsko - mazurskie	649.3	730.2	14436	8542	59.2	183.0	207.9	113.6
Wielkopolskie	1057.6	1299.7	20942	12660	60.4	305.8	304.5	99.6
Zachodnio-pomorskie	134.2	132.3	2079	783	37.7	44.3	43.4	97.9
Razem	8346.6	9108.6	355246	170106	47.9	2796.0	2657.3	95.0

Source: unpublished data of the AMA and Universal Agricultural Census of 2010

as milk processing plants failed to complete structural adjustments in the first years of Poland's membership in the EU, Poland negotiated in the Accession Treaty transitory periods that lasted until the end of 2006 to enable the completion of the adjustments.

The first action started by the Agricultural Market Agency (AMA) still prior to the integration with the European Union was limiting milk production. On the grounds of milk production in a reference year encompassing the period from 1 April 2002 to 31 March 2003, the Agency issued administrative decisions to milk producers authorising them to produce milk. The Agency issued over 355 thousand decisions on granting milk production limit for wholesalers and over 78 thousand decisions for direct suppliers. In the first allocation, nearly 7.5 billion kilograms of milk were distributed among wholesale suppliers. A differentiation between wholesale and direct suppliers was introduced. If a milk producer produces it on his own and sells it to the entities purchasing milk, then such a producer is treated as a wholesale supplier. If, however, a milk producer introduces it directly into the market (e.g. sells it on markets), then he is treated as a direct supplier.

In 2003, the Seym amended the Act on Milk and Dairy Produce Market Regulation. The Act introduced several major changes for milk producers. It enabled a direct supplier to introduce to the market milk for direct consumption apart from dairy produce. Furthermore, the legislator extended the deadline for submitting applications for the allocation of individual milk quota. The amount was established on the basis of the number of milk cows and an average cow's yield in a herd, calculated on the grounds of an evaluation carried out by the National Animal Breeding Centre (the Act, 2003).

The Act on Milk and Dairy Produce Market Regulation of 2004 obligates the Agency to administer those milk instruments. The Act was being written with a conviction that the European Union milk market is one of the most protected ones. The basic instrument ensuring market equilibrium and milk sector growth was a system of milk production limits. The system of milk quota was one of the fundamental elements of regulating milk market within the framework of the EU Common Agricultural Policy. High quality of raw milk is a pre-condition for its technological usefulness, high quality, and keeping quality of ready dairy produce. The need to reach the European Union quality standards is currently the main challenge facing milk producers. The issue is linked not only with respecting hygiene and sanitation principles in milk production but also equipping cow-houses with adequate milking parlours and cold stores. It required farms to owe equipment for the proper preparation, preservation, and storage of animal feeds. Furthermore, it was important to ensure that farms had potable water supply and that they applied a suitable method of waste and sewage disposal (the Act, 2004). In the course of the accession negotiations regarding agriculture, a total milk quota amounting to 9380 thousand tonnes was obtained, 8500 thousand tonnes of which was a wholesale quota, and a direct sales quota was equal to 464 thousand tonnes. Moreover, Poland was

granted a restructuring reserve at the level of 416 thousand tonnes. The reserve allowed Poland to account for the growth of market demand for milk as a result of the limitations imposed on milk consumption directly at farms. The main effect of imposing milk production quotas for milk producers was a change in the conditions of farm operation and development, whose growth was administratively reduced by a sales limit. Quotas enforced changes in production management, cost calculation, long-term planning, and balancing deliveries against a limit granted.

In the course of 2004-2010, fairly significant changes occurred in milk production and trade involving the fact that the number of wholesale suppliers fell by 52.1%; whereas, the number of direct suppliers (individual suppliers) fell by 69.7%. Livestock population demonstrated a decreasing trend in all voivodeships, except Kujawsko-pomorskie (110.1%), Podlaskie (121.4%) and Warminsko-mazurskie (113.6%) voivodeships. On the contrary, the number of entities buying in milk (milk plants) remained almost unchanged (294 and 284) (Information Bulletin, 2010).

For a dozen or so, years Poland has witnessed a process of milk production being concentrated in the regions offering favourable natural and economic conditions. In 2010, in three voivodeships (Mazowieckie, Podlaskie, and Wielkopolskie,) milk purchasing constituted nearly 51% of the milk purchased in all Poland. In four other voivodeships (Lodzkie, Warminsko-mazurskie, Lubelskie, and Kujawsko-pomorskie), joint milk purchasing constituted approximately 30%, giving in total of over 80% of the national milk production. The structure of milk purchasing has remained unchanged despite the fact that in recent years the amount of individual milk quotas awarded to producers rose nationwide by nearly 16%. The system of quota transfer adopted in Poland, in which quotas are closed within individual regions, is particularly unfavourable to milk production growth and it decelerates a progressing regional specialisation. The system suppresses market mechanisms that force milk production to move to the regions in which natural and economic conditions are more favourable, where such production is more profitable. It renders Polish dairy sector to be less competitive nationwide and also on the micro-scale, since both dairy farms located in the regions with favourable conditions as well as the producers from the regions lacking those conditions lose their advantage as a result (AMA Information Bulletin, 2011).

The EU legislation on sugar market reform

Sugar market in the European Union has been regulated since 1968, while general principles of such regulation, slightly modified, have survived until this day. The objectives and general rules for the regulation of the sugar market in the European Union applied to sugar producers and sugar beet growers in equal measure. The EU sugar market regulation, constituting an element of the Common Agricultural Policy, aimed to maintain and stabilise sugar beet and sugar prices at a relatively high level. The prices were to guarantee both high incomes to farmers growing sugar beet as well as sugar production profitability. Profits, thus, obtained were to provide funds for sugar export subsidies, usually applied at low prices on the international market. To achieve that, sugar production was limited (limitation, quotas imposition) to the volume of: quota A – equal to the Community internal market demand and quota B – corresponding with the volume which according to the concluded international agreements could be exported with subsidies. Any surplus over quotas A and B, called sugar C, had to be exported in strictly defined period without any subsidies. At the same time, high customs duties provided protection against cheap sugar imports from outside of the EU.

A and B sugar quotas were allocated by the competent European Union authorities among the Member States, following which ministries of agriculture of the Member States distributed quotas among sugar producing enterprises (companies, concerns) within the territory of their respective countries. The enterprises further divided the allocated quotas among sugar plants, while sugar plants concluded contracts for adequate amounts of sugar beet with their regular growers. Sugar beet growers retained their customary, historic right to sugar beet growing and supplying irrespectively of a sugar plant's change of location, structure or ownership form, caused by e.g. liquidation of smaller plants, enterprise mergers, change of company owner etc. New sugar plant owner was obligated to contract and buy sugar beet from the previous growers. In case of an administrative reduction in sugar production quotas, a percentage share of the raw material supplies from individual growers decreased as well, as a result of which some farmers abandoned sugar beet cultivation.

The sugar market reform, implemented in the enlarged EU-25, was adopted in 2006 and it aimed to achieve a further reduction of the area of sugar beet cultivation in the European Union countries, which resulted from an agreement made with the WTO. The reform has radically changed the system that had been in place for the previous 40 years. A reduction of 35% of a guaranteed sugar price in the course of four years along with the establishment of a restructuring fund constituted the core of the reform. The community sugar market was based on the principles which it had already reformed to a large extent in case of other common market organisations. In pursuance of the Council Regulation (EC) No. 318 of 2006, producers could apply for restructuring aid, provided that they ceased the deliveries of sugar beet (Council Regulation (CE), 2006).

Territorial application has been adopted for the sake of transparency of the procedures used in qualifying the beneficiaries of financial aid. The restructuring process encompassed 981 out of 2478 communes (which constituted approximately 39.6%) in all 16 voivodeships in Poland. Beneficiaries, in order to qualify for aid, had to operate within the territory of those communes.

The largest decrease (abandonment) of sugar production quota occurred in the following voivodeships: Mazowieckie, Kujawsko-pomorskie, and Wielkopolskie. It was also in those voivodeships that the largest number of growers was partly or completely divested of the right to cultivate and supply sugar beet. In turn, Zachodniopomorskie voivodeship was the least affected by the restructuring process.

Table 2

Decrease (abandonment) of sugar production quota and the number of growers who lost their right to cultivate sugar beet in comparison with the agricultural censuses of 2002 and 2010

Voivodeship	Abandoned sugar quota (in tonnes)	Number of sugar beet growers	Area of sugar beet cultivation in 2002 (in thou. ha)	Area of sugar beet cultivation in 2010 (in thou. ha)	Changes 2010/2002 in %
Dolnoslaskie	44669.0	1464	29.7	19.1	-35.7
Kujawsko - pomorskie	50887.8	4061	54.0	38.4	-28.9
Lubelskie	12767.1	1696	46.1	33.7	-26.9
Lubuskie	9968.6	221	2.3	0.9	-91.3
Lodzkie	15598.7	1819	10.8	6.6	-38.9
Malopolskie	2274.3	188	1,8	1.6	-11.2
Mazowieckie	64153.4	5305	23	11.8	-47.3
Opolskie	31837.7	1705	23.1	14.4	-37.7
Podkarpackie	7655.7	712	6.6	4.6	-30.3
Podlaskie	35551.3	1463	6.5	0.3	-331.7
Pomorskie	9087.7	508	13.7	9.9	-27.7
Slaskie	2594.3	482	2.9	1.7	-41.4
Swietokrzyskie	25583.5	2248	9.7	5.1	-47.4
Warminsko - mazurskie	5743.4	215	5.1	3.4	-33.4
Wielkopolskie	48348.3	4609	54	42.8	-20.8
Zachodniopomorskie	147.9	22	13.6	12.1	-10.1
Razem	366868.7	26718	302.9	206.4	-31.9

Source: Announcement of the Ministry of Agricultural and Rural Development of 2011 and the agricultural censuses of 2002 and 2010

An analysis of sugar beet cultivation area per voivodeship was conducted based on the data from the universal agricultural censuses of 2002 and 2010, demonstrating that sugar beet crops fell in all regions but not in equal measure. Despite a comprehensive reduction in its cultivation, there were still several voivodeships, which constituted centres of sugar beet growing. Those centres included the following voivodeships: Wielkopolskie (42.8 thou. ha), Kujawsko-pomorskie (38.4 thou. ha), and Lubelskie (33.7 thou. ha). Overall, a total area of 114.9 thousand ha was covered with sugar beet crops in the territory of the voivodeships specified above, which was 55.8% nationwide. In some voivodeships, sugar beet growing was headed towards a complete end, as was the case, for instance, in Podlaskie (0.3 thou. ha), Lubuskie (0.9 thou. ha), or Malopolskie (1.6 thou. ha) voivodeships.

In exchange for the loss of the right to cultivate and supply sugar beet, farmers were compensated from the EU funds. The quota amounts that farmers' reference quota concerned were as follows (in thou. EUR):

2006	2007	2008	2009 and subsequent years
99 135	122 906	146 677	159 392

Furthermore, the National Restructuring Programme was implemented in the communes specified by the Ministry of Agriculture and Rural Development (MARD) and those communes were subject to sugar industry restructuring (MARD Announcement, 2011).

According to M. Niemczak, in the first half of the 1990s, sugar industry in Poland featured 78 sugar plants scattered all over Poland, except Malopolskie voivodeship. The largest number of sugar plants was found in the following voivodeships: Kujawsko-pomorskie (13), Dolnoslaskie (12), and Wielkopolskie (11). There was only 1 sugar plant in the territories of Lubuskie, Podlaskie and Warminsko-mazurskie voivodeships. The pace of closing down sugar plants varied in particular voivodeships. Forty-three sugar plants operated in the course of the financial year of 2004/2005. The largest number of plants was closed in the following voivodeships: Dolnoslaskie (9), Kujawsko-pomorskie (7), Mzowieckie and Wielkopolskie (6 in each), and Lubelskie (4). The only two sugar plants located in Lubuskie and Warminsko-mazurskie voivodeships were closed as well. The number of sugar plants fell to 31 in the next financial year of 2006/2007. The most important determinants in the reduction of existing sugar plants were, inter alia: the number of sugar plants in a particular voivodeship, their processing and production capacity, financial results, and convenient transport connections. The above-specified factors caused the sugar plants with the best technical and production results start to take over the production from the liquidated facilities (Niemczak M., 2008). As

a result of subsequent privatisation and restructuring of the sugar industry (2010), 18 sugar plants remained in operation which belonged to four ownership groups, namely, the National Sugar Company, holding 7 plants and 39.1% share on the sugar market, Pfeifer&Lange with 4 plants and 26.3% share on the sugar market; and Suedzucker with 5 plants and 25.3% share on the market. Nordzucker is the smallest of the concerns with 2 plants and 9.3% share on the sugar market (AMA Information bulletin, 2010).

Joint organisation of agricultural markets

Under a Council Regulation (CE) No. 1234 of 2007 a joint organisation of agricultural markets was established and regulations concerning certain agricultural produce were introduced. The aim of the Common Agricultural Policy reform in this respect was, inter alia, simplifying the legislation, which used to regulate all aspects of agricultural trade in too great a detail. According to the Council, the simplification should not lead to questioning the decisions regarding the CAP that had been taken in the past. A diversified system of price support for individual sectors was devised in order to ensure market stabilisation and an adequate quality of life of rural population. Therefore, the Council (CE) argues that it ought not to annul or amend the existing instruments. The Council has adopted 21 joint market organisations (JMO), since the implementation of the CAP addressed to individual products or groups of products, which were regulated with separate, basic Council regulations. Most basic regulations had the same structure and many common provisions. It concerned in particular the regulations on trade with the third countries and general regulations related with the internal market. Thereby, it was necessary to join the provisions from different regulations into one framework. The decision constitutes the most important action within the scope of the CAP reform that enabled the annulment of almost 50 EU regulations and a reduction in the number of secondary legislation from 650 provisions to 200. The regulations govern a number of support instruments designed for agricultural producers, including state interventions and private storage, special intervention funds, systems of reducing production, systems of aid, measures of introducing products into trade and production as well as trade with the third countries. Moreover, previously separate managing committees have been replaced with one Management Committee that will be operating within the scope of individual sectors. The establishment of a universal joint market organisation does not constitute a policy change in individual sectors. It is a change of technical nature, aimed at simplifying legislation, reducing the number of regulations, achieving greater transparency, and simplifying decision-making processes (Council Regulation (CE), 2007).

Conclusions

The Agency established at the threshold of the process of system transformation was meant to facilitate the entry of Polish agriculture and the entities operating in it into a new economic reality. The objectives of the Agency activities chiefly focused on agricultural market stabilisation, and those objectives were subject to significant evolution, causing, in turn, changes of the situation on the agricultural market. The Agency was gradually developing new forms of operation and was extending the scope of intervention instruments in use. According to the current CAP terminology, the agricultural market and the trade of agri-food products belongs to the first CAP pillar. The instruments functioning in this pillar were divided into three fundamental groups: 1) price support, 2) direct financial aid to agricultural producers, and 3) quantitative limitation of supply. The above actions are a part of the system of joint market organisation. These three groups of the first pillar instruments are used simultaneously, and they complete and strengthen one another (Rembisz W., 2010).

Another step that the European Union undertook was establishing a joint organisation of agricultural markets in 2007. Certain principles were adopted that concerned in particular market interventions, the system of quotas and aid, standards of introducing products into trade and production as well as trade with the third countries. Joint organisation of agricultural markets designates a legal framework established on the EU level with regard to all agricultural sectors. In this way, the European Union aims to create common rules of agricultural markets management, standards of introducing agricultural produce to trade and their export, and import to and from the European Union.

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COOPERATION IN BUSINESS ACTIVITIES ON DAIRY FARMS IN SOUTH OSTROBOTHNIA, FINLAND

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Abstract. The aim of this study was to map and measure South Ostrobothnian milk producers' current resources, need for resources, and preconditions for cooperation as well as how they cooperate. The authors explored different operational models for cooperation and contract work. The data were collected from databanks and through interviews. The research data from databanks were collected from 311 farms and 218 dairy farmers of these farms were interviewed. The statistical analyses were based on cross-tabulations, χ^2-tests, Mann-Whitney U tests, Kruskall-Wallis tests and Pearson's correlation analysis. The results indicate that milk producers can develop their business activities by cooperating at different scopes. Cooperation will provide new opportunities to gain a competitive edge. Economies of scale can be gained, unit costs can be reduced, and risks can be shared by cooperation. Milk producers developing their business activities need resources, of which arable land is the most limited one. Options to solve this challenge include cooperation, e.g. with crop farmers on the spreading of manure and crop rotations. On milk farms, focusing on core knowledge, outsourcing, networking, and other alliances is becoming a part of strategic thinking.
Key words: milk production, cooperation, resources, strategy.
JEL code: Q12, L23, L25

Introduction

Competition in the EU milk market is tightening as quotas are disappearing and milk production is growing. The milk producers must react to the change in their operational environment. Finnish agriculture is characterized by the tradition of doing it yourself. Hiring outside workforce, cooperation in production, and the use of outsourcing services have been scarce (Pyykkönen P. and Tiilikainen S., 2009). As competition tightens, the spontaneous development of business operations by the milk producer may be too slow. They are not able to bear the risk of investments alone. According to Vehkamäki et al. (2011), one fifth of South-Ostrobothnian milk producers are potential developers of production by their entrepreneurial characteristics and resources.

The purchase of resources and the utilization rate of capacity can be improved through business management practices (Alhola K. and Lauslahti S., 2000; Bragg S.M. and Burton J.E., 2006). In changing conditions, the entrepreneur's role is emphasized and the importance of entrepreneurship increases (Kirzner I.M., 1979). Responding to the change requires entrepreneurship of a new kind. Cooperation may help with this task since it supports the formation of core competence, on the basis of which success can be built (Ali-Yrkkö J., 2009).

In Finnish agriculture, cooperation has been studied from the administrative, legal and organizational perspectives, in particular cooperatives and machinery stations as well as the organization of production and labour input (Kirkkari A. M., et al., 1998; Kallioniemi M., 1998; Pentti S., 1999). The key objectives have been the improvement of labour utilization, the securing of the sufficiency of labour input, and coping with work peaks, but also economic objectives have been set. In recent times, there have been studies on the organization and intensification of work (Kaila E. and Tuure V.-M., 2009; Kauppinen R., 2012). In the present article, cooperation is studied from the perspective of business management. Starting cooperation requires strategic thinking, which in the present study can be assumed to underlie the milk producer's decisions (Mintzberg H, 1991; Santalainen T., 2006). The study intends to show it in the scope of cooperation. The amount of cooperation is measured as compensation in money because other kinds of cooperation are scarce. The study aims to answer the following questions:

— How much and what kind of cooperation is done on South Ostrobothnian dairy farms?
— What options can be found to implement cooperation?
— What common characteristics do the South Ostrobothnian dairy farms involved in cooperation have?
— Can the use of capacity and the acquisition of resources be facilitated by cooperation?

Data and methods

The data was collected in cooperation with Seinäjoki University of Applied Sciences, MTT (Maa- ja elintarviketalouden tutkimuskeskus (Agrifood Research Finland)), ProAgria South Ostrobothnia, the Ministry of Agriculture and Forestry, the Agency for Rural Affairs, Statistics Finland, and TTS (Työtehoseura (Work Efficiency Institute)). All the dairy farms with more than 20 cows were retrieved from the data for 2009 of the Farm Register. After this, they were arranged in order of magnitude according to the number of cows. Every other dairy farm was selected to be included in the data (1st farm, 3rd farm, 5th farm, etc.). The sample ended up with 320 dairy farms. The data about the taxable

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Table 1

Comparisons of the averages of the background variables (Mann-Whitney U-test); milk producers who have been interviewed and who have refused

	Interviewed	Refused	
n	218	93	p-value
Farmer's age, years	44.26	45.28	0.472
Arable land, hectares	70.37	66.36	0.070
Number of cows	40.21	35.15	**0.006**
Milk output, litres	313 909	261 105	**0.003**
Increase in milk litres 2006-09, %	20.08	10.61	**0.019**
Taxable income of agriculture, €	64 212	55 997	0.736

Source: authors' calculations based on the research data

income, expenditure etc. of 313 farms received from Statistics Finland. The data that were not received from the registers, such as labour input and machinery, were collected through interviews. The interviews were implemented by ProAgria South Ostrobothnia. 70 per cent of the milk producers (n=218) accepted to be interviewed.

The data about labour input were collected in a uniform way by the TTS-Manager labour time planning tool. The data provided by the milk producer were entered in the program by stages: animal work, crop farming work, and other work. The values were defined for machinery and equipment into next categories: tractors; forage harvesting machinery; combine harvesters; ploughs; tillage equipment; sowing machines and rolls; spraying and fertilizing machinery; trailers; milking machines; equipment for milk cooling; feed processing equipment, equipment for feeding, and equipment for manure removal.

Since the data is cut (> 20 milking cows) the non-parametric Mann-Whitney U and Kruskall-Wallis tests, which do not require that the variables present a normal distribution, are used instead of a t-test and variance analysis (Metsämuuronen J., 2009). Pearson's correlation analysis is used to analyse the degree of linear correlation between cooperation and the variables selected for the study. Non-linear dependence is studied through cross-tabulations, and the χ2 test is used for testing. The χ^2 test is adequate when the sample size is so large that 20 per cent of the frequencies are lower than five and all the frequencies are higher than one (Ranta E. et al., 1989), which is achieved in the sample. The significance is marked with the p-value.

Research results and discussion

The milk producers who participated in the interview have developed their farm more than those who refused to participate in the interview. The means for number of cows, amount of milk and increase in production show a statistically significant difference (p-value < 0.05) between those who participated in the interview and those who did not (Table 1). Refusing to participate in the interview was partially systematic.

Cooperation on dairy farms

Most of the milk producers had cooperation, and only a few of them operated completely on their own. For every other milk producer, the cooperation was of a small scale. Cooperation was done in the harvesting of silage, the spreading of manure, seeding and the cultivation of soil, the threshing and drying of grain as well as, to some extent, in other farm and private household work. Only on one dairy farm cooperation was done in animal husbandry. Cooperation was mainly done against compensation in money; to a small extent as barter work[1]. The cooperation expenses correlated[2] with the total income (0.35^{***}), number of cows (0.27^{***}), arable land (0.28^{***}), interest payables (0.28^{***}), the value of production buildings (0.423^{***}), the value of machinery[3] (0.28^{***}), paid labour (0.15^{**}), and the value of forage harvesting machinery (0.20^{**}). Enterprise size and cooperation have linear dependence as well as paid labour and enterprise size do. Those milk producers who have invested a lot in milk production and a little in cultivation machinery exploited cooperation to the greatest extent . It seems that when an enterprise size grows, enterprises exploit cooperation and concentrate on their core competency. On the other hand, tight liquidity may increase the willingness to cooperate.

For cross-tabulation, the values of crop and grass farming machinery were classified into three categories[4]: less than 15.000 €, 15.000 to 40.000 €, and more than 40.000 €; and the acquisition of cooperation services into four categories, respectively: no cooperation, less than 2.500 €, 2.500 to 9.999 € and 10.000 € or more (Table 2). The distribution on the first line is significantly skewed compared to the other lines, and it has one, clear mode value (does not cooperate / the value of crop and grass farming machinery higher than 40.000 €). The milk producers who have little

[1] Barter work was done in the harvesting of silage, sowing, spraying, threshing, and the spreading of manure.

[2] Statistical significance level: *** = p < 0.001, ** = p < 0.01, * = p < 0.05

[3] The value of machinery includes the machinery of the cowshed.

[4] Work at cowshed is not considered, because only one of the farms cooperated in animal husbandry.

Table 2

Value of crop and grass farming machinery, and acquisition of cooperation services

Acquisition of cooperation services	Value of crop and grass farming machinery			Total
	< 15000 €	15000 – 40000 €	> 40000 €	
No use	6	12	17	35
< 2500 €	23	25	21	69
2500 – 9999 €	34	27	15	76
≥ 10000 €	15	15	8	38
Total	78	79	61	218

Source: authors' calculations based on the research data

Table 3

Connections between the values of crop and grass farming machinery, and the values of cowshed machinery

Value of crop and grass farming machinery	Value of cowshed machinery			Total
	< 10000 €	10000 – 30000 €	> 30000 €	
< 15000 €	**49**	21	8	78
15000 – 40000 €	33	29	17	79
> 40000 €	15	21	**25**	61
Total	97	71	50	218

Source: authors' calculations based on the research data

Table 4

Cooperation on dairy farms in South Ostrobothnia

	Utilize service	Not utilize service	Total
Offer service	26.6 %	4.1 %	30.7 %
Not offer service	57.4 %	11.9 %	69.3 %
Total	84.0 %	16.0 %	100.0 %

Source: authors' calculations based on the research data

cooperation have most invested in crop and grass farming machinery. The distribution in the last column of Table 2 is also skewed, and the cell "does not cooperate / the value of crop and grass farming machinery is more than 40.000 €" receives a clearly higher value than the cell "cooperates for more than 10.000 € / the value of crop and grass farming machinery higher than 40.000 €". The milk producers exploiting cooperation services to the greatest extent invest little in crop and grass farming machinery. Based on the $\chi 2$ test, their investment behaviour is not statistically independent (p-value = 0.036).

In Table 3, the values of crop and grass farming machinery and cowshed machinery are classified by order of magnitude. The distribution on the first line is notably skewed compared to the other lines, and it has one, clear mode value (the value of cowshed equipment lower than 10.000 € / the value of crop and grass farming machinery lower than 15.000 €). These milk producers have refrained from investments. In this group, the average milk output is clearly smaller than the average in the data (6.838 litres / 7.648 litres) as well as the taxable income of agriculture (51.656 € / 64.212 €). Failure to make investments is connected with poor results. The distributions in the first and last columns of Table 3 are skewed and they have clear mode values. In the group of the most active investors, the average output of cows is higher than the average in the material (7.969 litres / 7.648 litres) as well as the taxable income of agriculture (71.094 € / 64.212 €). On these farms, milk output had been increased in years 2006–2009 significantly more than on the average (43.4 % / 20.1 %). According to the $\chi 2$ test, the investment activities are not statistically independent (p-value = 0.000).

Cooperation in business activities

The milk producer can participate in different forms of cooperation and cooperate with different people. The milk producers cooperated in a maximum of nine different forms of cooperation. In the present study, cooperation is considered based on four categories of cooperation. The classification criteria consist of the milk producers' answers. The classification was established based on the use and supply of cooperation in the following way (Table 4):

Table 5

Values of crop and grass farming machinery in different cooperation strategy groups

	Cooperation strategy groups [a]				
n	58	125	9	26	
Machine	U,O	U,nO	nU,O	nU,nO	p-value
Combine harvester, €	4712	3240	**14768**	5955	**0.002**
Cultivation machinery [b], €	8815	8095	13482	**16723**	**0.022**
Grass machinery, €	22764	14513	21453	**26137**	**0.002**
Arable land/cow	2.00	1.74	**2.31**	1.96	**0.011**

a) U = utilize, O = offer, nU = no utilize and nO = no offer
b) Ploughs, tillage equipment, sowing machines and rolls, spraying and fertilizing machinery

Source: authors' calculations based on the research data

1) milk producers who utilize farm to farm services but not offer them;
2) milk producers who offer farm to farm services but not utilize them;
3) milk producers who utilize and offer farm to farm services;
4) milk producers who do not utilize and offer farm to farm services.

Of the South Ostrobothnian milk producers, 84 per cent utilize cooperation, and 31 per cent offer it, 27 per cent both utilize and produce cooperation services, and 12 per cent have no cooperation. Most frequently, cooperation is done in the harvesting of silage (60 %), the spreading of manure (44 %) and threshing (40 %). Least frequently, cooperation is done in sowing and tillage work (17 %). Almost all of the milk producers have sowing and tillage equipment. As a rule, their value is low, because in the case of 82 per cent of the milk producers it does not reach 10.000 €. The use of these machines has been scarce, because the cultivated area covered by crops is small in comparison with that covered by grass. Of the milk producers utilizing cooperation services, 60 per cent paid 5.000 € or less for the cooperation services while 8 per cent did not use compensation in money at all. Of the milk producers utilizing cooperation services, 21 per cent use more than 10.000 € worth of cooperation services. Eight per cent of the milk producers used 1.000 or more hours of hired labour force.

In the cooperation strategy groups, the Kruskall-Wallis test was used to study whether the values of crop and grass farming machinery were the same in these groups (Table 5). The values of crop and grass farming machinery are the lowest on dairy farms utilizing cooperation, but not offering it. The dairy farms that do not utilizie cooperation services have invested most capital in those machines. Dairy farms utilizing and offering cooperation services have invested capital in grass farming machinery in the same way as dairy farms that are not engaged in cooperation at all.

The milk producers utilizing cooperation services but not offering them (U,nO) used services most frequently in the harvesting of silage, the spreading of manure, and threshing. They had least arable land per cow. *The number of the milk producers offering cooperation services but not utilizing them (nU,O)* had most arable land per cow. They were only nine in this group. For four of them, it was an important source of income (> 20.000 €), most frequently in the harvesting of silage and threshing. *Of the milk producers utilizing and offering cooperation services (U,O)*, 55 per cent paid less than 5.000 € for the cooperation services. Whereas, 36 per cent of them spent 5.000 € or more on cooperation services. For every fifth of them, the production of cooperation services was an important source of income (> 15000 €). Cooperation was done most frequently in the harvesting of silage, the spreading of manure, and threshing.

Demand for farm-to-farm cooperation services

The data was classified into three categories: milk producers who paid less than 2.500 € for cooperation services, those who paid 2.500 to 9.999 €, and those who paid 10.000 € or more. The Kruskall-Wallis test shows there are statistically significant differences among the groups related to the use of cooperation services in the number of cows and arable land, in the amount of capital invested in combine harvester, cultivation machinery, grass machinery, cowshed and equipment, and in the liabilities of agriculture (Table 6). The values of combine harvester and grass machinery per arable land (€/ha) showed statistically significant differences among the groups. The amount of capital invested in combine harvester and grass machinery per hectare is the largest in the group utilizing least cooperation services. The use of paid workforce is the most frequent on farms with the most frequent use of cooperation services. Yet, the difference is not statistically significant (p-value 0.224). The youngest milk producers are found in the group of those who have had the most cooperation. In the Mann-Whitney U-test, this group differs from the two other groups (p-values 0.033 and 0.007).

Cooperation is the most active on dairy farms having invested in a cowshed and related machinery, at the same time, as they have refrained from investments in cultivation machinery. The amount of capital invested in tractors, combine harvester, grass machinery and other cultivation machinery both per dairy farm and a number of arable hectares is the largest in the group utilizing least cooperation services. The finding that turnover of the dairy farms that have most demand for farm-to-

Table 6

Comparison of background variables in different demand groups for farm-to-farm cooperation services; Kruskall-Wallis test

	Demand for cooperation services, €			
	< 2500	2500-9999	≥ 10000	
n	35	145	38	
	Average	**Average**	**Average**	**p-value**
Capital				
Number of cows	40.1	37.8	49.6	**0.038**
Arable land, hectares	78.1	63.2	90.5	**0.000**
Tractors, €	59 596	40 831	53 876	0.084
Combine harvester [b)], €	8222	4154	2002	**0.000**
Cultivation machinery [a),b)], €	20 341	8 020	11 357	**0.022**
Grass machinery [b)], €	24 933	18 518	11 824	**0.001**
Cowshed and equipment, €	64 823	78 797	172 677	**0.000**
Liabilities of agriculture, €	140 226	177 591	407 921	**0.001**
Work on farm, hours	5 179	5359	6010	0.224
Financial				
Turnover, €	143 159	141 182	226 697	**0.002**
Taxable income of agriculture, €	68 413	61 774	69 644	0.847
Other variables				
Farmer's age, years	46.0	44.6	41.5	**0.036**
Milk production, litres	308 050	293 687	396 467	0.055
Increase in milk litres 2006-09, %	13.9	18.9	30.2	0.342
Arable land/cow [c)]	2.05	1.75	2.07	**0.016**

a) Ploughs, tillage equipment, sowing machines and rolls, spraying and fertilizing machinery.
b) €/hectare; combine harvester (p-value = 0.000), and grass machinery (p-value = 0.000).
c) If we divide arable land of the whole group by number of cows the figures are 1.95, 1.67 and 1.82.

Source: authors' calculations based on the research data

farm services is highest (p-value = 0.002) but not with taxable income in agriculture (p-value = 0.847), can be interpreted so that the taxable income of the farm that have most demand for farm-to-farm services is as low as other dairy farms due to the high sunk costs of recent investments on dairy business (Mäkinen et al., 2012).

Supply of farm-to-farm cooperation services

Milk producers utilizing cooperation services (151) outnumber those producing cooperation services (67), because milk production is labour intensive. The data were classified into two groups: milk producers who have charged less than 2.500 € for their services and milk producers who have charged 2.500 € or more (Table 7). Arable land and the values of combine harvester, cultivation machinery and grass machinery are statistically significantly higher in the group of those providing a lot of cooperation services than in the other group. In the group, in which is the most cooperation, there is an average of 2.37 hectares per cow and in the other group –1.77 hectares, respectively. It seems that, in the group providing the most cooperation services, resources have been allocated for crop production and contract work, while the investment of milk production has remained scarce. The risk of diversification is due to the fact that the entrepreneur's know-how is not sufficient for all the areas, and the resources are not efficiently used, and so the economic result of the entire business operations may be affected.

Conclusions, proposals, recommendations

Only one farm has cooperation in animal husbandry. Cooperation is carried out mostly in the harvesting of silage, the spreading of manure and threshing. Cooperation is carried out to a small extent in seeding and the cultivation of soil, and in other farm and private household work. Cooperation tends to become more common when dairy business expands and develops. Then, the milk producer will concentrate on milk production, which will improve the economic result. Young dairy farmers cooperate more than the old ones. They build networks and exploit them. This may have a decisive effect on the success of the enterprise.

Table 7

Comparison of the background variables in different supply groups of farm-to-farm cooperation services; Mann-Whitney U test

	Supply of cooperation services, €		
	< 2500	≥ 2500	
n	179	39	
	Average	**Average**	**p-value**
Capital			
Number of cows	40.8	37.5	0.479
Arable land, hectares	67.6	82.9	**0.007**
Tractors, €	44 703	52 608	0.131
Combine harvester, €	3 782	7 416	**0.007**
Cultivation machinery [a),b)], €	9 043	11 813	**0.003**
Grass machinery, €	16 743	25 901	**0.003**
Cowshed and equipment, €	93 560	89 969	0.643
Liabilities of agriculture, €	211 575	214 569	0.376
Work on farm, hours	5 234	5239	0.332
Financial			
Turnover, €	133 656	162 804	0.163
Taxable income of agriculture, €	65 231	58 062	0.985
Other variables			
Farmer's age, years	44.8	42.0	0.085
Milk production, litres	317 674	296 627	0.540
Increase in milk litres 2006-09, %	21.9	15.3	0.160
Arable land/cow [b)]	1.76	2.32	**0.000**

a) Ploughs, tillage equipment, sowing machines and rolls, spraying and fertilizing machinery.
b) If we divide arable land of the whole group by number of cows the figures are 1.66 and 2.21.

Source: authors' calculations based on the research data

The milk producers offering the most cooperation services have most arable land per cow, which is indicative of the strategic thinking of the group in question. Because of the diversification, productivity in milk production remains at a lower level than on the average in the data. Excessive diversification may be detrimental as the milk producer's time and know-how are not sufficient to cover all the areas (Rantamäki-Lahtinen L. et al., 2008; Rantamäki-Lahtinen L., 2009). Some of the milk producers who have a lot of crop farming capacity exploit it and cooperate, but the major part of them act on their own and waste their resources. Cooperation allows the improvement of the use of resources (Ryhänen M. et al., 2011).

The development of dairy farms is challenging because little arable land is opened to the market compared to the needs of those developing their production (Vehkamäki S. et al., 2011). High farmland prices affect the liquidity of farmers developing their production (Pyykkönen P., 2006), so that new means are needed for the purchase of land. Cooperation between different lines of production may intensify land use, which will decrease demand for land and pressures to increase prices. The outsourcing of heifer rising and/or the establishment of a joint cowshed will open up new opportunities for the acquisition of arable land (Laitila E. et al., 2012).

Eventually, it is up to the milk producer to decide how to develop their farm: focusing on doing it themselves or in cooperation with others. Decision situations differ from each other. Milk producers' values, attitudes and personal characteristics are different, and so there is no one right way to act. Well-established cooperation in crop and grass farming should spread to animal husbandry.

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THE ROLE OF OLSON'S INTEREST GROUPS THEORY IN EXPLAINING THE DIFFERENT LEVEL OF AGRICULTURAL SUPPORT IN COUNTRIES WITH DIFFERENT DEVELOPMENT LEVEL[1]

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Abstract. The character of agricultural policy is different in countries with different development level. Well-developed countries subsidize agricultural producers, while less developed countries often tax them. This phenomenon is difficult to explain on the basis of classical economic arguments, however Mancur Olson's theory of interest groups seems to give an answer. The main aim of this paper is to explain the phenomenon of the development paradox with the use of Mancur Olson's theory of interest groups. Theoretical considerations and empirical analysis have led to the conclusion that the theory of interest groups and collective actions seems to provide a well-grounded political explanation of the development paradox. Since farmers group in well-developed countries is relatively small, the benefits from the support per capita are significant, and so are the incentives to collective action. At the same time, consumers/ taxpayers group is relatively big, and agricultural support costs per capita are small, which weakens the incentives to act against agricultural policy. Empirical analysis also confirms that the level of support to agriculture is an inverse function of the relative size of farmers' interest group and that the relation between GDP per capita and agricultural support is significantly positive.
Key words: public choice theory, agricultural support.
JEL code: Q18, H41

Introduction

The agricultural sector is a part of the economy, which was and still is the subject to strong government's interference; however, the character of such actions is different in countries with different development level. Well-developed countries support agricultural producers, protect domestic markets, and subsidize export, while the least developed countries often tax their agricultural sector. This phenomenon, well known and described in the literature (Swinnen J., Banerjee A., Rausser G., de Gorter H., 2000; Olper A., 2001, Grzelak A., 2011), was called by the author of this paper "a development paradox". It means that there exists a positive relation between the level of economic development and the amount of support provided to the agricultural sector. This situation contributes to the growth problems and poverty accumulation in developing countries. On the other hand, in developed countries support goes mainly to large producers, while the income of smaller farmers does not substantially increase. From an economic perspective, it makes little sense because development paradox is contrary to the classical theories of economic and foreign trade, which indicates that agricultural policy intervention reduces both the welfare level of the whole world and of an individual country. Hence, one might search for the explanation of this phenomenon not in the classical economic arguments, but in the concepts of the public choice theories (Anderson K., 2009), including the Mancur Olson's theory of interest group, which explains why smaller interest groups have larger influence on government's policy than the larger ones.

Although agricultural producers in developed countries constitute a small share of labour force, their political influence is strong, and hence the level of support they receive is much higher than in less developed countries, where farmers constitute majority of the labour force. This paper assumes the following research hypothesis: the level of support agricultural producers receive is an inverse function of the relative size of their interest group. The main aim of this paper is to explain the phenomenon of the development paradox using Mancur Olson's theory of interest groups. The first part of the paper gives some theoretical background and describes the logic of Olson's theory. The second part presents an empirical analysis, which proves the assumed hypothesis.

Research results and discussion

1. Conceptual framework

The theory of interest groups has been formulated in "The Logic of Collective Action: Public Goods and the Theory of Groups", the most important book by Mancur Olson, first published in 1965 (Olson M., 1965). The book questions two widespread opinions: that in a democracy the majority will prevail over the minority; and that everyone in a group will act collectively to achieve common interest. Olson argues that incentives to act collectively decline, as the interest group is getting relatively larger, and that the smaller interest groups gather greater political power. There are several factors, which explain this phenomenon. Firstly, in order to act collectively, a group requires a kind of organization, communication, and coordination among its members.

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Transaction costs of organizing a lobby are higher in larger groups than in smaller ones. Secondly, potential gains per capita are lower in larger groups, while individuals in smaller groups can gain more. This means that incentives to act collectively are weaker in lagers groups, and individuals will tend to "free ride". Thirdly, in larger groups, individuals are relatively small in the relation to the total, so the addition or subtraction of a single member will have almost no meaning for the group's success. In a smaller group, actions of an individual matters, so there exists stronger social and economic incentive.

The above presented conceptual framework can be applied to explain why farmers in developed countries receive higher support, and farmers in developing countries are even being taxed. There is a negative relation between the level of development and the size of agricultural population. Many developing economies are based on the agricultural sector; hence, agricultural work force constitutes the majority of the society. Government has no other option but to tax the largest sector of its economy. During the economic development and transition from an agricultural to an industrial economy, labour begins to drain from the agricultural sector to other sectors of the economy[3]. At the same time, one can observe the process of transformation from agricultural taxation to protectionism. This situation becomes clearer when one investigates in detail the sharing of social costs and benefits of agricultural policy. Along with the economic growth and changes in the structures of the economy, the distribution of benefits and costs of agricultural policy also changes. Firstly, the relation of population working in agricultural sector to the total population is getting relatively smaller. However, the antagonistic group, which bears the costs of supporting farmers, viz. consumers/taxpayers working outside the agriculture, is getting relatively larger. This means that the cost per capita (i.e. per person employed outside agriculture) of supporting agricultural income decreases, and so does the incentive to act against such policy (Swinnen J., 2008). Secondly, due to the Engel's law[4], public opposition to agricultural subsidies will reduce, as the relative costs of such support for consumers decline. These two facts lead to the situation, in which benefits of the potential reduction in agricultural support would be distributed among a large group of consumers and taxpayers, which decreases the incentives to engage in a policy against agricultural support. For an individual it is simply not beneficial enough to engage resources and time because profits would be too small.

On the other hand, a look closer at the distribution of benefits, which agricultural policy generates for the farmers, is worth of attention. Firstly, as the level of farmer's income received from the market decrease, they start looking for other sources of income, including government transfers. As a result, the incentives to engage in political and collective actions are stronger. Secondly, because the relative size of farmers' interest group is declining, the benefits of agricultural policy per capita are higher and essential for the individuals; hence, they tend to act actively in favour of their interest group. Being aware of this, the government and political parties support the most influential group, in this case – farmers. That is why relatively smaller farmers group will benefit from higher level of agricultural protection. The above-mentioned theoretical considerations allow formulating the hypotheses, that the level of agricultural support is an inverse function of the relative size of the farmer's interest group.

2. Empirical analysis

The empirical analysis is based on the World Bank database on estimates of distortions to agricultural incentives 1955-2007, updated in March 2012 (Anderson K., Valenzuela E., 2008; Anderson K., Nelgen S., 2012). The original version of this database included data from 75 countries with different level of development[5], the total share of which in the world's population, farmers' number, agricultural and total GDP accounts for around 90-96% of world's total. The basic support estimate NRA (nominal rate of assistance) has been estimated for commodities that together account for 70% of the value of agricultural production. The NRA for a single product indicates the percent for how much agricultural producer's income is higher (or lower) than the percent, he would obtain in the absence of any interference from the state. NRA for the sector is calculated as a weighted average, where the weights are based on the value of production measured in world prices. NRA used in the empirical analysis also includes non-product specific support for the sector as whole and decoupled payments[6].

The Table 1 presents the level of agricultural support measured with the NRA in the groups of countries with different development level. It can be noticed that the NRA reaches the highest values for countries with the highest level of GDP per capita, i.e. the European countries, North America and Japan. However, in Asia, Africa and Latin America, until the beginning of the twenty-first century, agricultural producers were taxed as indicated by the negative values of NRA. It can be observed, however, that this estimate is evolving in favour of the agricultural sector while countries are developing and the national income is growing.

[3] Some authors try to justify intervention in agriculture in the developed countries with the attempts to maintain a macroeconomic balance and a need to return an economic surplus to agriculture, which drains in the process of economic development (Czyzewski A., Kulyk P., 2010).

[4] Decrease in the share of food expenditure in total consumer spending.

[5] Both, the core and supplementary databases from 2007 have been updated to 2010 (or to 2009 in some developing countries). Another seven countries have been added as well, namely Belgium, Cyprus, Greece, Israel, Luxembourg, Malta, and Morocco, to make a total of 82 countries.

[6] The term refers to the support instruments which are not directly related to the current level or type of production. The purpose of these payments is to provide support to agricultural producers in a way which does not distort the level of prices, production, consumption and foreign trade. Since 2004, the majority of direct payments under the Common Agricultural Policy have been decoupled.

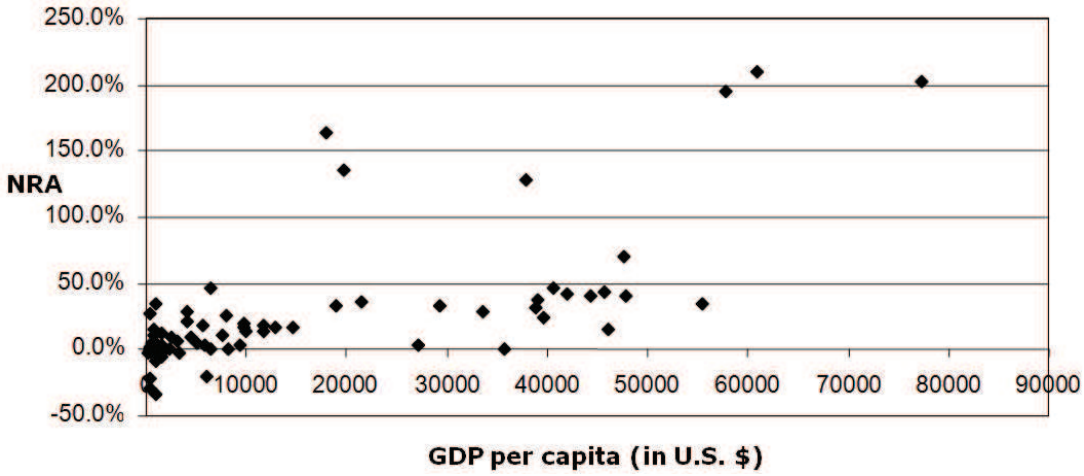
Table 1

Nominal rate of assistance (NRA) in agricultural sector in groups of countries with different development level (1955-2007[a])

Region	NRA (in %)						GDP per capita[b]
	1955-59	1965-69	1975-79	1990-94	2000-04	2005-07	world = 100
Africa	-14	-11	-13	-9	-7	n.a.	14
Asia	-27	-25	-24	-2	12	n.a.	20
Latin America	-11	-7	-18	4	5	n.a.	64
Central and Eastern Europe	n.a.	n.a.	n.a.	10	18	25	48
Western Europe	44	68	56	64	37[c]	18[c]	454
U.S. and Canada	13	11	7	16	17	11	636
Australia and New Zealand	6	10	8	4	1	2	405
Japan	39	50	67	116	120	81	610

Note: [a] In the updated database from 2012 aggregated data is not available; [b] 2000-2004 average; [c] After taking the decoupled payments into account, the value of the index increases by about 20 percentage points.

Source: author's calculations based on Anderson K., Croser J., Sandr D., 2009



Source: author's construction based on www.worldbank.org/agdistortions and Anderson K., Valenzuela E., 2008

Fig. 1. **Relation between agricultural support measured by NRA and GDP per capita in 75 countries with different level of development**

These findings are also confirmed in Figure 1, which shows the relationship between the NRA and GDP per capita in 75 individual countries[7]. The linear correlation coefficient amounts to 0.69, which confirms the existence of the development paradox, i.e. a positive relationship between the level of economic development and the level of support provided to the agricultural sector. The highest level of agricultural support is in countries like Switzerland, Norway, Iceland and Japan, where GDP per capita exceeds 40 thousand U.S. dollars. The countries that continue to impose heavy taxes in favour of agricultural sector are Bangladesh, Ivory Coast, Tanzania and Zimbabwe, where GDP per capita does not exceed one thousand U.S. dollars.

The main aim of the following regression analysis is to verify the hypothesis made in the conceptual framework. As a dependant variable in the regression equation, the NRA estimate for the total agricultural production was used, which also includes non-product-specific assistance and decoupled payments (nra_totd). Two potential independent variables were introduced in scope of the study. The first of them was a share of population economically active in agriculture in the overall economically active population (agr_labour). This variable helped to verify the hypotheses that the level of agricultural support is an inverse function of the relative size of their interest group. The assumption was made that only economically active population is willing to engage in

[7] Based on newest available data.

Table 2

Results of the OLS regression analysis; 53 countries, dependant variable: NRA estimate (nra_totd); independent variables: share of population economically active in agriculture in the overall economically active population (agr_labour), GDP per capita calculated at constant prices from the year 2000 in U.S. dollars (GDPpc)

	Intercept	agr_labour	GDPpc	Adjusted R^2	F-test	BETA
Value	5.394	-0.258	0.001	0.573	35.877	-
t-value	0.983	-2.339	4,731	-		-0.276
p-value	0.330	0.023	0.000	-	0.000	0.559

Source: author's calculations in STATISTICA

collective actions, since only this group of society posses required resources. The second independent variable was the GDP per capita calculated at constant prices from year 2000 in U.S. dollars (GDPpc). This variable helped to verify the hypothesis that due to Engel's law, the increase of income reduces public opposition to agricultural subsidies, since the relative cost of such support for consumers' declines.

The analysis used the most recent data available in the World Bank database. Most of them came from the year 2010 or 2009. Due to the lack of some data or their inconsistency, a few cases were removed, and finally the study was based on 53 countries with different level of development. Results of the regression analysis are presented in Table 2, and they suggest that both independent variables are statistically significant and contribute to the explanation of the agricultural support variability in countries with different level of development. The regression equation takes the following form:

$$nra\_totd = 5.394 - 0.258 agr\_labour + 0.001 GDPpc \quad (1)$$

The results of the regression analysis confirm the hypothesis that the level of agricultural support is an inverse function of the relative size of their interest group. On average, a 10 percentage point decrease in the share of agricultural labour results in 2.6 percentage point increase in the nominal rate of assistance for agricultural sector, assuming other factors unchanged. On the other hand, the relation between the support to agriculture and national income is positive. On average, a thousand U.S. dollars increase in GDP results in 1 percentage point increase in nominal rate of assistance for agricultural sector. Adjusted determination coefficient R2 shows that the variability of the independent variables explain the variability of the dependent variable at 57%. The obtained value of F-statistic allows the rejection of the hypothesis of the lack of model's significance.

Conclusions, proposals, recommendations

The main aim of this paper was to analyse the phenomenon of development paradox, which refers to the positive relation between a country's development level and the agricultural support level. The author suggested that Mancur Olson's theory of interest groups might be useful in explaining this phenomenon. Based on this theory, the following hypothesis was formulated: the level of support agricultural producers receive is an inverse function of the relative size of their interest group. Theoretical considerations and empirical analysis have led to the following conclusions.

— Mancur Olson's theory of interest groups and collective actions seems to provide a well-grounded political explanation of the development paradox.

— The regression analysis confirms that the level of agricultural support is an inverse function of the relative size of farmers interest group measured by the share of agricultural labour within the overall labour force. As farmers group is getting relatively smaller, the benefits from the support per capita are rising and so do incentives to collective action. As consumers/taxpayers group is getting relatively bigger, agricultural support costs per capita are decreasing, and the incentives to act against agricultural policy are weaker;

— Empirical analysis also confirms that the relation between GDP per capita and agricultural support is significantly positive, which verifies the hypothesis that increase of national income reduces public opposition to agricultural subsidies, since the relative cost of such support for consumers declines.

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IMPACT OF DIRECT PAYMENTS ON SUSTAINABILITY OF FARMS IN POLAND – SIMULATION BASED ON THE EXAMPLE OF FADN FARMS FROM WIELKOPOLSKA AND SLASK REGION

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Abstract. The article is an attempt to evaluate the impact of direct payments on economic situation of farms with varying degrees of sustainability in Wielkopolska and Slask Region in Poland during the period 2004-2012. Based on the simulation, it was detected that since 2009, payments have been effective means to supporting environmental sustainability of agriculture in this region. Introducing of sanctions against unsustainable farms resulted in income compensation of both sustainable and unsustainable farms. It is also proved that in 2004-2008, sustainable farms located in this region, achieved lower economic performance than unsustainable farms. A significant variation in production types between the groups of sustainable and unsustainable farms also occurred. In this article, the author has used the data of Farm Accountancy Data Network (FADN) on economic situation of farms in Wielkopolska and Slask Region during the period 2004-2008. The research sample included 231 permanently sustainable farms and 57 permanently unsustainable farms.
Key words: sustainable agriculture, direct payments, the economic performance of farms
JEL code: E02, H23, Q18

Introduction

Sustainable development of agriculture is one of the most important objectives of the Common Agricultural Policy of the European Union. To achieve this purpose, the retransfer of funds is made to the agricultural sector in the EU. This support is a universal tendency in different regions of the world, regardless of their level of development (Kulyk P., 2009). This is practiced due to existing peculiarities of such factors as land and agriculture, which depend on agricultural sector. Consequently, in market conditions gross margin might vary in this respect. This phenomenon increases the growth of specialization in production and market risk (Czyzewski B., 2009). External funds for farms are still important to shape economic and production performance of this sector (Grzelak A., 2012). The Common Agricultural Policy is aimed at preventing the depreciation of the agricultural sector in the EU. Since Mc Sharry reform in 1992, we can observe the transition of the CAP in the direction of sustainable agriculture. This objective was intensified by the Agenda 2000 reform from Luxembourg and the "Health Check" (Czyzewski A., Poczta-Wajda A. 2009; Czyzewski A., Stepien S. 2009; Czyzewski A., Stepien S. 2011).

According to the Agenda 21 for the Baltic Sea Region: "Sustainable agriculture is such that supplies fertility of ground for future generations thorough strengthening and rebuilding organic substances in soil, clearness of water, and richness of biological variation in agricultural landscape.'' (Agenda 21) Proponents of the sustainable development concept in the European Union are farms that produce in accordance with the principles of "cross-compliance". According to the new philosophy of the common agricultural policy (CAP), sustainable farms should be rewarded for function "guardians of the natural landscape of rural areas in the EU" by receiving direct payments in full amount. Whereas farms in which production does not take place in accordance to "cross-compliance" requirements of the EU, are partly or fully denied access to the direct payments. In the EU-15, these sanctions apply to farmers since 2007. In the new EU member states, including Poland, the cross-compliance requirements are being implemented gradually. Since 2009, the oblige requirements "A" apply to environmental protection. Whereas the requirements "B", which include the guidelines for public health, animals, plants health, and animal identification and registration are obliged since 2011. The requirements "C" will be implemented in 2013 – they relate to animal welfare. According to the guidelines of the Ministry of Agriculture and Rural Development, in the case of not observing cross-compliance requirements, direct payments are reduced in proportion to the violation. The level of penalties for not observing the basic requirements depends on many factors. If a farmer has intentionally committed non-compliance, the reduction is, as a rule, 20% of the total amount. Paying Agency may, based on the assessment provided by the competent control authority, decide to reduce this percentage to not less than for 15%. In certain cases, penalties may be increased up to 100% of the total amount of payments (Department 2012).

Therefore, since the introduction of sanctions (in Poland since 2009), farmers are faced with a dilemma. Whether to produce in a sustainable way, while maintaining the right to all direct payments, or to produce in an unsustainable way, realizing the microeconomic efficiency, yet resigning with partial or fully refusal of direct payments? It can be assumed that the choice of production implementation in agricultural farms will result after comparing the costs and benefits of these two different ways (sustainable or unsustainable). Based

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Table 1

Area payments in 2004-2008 [zl/ha]

Type of payment	2004	2005	2006	2007	2008
Single area payment	210.53	225.00	276.28	301.00	393.31
Supplementary payment area - the main crop plants	292.78	282.35	313.45	294.91	269.32
Supplementary payment area - hop	1013.81	870.02	962.75	978.77	999.1
Supplementary payment area – animal payment	-	-	-	438.73	379.55

Source: (Marks-Bielska R., Babuchowska K., 2009)

on this thought, the author of the article attempts to assess the relative differences in the economic situation of sustainable and unsustainable farms located in Wielkopolska and Slask Region, during the period 2004-2010. The author has formulated the first hypothesis as follows: *sustainable farms achieve lower economic performance than unsustainable farms.* Subsequently, the author of the article attempts to simulate the costs resulting from the loss of the right to whole or partial access to direct payments in unsustainable farms . It is based on the economic results achieved by these farms during the period 2004-2008.

The purpose of the simulation was to answer the question whether direct subsidies can be an effective instrument influencing the growth of sustainability of agriculture in the studied region. It becomes such, if the amount of payments is adequate to the loss resulting from the reduction of the intensity of the production in sustainable farms. The second hypothesis of the article is: *the sanctions regarding payments for unsustainable farms after 2009 affect the economic situation in both unsustainable and sustainable farms.* For the confirmation of this hypothesis, it is established that after 2009, the loss of benefits resulting from the reduction of intensity of production in sustainable farms will be levelled by direct payments. Therefore, it can be concluded that the payments are an effective instrument of the Common Agricultural Policy that influences the growth of environmental sustainability of farms in Wielkopolska and Sląsk Region. In the evaluation of environmental sustainability of farms, three criteria were used:

— the share of cereals in the structure of crops not exceeding 66%;
— the number of groups of plants in farms, which should be of at least three;
— number of all animals in a farm, which should not exceed two livestock units per one hectare of agricultural land.

Sustainability indicators were selected from agri environmental criteria, the Nitrates Directive, which is a part of cross-compliance requirements, and data available in the Farm Accountancy Data Network[2] collection. For the analysis, the author used the data on the economic situation of the FADN farms located in Wielkopolska and Slask Region. It is assumed that farms that met all the three criteria continuously in each of the years of the research period, starting from 2004, belonged to a permanently sustainable (231 farms) farms' group. Whereas, those farms, which did not meet any of them in each of the years of the research period, belonged to a permanently unsustainable (57 farms) farms' group. Thereby, two constant research samples were obtained. In the first part, the study was carried out to assess the economic situation and the potential of production in sustainable farms against unsustainable. In the analysis, the following measures were used: the annual amount of work in hours, farm size in hectares, the number of animals per hectare (in large stock units), total production in polish zloties; and attributable to: one work hour and per hectare of arable land, total costs in zl, income in zl; and attributable to: one work hour and per hectare of arable land. In the analysis, the mean values were used.

In the next part of the study, the author carried out the simulation of impact of direct payments within the years 2004-2008 on the economic situation of unsustainable farms. During these years, unsustainable farms received full payments, which increased their income (sanctions for failure to meet the requirements of cross-compliance, were introduced in Poland in 2009). Consequently, the value of average income in these farms earned within each year decreased by the amount of direct payment. This amount resulted from multiplying the average size of the farm and the value of the area payment per hectare of arable land (Tables 1 and 2).

A farmer who meets the requirements relating to single area payment scheme in the years 2004-2012 is entitled the right to additional payments for crop area in the main crop, the cultivation of hops, and since 2007, so-called "animals' payment". The study assumes that all farms apart from the area payment received supplementary payments to the plants' as main crop growing. In accordance with the list of the Ministry of Agriculture and Rural Development, this payment includes all crops occurring in the Polish agriculture (Agency 2010). In addition, none of the farms, which were granted permanent pasture, benefited from payments for crops and animals. This was because in the group of unsustainable farms, 53 farms were specializing in pig fattening and only four were multidirectional. As a result, none of them applied for these payments.

Afterwards, the incomes of unsustainable farms receiving no payments were compared with incomes achieved by sustainable farms during the years 2004-2012. Since no data were available on the amount of

[2] Farm Accountancy Data Network (FADN) was established under Council Regulation EEC No 79/65/EEC of 15 June 1965 on the creation and collection of accountancy data on the incomes and farm activities in the European Economic Community. Since 2004, the FADN accounting is conducted in Poland in a representative sample of farms.

Table 2

Area payments in 2009-2012 [zl/ha]

Type of payment	2009	2010	2011	2012
Single area payment	506.98	562.09	710.57	732.06
Supplementary payment area - the main crop plants	356.47	327.28	274.21	211.80
Supplementary payment area - hop	1363.94	1420.07	1 476.08	1 276.38
Supplementary payment area – animal payment	502.62	439.03	396.14	306.99

Source: http://funduszeue.info/blog/2012/12/02/arimr-rozpoczyna-wyplate-platnosci-bezposrednich-i-platnosci-rolnosrodowiskowych-za-2012-r/

Table 3

Production potential and economic performance of sustainable farms during 2004-2008

Indicators	2004	2005	2006	2007	2008	2004-2008 (average)
Farm size in hectares	58.26	58.44	58.44	58.88	59.39	58.68
Input of labour in hours	5588	5566	5588	6006	6006	5742
Input of labour in hours per hectare	96	95	96	102	101	98
Number of animal (large stock) units per hectare	0.86	0.86	0.87	0.87	0.83	0.86
Total production in zl	245148	239255	253101	309956	289570	267406
Total production in zl per hectare	5106.8	5002.1	5314.4	6333.0	5549.5	5461.2
Total production in zl per hour of labour	33.83	33.16	35.98	43.80	40.48	37.5
Total costs in zl	202945	196914	216738	240881	272501	225996
Income from agriculture in zl	71714	75540	80556	114378	71851	82808
Income from agriculture in zl per hectare	2032.9	1846.8	2270.4	2865.2	1898.6	2182.8
Income from agriculture in zl per hour of labour	13.30	12.49	15.30	20.21	14.58	15.18

Source: author's calculations based on the FADN data

farms' income in 2009-2012, it was assumed that in each of these years they were equal to the average amount of income for the period 2004-2008, and the size of the direct payments was adjusted. It means that the value of payments was subtracted from the value of average annual income during the period 2004-2008. After that, the average value of income was calculated for the period 2004-2008 without direct payments for the groups: "sustainable" and "unsustainable". According to the author's calculations, the average increase resulted by the amount of direct payments, which was the result of multiplying the average farm size in 2008 and the amount of payments per hectare for each year of the period 2009-2012. Consequently, the values of income for each year of the period 2009-2012 in the both farms' groups – "sustainable" and "unsustainable" – were obtained within the research. According to the previously made assumption, the average farm size in the analysed groups each year during the period 2009-2012 corresponds to the average size in 2008.

Economic results and the production potential of farms with varying degrees of sustainability during 2004-2008

The average area of sustainable farms differed from average area of unsustainable farms within the years 2004-2008 by more than 35 hectares. Sustainable farms can be characterized by far lower labour inputs per hectare of agricultural land (on average by 91 hours) and the intensity of livestock production. The average quantity of animals per hectare of agricultural land generally during 2004-2008 was 0.86 in sustainable farms, while in unsustainable farms – up to 6.99. The detection of so large herds of animals maintained on unsustainable farms leads to the conclusion that these farms certainly do not meet the provisions of the Nitrates Directive, in which the maximum density of animals in the farm cannot exceed two units of per hectare, which corresponds to the production of nitrogen of 170 kg. Much lower intensity of livestock production as well as higher inputs of labour and land for sustainable farms have also resulted from differences in the structures of these groups by production types. In the group "sustainable", multidirectional farms (60.2%) dominated, followed by farms specialized in field crops (19%), specialized in the breeding of beef cattle (9.5%), and specialized in the production of milk (8.7%). In the group "unsustainable", the farms specialized in the breeding of pigs (93%) dominated, followed by multidirectional farms (7%).

Sustainable farms during the period 2004-2008 were characterized by lower economic results than unsustainable farms. The average total income per

Table 4

Production potential and economic performance of unsustainable farms during 2004-2008

Indicators	2004	2005	2006	2007	2008	2004-2008 (average)
Farm size in hectares	21.83	22.70	24.54	23.64	24.23	23.39
Input of labour in hours	4510	4114	4708	4510	4268	4422
Input of labour in hours per hectare	207	181	192	191	176	189
Number of animal (large stock) units per hectare	6.62	7.05	7.12	7.49	6.66	6.99
Total production in zl	370900	360246	374728	422526	452197	396119
Total production in zl per hectare	26618	27475	25710	35780	37345	30585
Total production in zl per hour of labour	76.46	86.28	72.39	90.84	99.42	85.08
Total costs in zl	275068	276022	300061	365917	361049	315623
Income from agriculture in zl	113372	102979	99744	78660	116348	102221
Income from agriculture in zl per hectare	5028.3	7290.8	5727.7	4535.0	6084.8	5733.3
Income from agriculture in zl per hour of labour	23.42	24.19	20.54	18.77	24.90	22.36

Source: author's calculations based on the FADN data

Table 5

The value of direct payments in sustainable and unsustainable farms during 2004-2008 [on average in zl per farm]

Items	2004	2005	2006	2007	2008	2004-2008 (average)
Unsustainable farms	10987.3	11516.9	14472	14087.3	16055.5	13423.8
Sustainable farms	29322.9	29649.5	34463.8	35087.2	39353.6	33575.4

Source: author's calculations based on the FADN data

Table 6

The value of direct payments in sustainable and unsustainable farms during 2009-2012 [on average in zl per farm]

Items	2009	2010	2011	2012	2009-2012 (average)
Unsustainable farms	20196.1	20802.36	23034	22076.89	21527.34
Sustainable farms	50667.25	52188.23	57786.89	55385.7	54007.02

Source: author's calculations based on the FADN data

hectare of agricultural land in unsustainable farms was nearly 6 times higher than in the group of sustainable farms. They also have nearly 2 times higher income per working hour. However, unsustainable farms have about 30% higher total costs in zloties. It should also be noted that significant differences in farms' income were detected, although not as significant as in the case of production value. In absolute values, the average incomes in sustainable farms were 20% lower than in unsustainable farms.

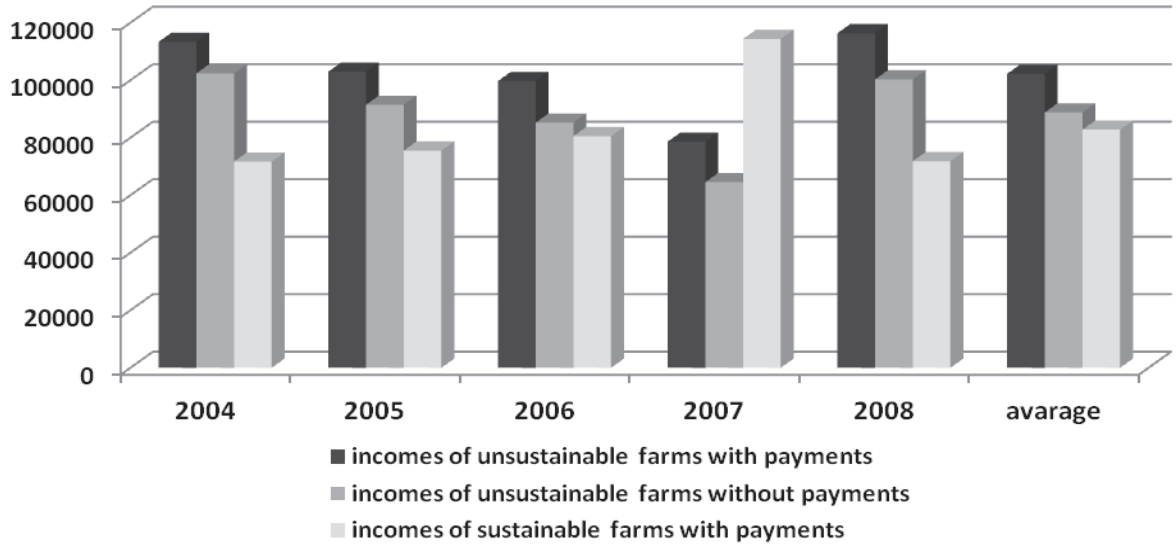
Unsustainable farms have more than twice higher income per hectare of agricultural land than sustainable farms. This was due to significantly smaller land resources. However, in unsustainable farms labour income per hour was up to 32% higher than in sustainable farms. *The hypothesis seems to be true that sustainable farms achieve lower economic results than unsustainable farms.*

Simulating the impact of direct payments on the economic situation of farms with different levels of sustainability during 2004-2012

Tables 5 and 6 illustrate the value of area payments, which increased the income of sustainable and unsustainable farms during 2004-2012.

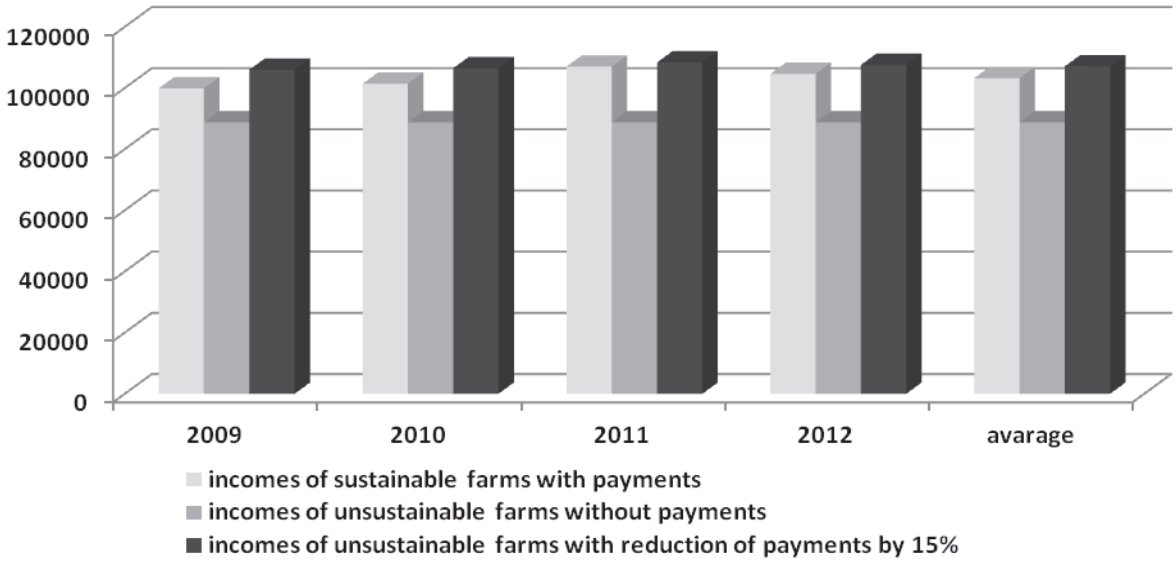
Sustainable farms on average, during this period, received 2.5 higher volumes of payments than unsustainable farms. This was owing to the fact that their land resources are on average 2.5 larger.

Could unsustainable farms' unavailability to receive direct payments due to their failure to fulfil cross-compliance rules would level differences in economic situation between both analysed groups? Figure 1 illustrates the value of incomes of the unsustainable and sustainable farms during 2004-2008



Source: author's construction based on the FADN data

Fig. 1 **The impact of direct payments on the economic situation of sustainable and unsustainable farms in Wielkopolska and Sląsk Region during 2004-2008**



Source: author's construction based on FADN data

Fig. 2 **The impact of direct payments on the economic situation of sustainable and unsustainable farms in Wielkopolska and Śląsk Region in years 2009-2012**

(with payments and without payments). It shows that the deprivation of unsustainable farms of payments in those years, except for 2007, would not compensate for differences in income of unsustainable and sustainable farms. In 2007, sustainable farms had higher direct production output, and their economic situation was better than situation on unsustainable farms. It was an effect of the low market price of pork in Poland in this year, which caused a significant reduction in income of unsustainable farms.

This situation changed after 2009 as indicated by the simulation results illustrated in Figure 2. It is worth recalling the assumption that incomes of the analysed farms' groups each year during the period 2009-2012 were the average income during the years 2004-2008 adjusted by the volume of the payments. Consequently, incomes of unsustainable farms in each of the years without payments are the same. Their size in relation to income with payments of sustainable farms is lower in each of the years during the period of 2009 to 2012.

Moreover, taking into account the lowest level of sanctions in the form of reduced payments by 15% in unsustainable farms, this causes equalization of these farms' income with the income of sustainable farms. This leads to the conclusion that since 2009, the system of direct payments has been an effective instrument

to protect sustainable farms against the decline in income caused by the reduction in production intensity. Therefore, it is possible to support the hypothesis, saying that applicability of sanctions by limiting the size of payments for unsustainable farms since 2009 has levelled the economic situation of unsustainable and sustainable farms. This is indicated by the simulation results of FADN farms with varying degrees of sustainability located in Wielkopolska and Slask Region.

Conclusions

To sum up the survey, the author concludes that:

— Sustainable farms in Wielkopolska and Slask Region during the period 2004-2008 were characterized by much worse economic situation than unsustainable farms. This occurred in the conditions of much higher (more than twice) area exploitation and intensity of livestock production in unsustainable farms. The lower results of sustainable farms enhanced the need to support the income of these farms considering their care for the natural environment in rural areas. The European Union is also aware of this aspect and introduces penalties for unsustainable farms in the form of deprivation of direct payments. In Poland, such system has been applied since 2009.

— Since 2009, direct payments have compensated the loss of the benefits through reducing the intensity of production in sustainable farms. The payments have equalized the income between sustainable and unsustainable farms. Such situation occurred even taking into account the lowest level of sanctions against unsustainable farms (reducing subsidies by only 15%). It was possible thanks to the significant increase in the amounts of payments after 2008. Therefore, it can be concluded that the direct payments in Poland after 2008 have become an effective instrument for growth of sustainable agriculture. This is indicated by the simulation results of FADN farms with varying degrees of sustainability located in Wielkopolska and Śląsk Region.

— The increase in direct payments in Poland after 2008 was so large that compensated the economic situation of both sustainable and unsustainable farms. If agriculture in Poland is due to come on the way of the sustainable development, then high direct payments are necessary for its achievement. Otherwise, sustainable farms will not have economic incentives to continue the production in accordance with the requirements of the environment.

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DEVELOPMENT AND POTENTIAL OF AGRICULTURE IN THE WESTERN PART OF ROMANIA

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Abstract. Agriculture represents an important economic component at both global and national levels with multiple functions, among which one stands out as being a main component, namely to ensure food supply for humanity. Except a few food products or agricultural products outside agriculture, all food products appear as finished products of various productive processes that give content to this important branch of the national economy. The need to increase the volume of food products for people required intensification of agricultural production. Therefore, the paper will describe aspects of the development of agriculture in the counties of Timis, Hunedoara, Caras-Severin, and Arad; a few problems as well as its potential. In the four counties studied, which have an agricultural production that is vital for the agricultural economy of the country, cultivated areas are expanding, unworked land is a real potential for bringing new crops into this area, and new technologies that will bring more to the economy of the country. The main objective for the paper is to determine the number of ha of unused land of the four countries. In order to determine unworked areas, the authors consulted various bibliographic materials from which were able to do some calculations, and conclusions were drawn on their basis. Currently, in Romania, the Ministry of Agriculture works on this problem regarding the merging of the parcels on large surfaces as well as searches for solutions regarding the increasing of the arable land by reducing the number of gardens.
Key words: agriculture, development, Banat, arable land, unworked land.
JEL code: Q 15

Introduction

The paper will include a brief description of the four counties in the western part of the country, an enlarged presentation of the western agricultural exploitations and also of each county, and their distribution into categories of use. The paper will be completed by dividing the percentage of farmland and major crops, wheat and maize cultivated areas per county. The main purpose of this paper, based on the research literature calculations, is to determine the unworked land in the four counties studied. The study was based on the methods specific to selective research: identification of a problem under research, delimitation of the research framework, information collection, data processing, analysis and interpretation and drawing up the conclusions. The information sources that have been used are the official data of National Institute of Statistics 2011 and Census of Agriculture 2010.

Research results and discussion

Located at the crossroads of important European routes of communication and transport, West Region, Romania is a promising environment for investors. Created in 1998 through the combination of four counties (Arad, Timis, Caras-Severin, and Hunedoara) West Region Romania borders the Danube and Serbia to the southeast and Hungary to the northwest, and is a part of the Euroregion Danube - Cris - Mures - Tisa (DKMT).

Timis County is located in the western part of the country; it borders Yugoslavia and Hungary to the west and Arad, Hunedoara, and Caras-Severin in the north, east, and south. Geographical location is very advantageous, at the crossroads of major European roads, where western culture and civilization interfere with the East ones. Timis County, Romania's largest county with an area of 8697 km², has a temperate climate, two-thirds of the territory are covered with plains crossed by the rivers Timis, Bega, and Barzava.

Arad County is located in the western Romania and lies on both sides of Mures and White Cris. It borders Bihor to the north and northeast, Alba to the east, Hunedoara to the southeast, Timis to the south, and Hungary to the west. Its surface occupies 7754 km². Arad County lies in the eastern sectors of Pannonian Plain (Arad Plain, High Plain of Vinga, Cris Plain, Cermein Plain). As orographic formation, it is typical of the golf depression specific to Apuseni Mountains (depression Zarand) with a special feature, namely sudden shift from the plain to the mountains.

Caras-Severin is a county in Banat and Transylvania, the regions of Romania, whose residence Resita, an industrial city, is located in the southwest of Romania. Caras-Severin County has an area of 8514 km². Geographically, in Caras-Severin County there are the three classic stages, but only mountainous terrain is predominant, occupying 65% of the territory with mountainous terrain increasing from west to east.

Hunedoara County is located in the central-western part of Romania and borders the following counties: Arad, Alba, Valcea, Gorj, Caras-Severin, Timis, and Bihor, with an area of 7.063 km². The landscape of the county is hilly, mostly mountainous with heights from 2.500 m in the south.

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Table 1

Agricultural exploitations in western development region, number and area used

Western region	Total agricultural exploitations (number)	Agricultural exploitations using agricultural area (number)	**Agricultural exploitations not using agricultural area (number)**	Utilized agricultural area (ha)	Utilized agricultural area per agricultural exploitation (ha)
Arad	71675	70131	**1544**	452273.77	6.31
Caras-Severin	62799	58494	**4305**	381118.76	6.07
Hunedoara	59600	58389	**1211**	236690.82	3.97
Timis	78829	75990	**2839**	660103.56	8.37
Total West Region	**272903**	**263004**	**9899**	**1730186.91**	**6.34**
Total Romania	***3856245***	***3721885***	***134360***	***13298190.89***	***3.45***

Source : author's calculations based on General Agricultural Census, 2010

Table 2

Agricultural exploitations with a utilized agricultural area, by use category of utilized agricultural area in the western region, number

Western region	**Utilized agricultural area**			
	Arable land	**Pasture and hay**	**Permanent crops**	**Family gardens**
Arad	47584	15326	3459	60596
Caras-Severin	44350	39543	13215	31056
Hunedoara	43699	44803	2018	41311
Timis	52627	10870	2471	65055
Total Regiunea Vest	188260	110542	21163	198018
Total Romania	2750092	1512210	1123460	2479249

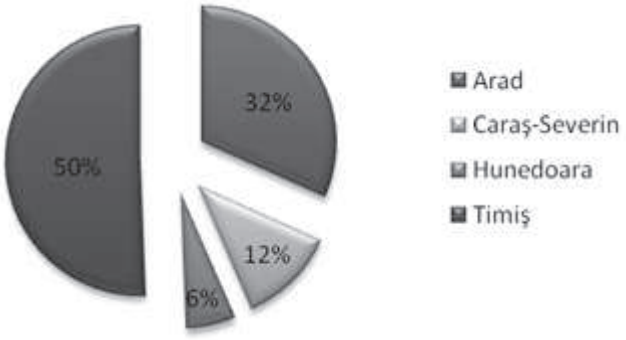
Source: author's calculations based on General Agricultural Census, 2010

The land is the main means of production in agriculture together with mechanization resources, financial and especially land provides the overwhelming compartment of food products for humans. To fulfil this function, the earth, as means of production, has evolved and continues to evolve. According to the latest agricultural census in Romania, Romania's total agricultural area in 2010 was approximately 13. 3 million hectares, of which approx. 8.3 million hectares are arable land. Agricultural exploitation (farm) represents the set of production units managed by farmers and are situated within the territory of Romania.

West of the country, namely Banat Plain, is the second largest agricultural production basin of the country after the Romanian Plain. With this highly important meaning for the agricultural economy of the country, the western part of Romania has to be studied and all resources identified in order to increase agricultural production. The total number of agricultural exploitations of western region is 272 903 000 of a total of 3,856,245 million per country (GAC, 2010), i.e. 7.07%, which means that utilized agricultural area per farm is higher than the rest of the country, i.e. 6.34 ha compared to 3.45 nationally, i.e. 183.7% higher, as shown in Table 1. Timis is first in the number of farms and of the utilized agricultural area with the highest average of hectare per utilized agricultural area. Yet, the same thing cannot be said about farms not using agricultural area, where Timis ranks third, the first being the Hunedoara county, which has the least utilized agricultural area, and also the total number of farms is low given the area under study is not suitable for agriculture due to its geographical location, having instead a good growth in industry and tourism. The same thing one can observe in Caras-Severin, where mountainous terrain is predominant. A total holding of Arad County is 71,675 with 1,544 agricultural exploitations not using agricultural area. Total holdings account to 7.07% in the West region compared to Romania, where the percentage of agricultural exploitations using agricultural area is 7.06%, and so we deduce that the remaining 0.01% is unused exploitations being below the national average. However, even this area must and will be integrated into agricultural use. Of the total area of Romania, the west of the country has an agricultural area of 1730 186.91 ha, which is 13.01% of the total.

Utilized agricultural area is divided into four categories: arable land, pasture and meadow, permanent crops, and family gardens. Table 2 summarizes the number of agricultural exploitations in the four categories of farmland in western Romania. Timis has the largest area of arable land in the four counties, followed by Arad and closely by Caraş-Severin and Hunedoara.

As for pastures and meadows category, Hunedoara and Caras-Severin have large areas, followed by Arad and Timis. Regarding permanent crops, Caras-Severin is a major basin in this section, holding not less than 13,215 agricultural exploitations. As for family gardens, there is a great number per the west area - 198,018,



Source: ***author's calculations based on General Agricultural Census, 2010***

Fig 1. **Arable land from the western part of Romania**

which shows that the local population provides much of the food from them. Overall Romania occupies 13 298 190.89 ha.

In Figure 1, we present the percentage of arable land distribution area in the western part of Romania. After analysing the figure, we can say that 50% of the arable land from the four counties is located in Timis and 32% of the surface in Arad, the rest being divided between Hunedoara and Caras-Severin, the values were respectively 6% and 12%. We are in particular interested in the arable land within these districts, therefore we present below the main crops, i.e. wheat and corn.

According to the Romanian Statistics Yearbook, in Romania, the area under wheat in 2010 was 2.1624 million. In 2010, in the Timis County 124 407.94 ha with wheat were cultivated, i.e. 5.75% of the total wheat area of the country, and 58.64% of the total cereal crop in the western region analysed. Maize was sown on 2,098,400 hectares in 2010 per country, and in Timis per 113 948.13, with a contribution of 5.43% to the total crop in Romania and 43.6% of the share of the western part of the country. The remaining agricultural land is divided between industrial crops, legumes, other cereal for grains, vegetables, etc.

In Arad, the total wheat area for 2010 was 69 989.72 ha, representing 3.23% of the total amount of the national crop, respectively that of 32.99% of the total hectares planted with wheat in the West. For maize, hectares' area is greater than that of wheat, respectively 103 817.67, representing 4.94%, i.e. the total share of the country and 39.75% of the total weight of western development region.

Caras-Severin and Hunedoara counties, areas with less potential for cereal crops, have obviously a less number of hectares, in Caras-Severin being cultivated 10 212.99 ha of wheat, which is 0.47%, and 4.82% of the country's share of the western area studied. As for Hunedoara, in 2010 grain surfaces were of 7510.24 hectares, representing 0.34% of the total area of Romania, and 3.55% of the Western region. Here even the areas planted with corn are smaller, namely in Caras-Severin 26 312.76 ha, with a contribution of 1.25% nationwide and 10.7% in the Western area, Hunedoara has the lowest values, only 17 082.27 ha maize, the percentage of the country is of 0.81% and that on the area of 6.54%.

The total number of persons who worked in agriculture in the western part of Romania in 2010 was 532,858, most of them working in family gardens in rural areas; many have no other sources of income.

Therefore, as a conclusion, we can deduce that Timis and Arad counties have large grain surfaces, and they are also important for the Romanian agriculture with relatively high weight compared to other counties, bringing their contributions to the economy of the country. Total wheat crop in the four counties makes a contribution of 9.79% of the total hectares planted, and in the case of maize, a percentage of 12.43% of the country is sown in the west. However, we can not fail to notice that there is a very small share of unworked land in the west - 0.01%, hence we can conclude that agriculture is an important sector of the economy of the country, which was (even during the crisis), still is, and will be growing.

One aspect worth taking into account regarding to the western part of the country is expected increase in the area under industrial crops, sunflower, soybean, rapeseed, for the production of biofuels (biogas, biodiesel, bioethanol), which have become of great importance over the years to the detriment of traditional agriculture. As we can see from the brief descriptions of the counties analysed, although they are crossed by major rivers, the land irrigation in the area is insignificant. With proper investments for different irrigation systems, the average productivity per hectare would increase considerably.

Conclusions, proposals, recommendations

1. In 2010, total agricultural area of Romania was aprox. 13.3 million hectares, of which approx. 8.3 million hectares are arable land, which gives agriculture an important place in the economy of the country.
2. The western part of the country has a high potential for agriculture, and applying modern technologies would improve noticeably the average quantities per hectare.
3. Of the four counties analysed, Timis and Arad occupy 82% of the total area of the western area, the rest being divided between Caras-Severin and Hunedoara, counties with a high potential for rural tourism and agro-tourism.

4. Industrial plant cultivation tends to occupy a growing area, mainly due to the safety of production sale and the high price compared to conventional crops (wheat, corn, etc.).
5. As a recommendation for unworked land (*134 360 ha)*, there may be cultivation of other crops (like vegetables) besides the classical cultures (corn, wheat, sunflower, rapeseed, or soy) in the area.
6. The main limiting factor of production in Romania and the Western part of the country is the lack of irrigations, as soil, climate, and geographical location enable the country to achieve much higher yields in all crops.

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THE TRENDS OF TECHNICAL AND ALLOCATIVE EFFICIENCY IN LITHUANIAN FAMILY FARMS

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Abstract. The economic or cost efficiency can be decomposed into technical and allocative efficiencies. The technical efficiency is related to farm ability to transform inputs to outputs, whereas the allocative efficiency is the ratio of the observed and the optimal cost, and measures farm's ability to choose an optimal input-mix. The paper employed the Cost Malmquist Index to measure the changes in economic efficiency as well as the technological change. Therefore, the total factor productivity change was estimated for the sample of 200 Lithuanian family farms covering the period of 2004–2009. The results indicated that the cost productivity decreased by some 8%, whereas the total factor productivity – by 20% during the period. Declines in both pure technical efficiencies were the main drivers of the decrease, and the scale effect had almost no impact.
Key words: efficiency, total factor productivity, Malmquist Index, data envelopment analysis, Lithuania.
JEL code: C43, C44, C61, Q10, Q12.

Introduction

The accession to the European Union in 2004 rendered many significant transformations for the Lithuanian agriculture. Specifically, the production and equipment subsidies gave a momentum for modernization. On the other hand, the fluctuations of the relative prices of the agricultural production resulted in the decreasing prevalence of the livestock farming and, to some extent, in farm expansion. These transformations obviously reshaped the technologies of the agricultural production.

Family farms produce the largest share of the agricultural output in Lithuania. As for 2004–2009, some 75–71% of the gross agricultural output was produced in the family farms, whereas the remaining part came from the agricultural enterprises. Although the agricultural companies mainly specialize in crop farming, the share of livestock production there did not decrease to the same extent as it occurred in the family farms.

One of the key features describing the performance of agricultural sector is its productive efficiency. The issues of agricultural efficiency are those of particular importance in the Central and East European (CEE) states thanks to their economic structure influenced by the historical turmoil during the 20th century (Gorton M., Davidova S., 2004; Alvarez A., Arias C., 2004; Henningsen A., Kumbhakar S., 2009; Henningsen A., 2009). Efficiency measures are the primal tools for the economic science and policy-making. Specifically, one can consider certain types of efficiency, e.g. technical efficiency (TE), allocative efficiency (AE), cost efficiency (CE), and profit efficiency. This paper focuses on the technical efficiency measurement, whereof involves no price information and cost efficiency, which require input price data.

The frontier methods are the primal tools for distance function estimation and measurement of the efficiency (Samarajeewa S. et al., 2012). The productivity indices based on the distance functions can then be employed to measure the total factor productivity (Coelli T.J., Rao D.S.P., 2005; Ippoliti R., Falavigna G., 2012; Tohidi G. et al., 2012; Epure M. et al., 2011). The total factor productivity change can also be decomposed into the different terms identifying the causes thereof (Malmquist S., 1953; Fare R. et al., 1992; Fare R. et al., 1994; Maniadakis N., Thanassoulis E.,, 2004).

Whereas Vinciuniene V. and Rauluskeviciene J. (2009), Rimkuviene D. et al. (2010), and Balezentis T. et al. (2012) attempted to estimate the efficiency of the Lithuanian agricultural sector, however the total factor productivity changes and cost productivity changes are still topical issues for the scientific research. Balezentis T. (2012) employed the cost Malmquist Index to analyse the trends of the cost productivity change in Lithuanian agriculture. This particular paper is based on the methodology developed by Balezentis T. et al. (2012). In the present study, the authors will further analyse the results across different farming types.

This paper therefore seeks to assess the changes in cost (economic) efficiency of the Lithuanian family farms during the period of 2004–2009. The non-parametric frontier technique, viz. data envelopment analysis (DEA), is employed alongside with the Cost Malmquist Index to measure the cost productivity change. The micro data covering some 200 family farms for the period 2004–2009 were obtained from the Farm Accountancy Data Network (FADN).

Preliminaries for the cost Malmquist Productivity Index

Measurement of the total factor productivity (TFP) of certain DMU involves measures for both technological and firm-specific developments. As Bogetoft P. and Otto L. (2011) put it, firm behaviour changes

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over time should be explained in terms of special initiatives as well as technological progress. The benchmarking literature (Bogetoft P. and Otto L., 2011; Coelli T., Rao D.S.P., 2005) suggests the Malmquist Productivity Index as the most celebrated TFP measure. Hence, this section describes the preliminaries of the Malmquist Index.

The technology set and respective frontier are likely to shift from one period to another. Therefore, one needs an appropriate measure to identify these changes. The Malmquist Productivity Index (Malmquist S., 1953) can be employed to estimate TFP changes of a single firm over two periods (or *vice versa*), across two production modes, strategies, locations etc. In this study, the authors will focus on the input–oriented Malmquist Productivity Index and apply it to measure period–wise changes in TFP. The input–oriented Malmquist Productivity Index due to Caves D.W. et al. (1982) is defined as

$$M_I = \left(M_I^t \cdot M_I^{t+1}\right)^{1/2} \equiv \left(\frac{D_{I,CRS}^t\left(x^{t+1}, y^{t+1}\right)}{D_{I,CRS}^t\left(x^t, y^t\right)} \frac{D_{I,CRS}^{t+1}\left(x^{t+1}, y^{t+1}\right)}{D_{I,CRS}^{t+1}\left(x^t, y^t\right)} \right)^{1/2}, \quad (1)$$

with indices t and t+1 representing respective periods and $D_{I,CRS}^t$ being the Shepard distance function for the period t assuming constant returns to scale (CRS). The two terms in brackets follow the structure of Fisher's index. Thereafter, a number of studies (Fare R. et al., 1992, 1994; Ray S.C. and Desli E., 1997; Simar L. and Wilson P.W., 1998; Wheelock D.C. and Wilson P.W., 1999) attempted to decompose the latter index into different terms, each explaining certain factors of productivity shifts. Specifically, Fare R. et al. (1992) decomposed productivity change into efficiency change (ΔE or catching up) and technical change (ΔT or shifts in the frontier):

$$\begin{aligned} M_I &= \Delta E \cdot \Delta T \\ &\equiv \frac{D_{I,CRS}^{t+1}\left(x^{t+1}, y^{t+1}\right)}{D_{I,CRS}^t\left(x^t, y^t\right)} \cdot \left(\frac{D_{I,CRS}^t\left(x^{t+1}, y^{t+1}\right)}{D_{I,CRS}^{t+1}\left(x^{t+1}, y^{t+1}\right)} \frac{D_{I,CRS}^t\left(x^t, y^t\right)}{D_{I,CRS}^{t+1}\left(x^t, y^t\right)} \right)^{1/2}, \end{aligned} \quad (2)$$

The term ΔE measures the relative technical efficiency change. The index becomes greater than unity in case the firm approaches frontier of the current technology. ΔT indicates, whether the technology has progressed and thus moved further away from the observed point. In case of technological progress, the ΔT becomes greater than unity, and that virtually means, that it is possible to produce more using fewer resources. Given the Malmquist Productivity Index measures TFP growth, improvement in productivity will be indicated by values greater than unity, whereas regress – by that below unity.

As one can note, the decomposition of Fare R. et al. (1992) does not take into account the variable returns to scale (VRS) technology and consequently scale efficiency. Fare R. et al. (1994) thus further decomposed the ΔE component into the two factors, namely pure technical efficiency change (ΔPT) and scale efficiency change (ΔSE). Therefore, the Malmquist (M) Productivity Index was decomposed into three parts:

$$M_I = \Delta E \cdot \Delta T \equiv (\Delta PT \cdot \Delta SE) \cdot \Delta T, \quad (3)$$

where the term ΔT refers to Eq. 2 and

$$\Delta PT = D_{I,VRS}^{t+1}\left(x^{t+1}, y^{t+1}\right) \Big/ D_{I,VRS}^t\left(x^t, y^t\right), \quad (4)$$

$$\Delta SE = \left(\frac{D_{I,CRS}^{t+1}\left(x^{t+1}, y^{t+1}\right) \Big/ D_{I,VRS}^{t+1}\left(x^{t+1}, y^{t+1}\right)}{D_{I,CRS}^t\left(x^t, y^t\right) \Big/ D_{I,VRS}^t\left(x^t, y^t\right)} \right). \quad (5)$$

Therefore, ΔPT and ΔSE measures firm-specific changes in productivity related to shifts in technical and scale efficiency, whereas ΔT identifies shifts in the technology frontier.

The discussed Malmquist Productivity Index is suitable to analyse the dynamics of technical and scale efficiency. In order to measure the changes in economic (cost) efficiency, Maniadakis N. and Thanassoulis E. (2004) offered the Cost Malmquist Index:

$$CM \equiv \left(\frac{w^t x^{t+1} / C^t(y^{t+1}, w^t)}{w^t x^t / C^t(y^t, w^t)} \frac{w^{t+1} x^{t+1} / C^{t+1}(y^{t+1}, w^{t+1})}{w^{t+1} x^t / C^{t+1}(y^t, w^{t+1})} \right)^{1/2}. \quad (6)$$

The cost ratio $w^t x^t / C^t(y^t, w^t)$ is a reciprocal of the Farrel's measure, and measures the extent to which the aggregate production cost in period *t* can be reduced while maintaining the output vector y^t given the input price vector w^t. This ratio measures the distance between the observed cost, namely $w^t x^t$, and the cost frontier defined by $C^t(y^t, w^t)$.

According to Maniadakis N. and Thanassoulis E. (2004), the Cost Malmquist (CM) Index can be decomposed into the two components, viz. overall efficiency change (ΔOE) and cost-technical change (ΔCT):

$$CM = \Delta OE \cdot \Delta CT, \quad (7)$$

where

$$\Delta OE \equiv \frac{w^{t+1} x^{t+1} / C^{t+1}(y^{t+1}, w^{t+1})}{w^t x^t / C^t(y^t, w^t)}, \quad (8)$$

and

$$\Delta CT \equiv \left(\frac{w^t x^{t+1} / C^t(y^{t+1}, w^t)}{w^{t+1} x^{t+1} / C^{t+1}(y^{t+1}, w^{t+1})} \frac{w^t x^t / C^t(y^t, w^t)}{w^{t+1} x^t / C^{t+1}(y^t, w^{t+1})} \right)^{1/2}. \quad (9)$$

Thereby, ΔOE measures firm-specific changes in cost efficiency related to input–mix, and ΔCT catches the combined effect of changes in input prices and technology (both of which are out of firm's control).

By relating components of the CM to those of the M Index, one can further decompose the two terms of the CM. Firstly, ΔOE can be decomposed into efficiency change, ΔE and allocative efficiency change (ΔAE). The former term can be estimated by employing either Eq. 2 or Eqs. 4 and 5, whereas ΔAE is obtained by the virtue of the following computations:

$$\Delta AE \equiv \frac{w^{t+1} x^{t+1} / \left(C^{t+1}(y^{t+1}, w^{t+1}) D^{t+1}_{I,CRS}(x^{t+1}, y^{t+1}) \right)}{w^t x^t / \left(C^t(y^t, w^t) D^t_{I,CRS}(x^t, y^t) \right)}. \quad (10)$$

Secondly, ΔCT can be decomposed into technical change, ΔT and price effect, ΔP. The ΔT term is obtained according with the Eq. 2, while ΔP is defined in the following way:

$$\Delta P \equiv \left(\frac{w^t x^{t+1} / \left(C^t(y^{t+1}, w^t) D^t_{I,CRS}(x^{t+1}, y^{t+1}) \right)}{w^{t+1} x^{t+1} / \left(C^{t+1}(y^{t+1}, w^{t+1}) D^{t+1}_{I,CRS}(x^{t+1}, y^{t+1}) \right)} \frac{w^t x^t / \left(C^t(y^t, w^t) D^t_{I,CRS}(x^t, y^t) \right)}{w^{t+1} x^t / \left(C^{t+1}(y^t, w^{t+1}) D^{t+1}_{I,CRS}(x^t, y^t) \right)} \right)^{1/2}. \quad (11)$$

Finally, the Cost Malmquist Productivity Index can be decomposed into these components:

$$CM = \underbrace{\underbrace{\Delta PT \cdot \Delta SE}_{\Delta E} \cdot \Delta AE}_{\Delta OE} \cdot \underbrace{\Delta T \cdot \Delta P}_{\Delta AE} \equiv M \cdot \Delta AE \cdot \Delta P. \quad (12)$$

The Cost Malmquist Index could be further decomposed in the spirit of Ray S.C. and Desli E. (1997), Simar L. and Wilson P.W. (1998), Wheelock D.C. and Wilson P.W.(1999), however these computations are out of scope of this paper.

Preliminaries for DEA

The distance functions for respective components of the Cost Malmquist Index can be obtained by employing DEA. Suppose that there are $k = 1,2,...,K$ DMUs, each producing $j = 1,2,...,n$ outputs from $i = 1,2,...,m$ inputs. Hence, DMU *k* exhibits Farrel input–oriented technical efficiency θ_k, whereas Shepard technical efficiency is a reciprocal number, $1/\theta_k$.

The distance function for the *l*-th firm possessing input–output bundle $(x^{l,t}, y^{l,t})$ in terms of the technology set of the period *t* may be obtained by solving the following multiplier DEA program [2]:

[2] Indeed, Maniadakis N. and Thanassoulis E. (2004) used $\left(D^t_{I,CRS}(x^{l,t}, y^{l,t}) \right)^{-1} = \min_{\theta_l, \lambda_k} \theta_l$, i. e. the Shepard measures. These, however, would invert the interpretation of the Malmquist Index presented in this paper, thus making it less intuitive.

$$D^{t}_{I,CRS}(x^{l,t}, y^{l,t}) = \min_{\theta_l, \lambda_k} \theta_l$$

s. t.

$$\begin{aligned} &\sum_{k=1}^{K} \lambda_k x_i^{k,t} \le \theta_l x_i^{l,t}, \quad i = 1,2,...,m; \\ &\sum_{k=1}^{K} \lambda_k y_j^{k,t} \ge y_j^{l,t}, \quad j = 1,2,...,n; \\ &\lambda_k \ge 0, \quad k = 1,2,...,K; \\ &\theta_l \text{ unrestricted.} \end{aligned} \tag{13}$$

Meanwhile, the distance function, when the input–output bundle of one period *t* is compared to the efficiency frontier of another period, may be obtained by solving the following multiplier DEA program:

$$D^{t}_{I,CRS}(x^{l,t+1}, y^{l,t+1}) = \min_{\theta_l, \lambda_k} \theta_l$$

s. t.

$$\begin{aligned} &\sum_{k=1}^{K} \lambda_k x_i^{k,t} \le \theta_l x_i^{l,t+1}, \quad i = 1,2,...,m; \\ &\sum_{k=1}^{K} \lambda_k y_j^{k,t} \ge y_j^{l,t+1}, \quad j = 1,2,...,n; \\ &\lambda_k \ge 0, \quad k = 1,2,...,K; \\ &\theta_l \text{ unrestricted.} \end{aligned} \tag{14}$$

In Eqs. 13 and 14, the coefficients λ_k are weights of the peer DMUs. Noteworthy, this model presumes existing constant returns to scale (CRS), which is a rather arbitrary condition. CRS indicates that the manufacturer is able to scale the inputs and outputs linearly without increasing or decreasing efficiency. The variable returns to the scale model, hence, can be written by supplementing Eqs. 13 and 14 with a convexity constraint, $\sum_{k=1}^{K} \lambda_k = 1$.

According to Thanassoulis E. et al. (2008), in case of considering the input–output bundle and the input costs of the *t*-th period, the minimum cost can be obtained by the virtue of the following linear cost minimization model:

$$C^{t}(y^{l,t}, w^{l,t}) = \min_{\lambda_k, x_i} c(y^{l,t}, w^{l,t}) = \sum_{i=1}^{m} w_i^{l,t} x_i$$

s. t.

$$\begin{aligned} &\sum_{k=1}^{K} \lambda_k x_i^{k,t} \le x_i, \quad i = 1,2,...,m \\ &\sum_{k=1}^{K} \lambda_k y_j^{k,t} \ge y_j^{l,t}, \quad j = 1,2,...,n, \\ &\lambda_k \ge 0 \end{aligned} \tag{15}$$

where $w_i^{l,t}$ are the input prices for the *l*–th DMU. This model yields the minimum cost, which is compared with the actual costs when computing the Cost Malmquist Index. In case, if one wants to obtain the minimum cost with respect to technology of a different period, the following model is implemented:

$$C^t(y^{l,t+1}, w^{l,t}) = \min_{\lambda_k, x_i} c(y^{l,t+1}, w^{l,t}) = \sum_{i=1}^{m} w_i^{l,t} x_i$$

s. t.

$$\sum_{k=1}^{K} \lambda_k x_i^{k,t} \le x_i, \quad i = 1, 2, \ldots, m$$

$$\sum_{k=1}^{K} \lambda_k y_j^{k,t} \ge y_j^{l,t+1}, \quad j = 1, 2, \ldots, n. \qquad (16)$$

$$\lambda_k \ge 0$$

The discussed linear programming models provide the basis for computations of the components of the Cost Malmquist Index.

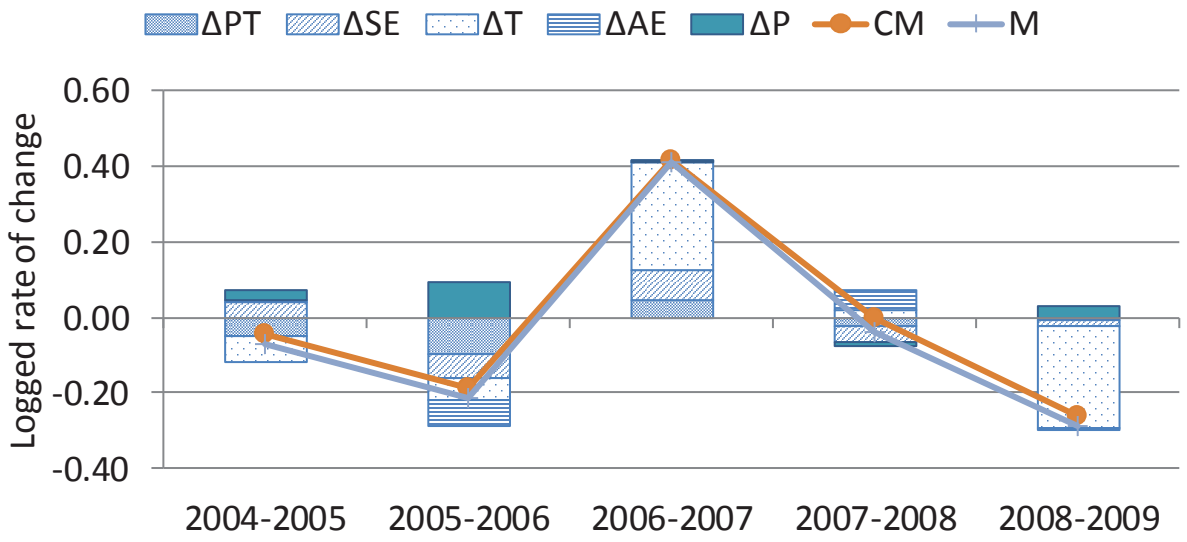
Data Used and Results

The technical and scale efficiency was assessed in terms of the input and output indicators commonly employed for agricultural productivity analyses (Bojnec S., Latruffe L., 2011; Douarin E., Latruffe L., 2011). More specifically, the utilized agricultural area (UAA) in hectares was chosen as a land input variable, annual work units (AWU) – as a labour input variable, intermediate consumption in Litas, and total assets in Litas as a capital factor. On the other hand, the three output indicators represent crop, livestock and other outputs in Litas, respectively. Indeed, the three output indicators enable to tackle the heterogeneity of production technology across different farms.

The cost efficiency was estimated by defining respective prices for each of the four inputs described earlier. The land price was obtained from the Eurostat and assumed to be uniform for all farms during the same period. The labour price is an average salary in the agricultural sector taken from Statistics Lithuania. The price of the capital is depreciation plus interests per one Litas of assets. Meanwhile, the intermediate consumption is directly considered as a part of total costs.

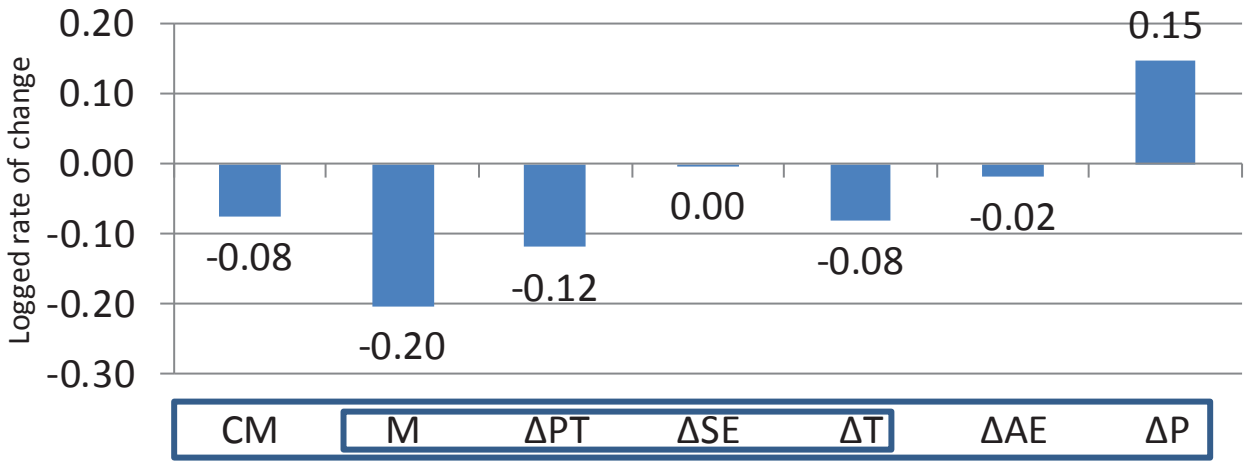
The data for 200 farms selected from the FADN sample cover the period of 2004–2009. Therefore, a balanced panel of 1200 observations is employed for analysis. The analysed sample covers relatively large farms (mean UAA – 244 ha). As for labour force, the average was 3.6 AWU.

The dynamics of the Cost Malmquist Productivity Index and its components is given in Fig. 1. The allocative efficiency and price change either played a rather insignificant role during most of the periods or moved to the opposite directions (e.g. during 2005–2006). Therefore, the difference between the Malmquist Productivity Index, M, and the Cost Malmquist Productivity Index, CM, remained close to nought. Obviously, the TFP was decreasing during most of the periods save those of 2006–2008. As for 2006–2007, the TFP change was mainly driven by the outward movement of the production frontier, which indicated the recovery after unsuccessful year 2006.



Source: designed by the authors.

Fig. 1. **Dynamics of the cost Malmquist Index and its components, 2004–2009**



Source: designed by the authors.

Fig. 2. **The cumulative change in the Cost Malmquist Index and its components, 2004–2009 (rectangles encompass the two productivity indices and their components)**

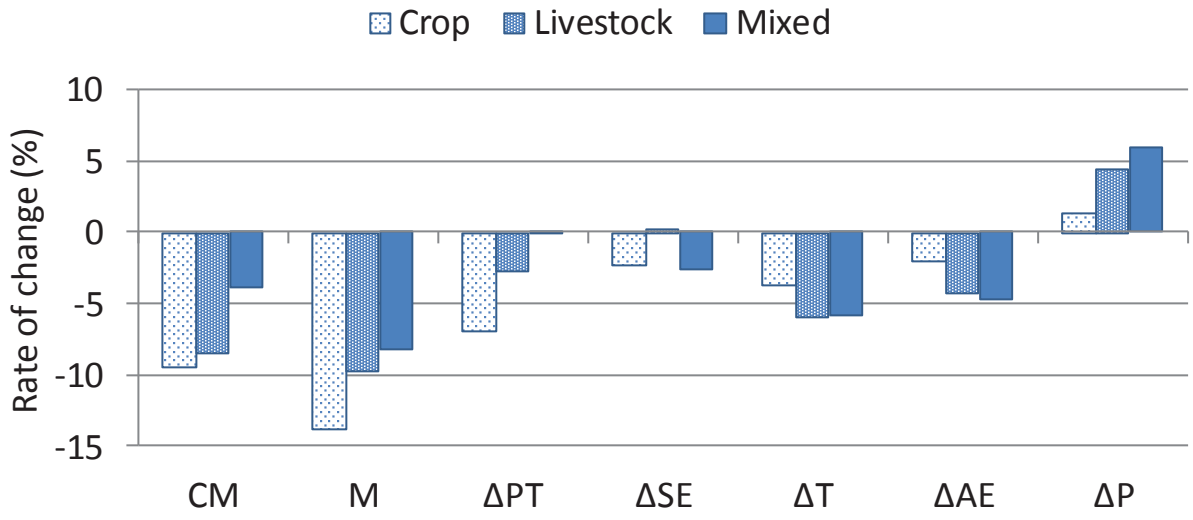


Fig. 3. **The cumulative change in the cost Malmquist Index and its components across farming types, 2004–2009**

Overall, the decrease in the TFP of some 20% was observed for the whole sample taking into account the period of 2004–2009. Thanks to a positive price change effect, ΔP, the cost productivity decreased to a margin of some 8%. The pure technical efficiency decreased by some 12%, and thus constituted the main source of decrease in the TFP. The cumulative scale efficiency change, ΔSE, summed up to zero, thus inducing a presence of the underlying constant returns to scale technology. Meanwhile, the allocative efficiency change, ΔAE, was negative, albeit quite insignificant (2%). Therefore, the input-mix adjustments were not efficiency-increasing either.

In order to assess the farming-type features of the TFP change, the Fig. 3 exhibits the mean values for the Malmquist Productivity Indices across crop (crop output constituted at least 2/3 of the total output), livestock (livestock output constituted at least 2/3 of the total output), and mixed farms. The analysis showed that the crop farms had suffered to the highest extent in terms of the TFP losses. However, the loss in the cost productivity was alleviated by the lowest decrease in productivity caused by change in the allocative efficiency. The latter finding implies that the crop farms were those most efficiently adjusting their input-mixes. The mixed farms experienced both the highest gains from the input price change and the highest losses induced by the decreasing allocative efficiency.

The scale efficiency changed rather insignificantly as regarding the livestock farms, whereas the two remaining farming types experienced a slight decrease therein. The steepest decrease in the pure technical efficiency was observed for the crop farms, whereas the production frontier moved inwards to the highest extent with respect to the livestock and mixed farms.

Conclusions, proposals, recommendations

The paper estimated the total factor productivity change for the sample of 200 Lithuanian family farms covering the period of 2004–2009. The results indicated that the cost productivity decreased by some 8%, whereas the total factor productivity – by 20% during the period. Declines in both pure technical efficiencies were the main drivers of the decrease, and the scale effect had almost no impact.

The crop farming should draw an immediate attention in terms of modernisation of this farming type, experienced the lowest input price effect and the highest decrease in the pure technical efficiency. On the other hand, the very production frontier moved inwards to a lower extent, if compared to the remaining farming types. Although the livestock and mixed farms did not exhibit the same steep decrease in the pure technical efficiency, their production frontiers mowed inwards to a higher extent, and thus resulted in the decreased total factor productivity.

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TRENDS OF CHANGES IN RESOURCES AND WORK PERFORMANCE IN POLISH AGRICULTURE IN COMPARISON WITH THE SELECTED EU COUNTRIES

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Abstract. The study presents differentiation of resources and productivity of labour on the farms in Poland in comparison with the other EU Member States. The analysis encompassed the years 2005 – 2010, the main source of information being the data of Eurostat and domestic statistics. Significant changes were observed in the analysed period; however, it was found that the states having joined the EU in 2004 and 2007 greatly differ in terms of employment level and labour productivity from the EU-15. These states have not been "catching up" the EU-15 states with regard to labour productivity in the analysed period.
Key words: resources, labour productivity, farms agriculture.
JEL code: J43, Q12,

Introduction

Changes in production resources, including the labour force and effectiveness of use of these resources may serve as an indicator for assessment of the condition of farms. It is possible to gain a competitive advantage, when an enterprise has access to appropriate resources and it is able to use them effectively. The issue of labour resources is a significant one in the context of the issue of balance between the production factors on farms (Zietara W., 2000). Agricultural work has many specific features, associated, for instance, with the need to take into account the spatial nature of agricultural production, climate conditions, seasonal character, and diversity of production. This exerts a significant influence on the scope and structure of use of the labour potential in agriculture. In comparison with other EU Member States, Poland is distinguished by a high share of workers employed in the agricultural sector. On the contrary, productivity of labour in farming in most EU Member States is lower in comparison with sectors other than agriculture. According to Kowalski, farming has been perceived in Poland as an outdated and unpromising, and one of the factors distinguishing the condition of farming is lower productivity of labour in comparison with industry (Kowalski A., 2009).

The aim of this study is to define the diversification in the use of human resources in agriculture in the European Union Member States. First, the author presents the changes in human resources in the agricultural sector in selected Member States of the European Union; second, the author assesses the effectiveness of human resource use on the macroeconomic scale. The analysis encompassed countries of the "old European Union" (EU-15) and those, which became members in 2004 and 2007.

The study is based on source materials of the European Statistical Office. It was not always possible to present comparisons for all countries due to incomplete data in the Eurostat database. The analysis was conducted using data on value of agricultural production and human resources, expressed in annual work units according to normative work time of 2120 hours/year. The analysis encompassed the period between 2005 and 2010; for some variables, information was available for the year 2012.

Human resources in agriculture in the EU Member States

The present, unusual condition of individual farming in Poland has been shaped by many factors. First of all, one can list historic factors, such as the social structure of the pre-war first Republic of Poland, the policy of invading countries during the partitioning period, a delay in urbanisation due to two world wars, and, in particular, the fact that under the Communist rule, agriculture was the only sector of economy characterised by private ownership (Jezierski A., Leszczynska C., 2003). This has surely influenced the resources of farms in terms of production factors, including human resources. The employment level in agriculture in Poland is very high (Table 1). Romania is the only country in the EU which has greater resources. Individual Member States of the EU are much diversified. However, significant changes – including a decrease in the employment rates – can be noticed in the subsequent years of the examined period.

The greatest decrease in the number of workers in agriculture has been observed in Latvia and Romania; it has also been quite significant in Bulgaria and the Czech Republic. In some countries, employment in agriculture has remained almost unchanged or the changes have been slight; these include, for instance, Great Britain or Italy. In Ireland, a small increase in the employment rate has been observed in the same period. On the average, the rate of employment in agriculture in the European Union has decreased by more than 20% between 2005 and 2012. As in Poland this decrease amounted to about 8%, it was relatively low.

A more precise measure of the level of human resources in agriculture of a particular country is the

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Table 1

Persons employed in agriculture in the selected EU Member States

State	Employment in agriculture (thousand AWU) by years								Change (%) 2012 2005
	2005	2006	2007	2008	2009	2010	2011	2012	
Belgium	70	68	66	65	63	62	58	58	-17
Bulgaria	626	564	494	465	436	407	407	407	-35
Czech Republic	139	133	138	121	115	109	106	106	-24
Denmark	63	61	59	58	55	54	52	52	-17
Germany	583	568	554	545	536	538	533	525	-10
Ireland	149	153	150	148	147	166	166	166	11
Spain	1017	1013	998	1012	922	924	894	881	-13
France	908	886	867	848	828	810	792	774	-15
Italy	1242	1257	1216	1182	1149	1171	1143	1151	-7
Latvia	138	123	107	99	93	86	82	78	-44
Lithuania	174	166	158	151	147	143	142	140	-20
Netherlands	194	190	186	182	180	178	175	170	-13
Austria	147	141	137	133	132	130	126	124	-16
Poland	2292	2292	2299	2299	2214	2101	2101	2101	-8
Romania	2596	2527	2205	2152	2152	1639	1565	1574	-39
Slovenia	90	89	84	83	80	77	78	78	-14
Sweden	76	75	69	66	63	60	57	54	-28
Great Britain	298	292	287	283	278	277	288	289	-3
Total EU-27	12637	12373	11774	11475	11104	10384	10158	10111	-20

Source: http://epp.eurostat.ec.europa.eu/portal/page/portal/statistics/ and author's calculations

Table 2

Human resources in agriculture in the EU Member States[2]

State	Employment in agriculture (AWU/100 hectares) by years					
	2005	**2006**	**2007**	**2008**	**2009**	**2010**
Belgium	6.2	6.0	5.9	5.0	4.8	4.5
Bulgaria	5.1	4.9	4.8	4.9	4.5	4.1
Czech Republic	5.3	5.1	4.9	4.5	4.3	4.3
Denmark	3.2	3.2	3.1	2.7	2.6	2.5
Germany	5.1	5.0	5.1	4.1	3.8	3.7
Ireland	2.7	2.7	2.9	2.7	2.3	2.0
Spain	3.9	3.8	3.7	3.2	3.4	3.5
France	3.1	2.9	3.0	2.4	2.6	2.1
Italy	6.4	6.7	6.4	6.5	6.4	6.5
Latvia	6.6	6.6	6.0	4.9	4.6	4.5
Lithuania	7.4	6.7	5.9	4.5	4.8	4.5
Netherlands	13.6	13.6	12.8	11.6	11.3	12.1
Austria	6.5	6.7	7.1	6.9	6.8	6.8
Poland	15.4	14.4	13.9	14.1	13.5	13.1
Romania	20.8	20.1	20.1	19.6	19.6	20.3
Slovenia	17.5	18.7	19.2	17.3	19.0	18.1
Sweden	3.1	3.1	3.3	3.2	3.2	3.1
Great Britain	2.4	2.3	2.5	2.1	1.8	2.0
Average (EU-27)	7.1	6.8	6.7	6.3	6.2	6.1

Source: author's calculations based on http://epp.eurostat.ec.europa.eu/portal /page/portal/statistics/

[2] It was impossible to conduct calculations for 2011-2012 due to the lack of data on agricultural land

number of workers per acreage of agricultural land. For this purpose, the author has determined the value of human resources per 100 hectares of agricultural land (Table 2).

The lowest employment rates in agriculture per 100 hectares of agricultural land were recorded in Ireland, France, Denmark, and Great Britain. In comparison with Poland, these countries are characterised by six to seven times lower employment per 100 hectares of agricultural land. On the contrary, the employment rate in Poland is about two times higher in comparison with the EU-27 average value. A tendency of decrease has been observed in the analysed countries since 2005. The resources have remained almost unchanged (just as in Sweden, Austria, or Italy characterised by stable, low level of employment in agriculture); only in Romania and Slovenia are characterised by the highest employment in agriculture per 100 hectares of agricultural land.

In 2005, the agricultural population constituted 17.4% of all of those employed in Poland; however, in the economically active population, it represented only 10.1% (Statistical Yearbook of Agriculture and Rural Areas…., 2007). Nevertheless, among the EU-27 countries, Poland belongs to the group with the highest employment rates in agriculture. The average share of employment in agriculture has been decreasing to the overall working population in the European Union (Table 3). The decrease amounted almost to 1 percentage point in the analysed period. Lithuania and Poland were the countries which experienced the highest decrease. Such changes indicate diversification of the pace of transformation which, among other things, is a consequence of technical and technological progress in agriculture. In countries, where employment in agriculture is high and agriculture plays a relatively significant role in the economy, the changes are more substantial in comparison with the countries of Western Europe, where the situation is stable.

Changes in the number and age structure of those employed in agriculture after 1989 in Poland have been influenced by overall demographic changes; however, there were visible differences in terms of involvement of subsequent generations in agriculture. First of all, the percentage of young persons (aged 15-24), working in agriculture, was decreasing visibly and permanently, while those age groups, among which the share of those employed in agriculture was high, started to retire. In the future, thus, one can expect a decrease in the number of employees working in this sector as the share of subsequent age groups, less involved in agriculture increases in the overall working population (Strzelecki P., 2010).

Productivity of labour in agriculture

One of the significant indexes characterising the processes of economic development of every country is the effectiveness (productivity) of labour. Increase of labour productivity leads to reduction of costs, increasing of supply of less expensive goods and services, development of the market, and it is translated to increase of the buying power, and thus, to the level of affluence of the society (Golaś Z., Kozera ,., 2002).

Table 3

Share of employment in agriculture in overall employment

State	Share of agricultural workers (in %) by years						2010-2005
	2005	2006	2007	2008	2009	2010	
Belgium	2.0	2.0	1.9	1.6	1.5	1.4	-0.6
Bulgaria	8.9	8.1	7.5	7.5	7.1	6.8	-2.1
Czech Republic	4.0	3.8	3.6	3.2	3.1	3.1	-0.9
Denmark	3.2	3.1	3.0	2.5	2.5	2.4	-0.8
Germany	2.4	2.3	2.2	1.8	1.7	1.6	-0.8
Ireland	5.9	5.7	5.5.	5.4	5.0	4.6	-1.3
Spain	5.3	4.8	4.5	4.0	4.2	4.3	-1.0
France	3.6	3.7	3.4	2.7	2.9	2.9	-0.7
Italy	4.2	4.3	4.0	3.7	3.7	3.8	-0.4
Latvia	11.8	11.2	9.9	7.9	8.7	8..8	-3.0
Lithuania	14.0	12.4	10.4	7.9	9.2	9.0	-5.0
Netherlands	3.3	3.3	3.0	2.8	2.8	3.1	-0.2
Austria	5.5	5.5	5.7	5.4	5.3	5.2	-0.3
Poland	17.4	15.8	14.7	14.0	13.3	12.9	-4.5
Romania	32.3	30.6	29.5	28.7	29.1	30.1	-2.2
Slovenia	9.1	9.6	9.9	8.6	9.1	8.8	-0.3
Sweden	2.3	2.2	2.3	2.1	2.2	2.1	-0.2
Great Britain	1.4	1.4	1.4	1.1	1.1	1.2	-0.2
Total EU-27	6.1	5.8	5.6	5.1	5.1	5.2	-0.9

Source: http://ec.europa.eu/agriculture/agrista/2010/table_en/C5-1-3513.pdf. Eurostat and author's calculations

Table 4

Labour productivity in the EU Member States in 2005-2010

State	Labour productivity (EUR thousand/AWU) by years					
		2006	2007	2008	2009	2010
Belgium	76.6	84.3	90.9	108.1	103.2	125.0
Bulgaria	11.3	12.3	12.4	16.5	14.9	16.8
Czech Republic	17.7	19.3	24.1	29.6	23.6	26.3
Denmark	89.5	93.7	109.0	123.9	118.2	145.5
Germany	44.6	47.6	53.7	72.3	67.2	72.6
Ireland	49.6	47.1	51.5	54.8	52.2	66.6
Spain	38.4	38.2	44.6	49.3	46.8	49.5
France	68.5	63.3	73.2	93.5	81.6	87.9
Italy	44.8	42.9	47.2	53.1	49.8	49.3
Latvia	5.5	6.2	8.5	10.8	9.4	10.7
Lithuania	7.5	8.2	12.5	18.2	13.4	16.0
Netherlands	80.1	86.2	96.2	106.7	102.4	104.7
Austria	23.5	23.8	25.0	27.7	25.8	27.5
Poland	6.1	7.0	8.9	9.8	8.2	9.6
Romania	4.1	4.7	4.8	6.3	4.8	5.1
Slovenia	12.4	11.6	11.7	13.9	11.9	13.0
Sweden	41.3	43.1	47.8	49.1	40.4	51.0
Great Britain	50.8	51.9	55.4	76.0	64.9	62.8

Source: http://appsso.eurostat.ec.europa.eu Economic accounts for agriculture - values at current prices

In general, the productivity index in economy is established as the correlation between effects and the total expenditures in the form of live and objectified labour. Measures of productivity may pertain tosindividual factors of production or all factors of production utilised. The concept of productivity is often used interchangeably with the term „effectiveness", although, it has been pointed out in literature on the subject that the two terms should be distinguished from one another (Kosieradzka A., Lis S., 2000). Czyzewski refers to the „gross" productivity factor, in which global production is the measure of effect, and the „net" productivity facto, where pure production is the measure of effect. In the broadest sense, this can be the total income of all factors, that is, the total of remuneration, taxes, depreciation, and economic surplus; in a narrower sense, it is limited to the surplus containing payment for own work of the owner of the resources, a bonus for uncertainty, and an economic rent Czyzewski B., 2012). In the present study, productivity has been defined as the quotient of the value of total agricultural production to the number of workers employed.

It isdbeing said that in Poland, agriculture is a sector of econom, which lowers the labour productivity indexes. About 13% of the entire economically active population is employed in agriculture, and the sector provides less than 3% of Gross Domestic Product (Statistical Yearbook…, 2011). Agriculture in Poland suffers from an excessive number of small farms, high employment, and insufficient level of productivity both in plant and in animal production. However, research results indicate that larger, market-oriented farms are characterised by labour productivity similar to that attained in Austria, Italy, or Spain (Golębiewska B., 2010).

Increase in labour productivity is influenced mainly by the production value level or reduction of employment. Other factors of significance may include motivation of employees, their skills, knowledge, labour organisation, or production technologies. There is a general belief that the pace of changes taking place in individual units and the economic and production effects attained are the result of personal traits of the managers (Wiatrak A.P., 1980). Labour productivity has greatly increased in Poland withIn the recent yeary. Effectiveness of use of the labour force measured by the value of agricultural production per 1 employee has been presented in table 4.

In most countries, productivity of human resources has been increasing since 2005. The highest labour productivity, measured on the basis of the total value of agricultural production per 1 employee was attained in Denmark, Belgium, and the Netherlands. These states also witnessed the highest increase in productivity in the examined period. As it has been pointed out by Wicki, countries characterised by low initial labour productivity in agriculture developed relatively faster than those, in which high productivity had been observed. However, in the period analysed, the productivity levels did not become similar, as absolute increase values were higher in the better developed countries. Thus, one can rather refer to divergence than convergence of the level of labour productivity (Wicki L., 2012).

Unfavourable conditions in terms of labour productivity were observed in Romania and Slovenia; in these countries, productivity remained almost unchanged. In contrast, all countries, which have been the EU Member States since 2004 and 2007, were characterised by low effectiveness of labour. For instance, productivity of Poland was almost 15 times lower in comparison with Denmark in 2005. The situation improved in the subsequent years to worsen once again in the period of 2009-2010.

Conclusions

The presented comparison of labour resources and their use allows stating that labour productivity has been much diversified among the EU Member States. Countries, which have joined the EU since 2004, fall behind the countries of Western Europe in terms of agricultural labour productivity quite significantly. The "old" EU Member States displayed a much higher effectiveness of use of labour. The differences were sometimes great. This, on the one hand, is due to the specific nature of production in such countries as the Netherlands. On the other hand, considering the substantial labour resources, e.g. in Poland, accompanied by low productivity of labour, it is necessary to point out the unfavourable proportions between the production factors. In this case, insufficient amounts of the third factor – capital which was not analysed in the study – may be of major significance.

Labour productivity in individual EU Member States may also be divided into high in the Western Europe countries and very low in the new members of the Community. In general, in countries joined the EU in 2004 and 2007, labour productivity was several dozen times lower. On the contrary, it has shown a tendency of increase in all the countries. However, on the basis of the analyses conducted, it can be stated that labour productivity in agriculture is not heading towards a similar level in all states of the EU-27. An improvement of the situation in the Polish agricultural sector is possible, as it has been forecasted, among other things, after transformation of the structure of farms, or decreasing of the number of economically active employees in agriculture in Poland which is mainly associated with generational changes.

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SIGNIFICANCE OF SUBSIDIES FOR FARMS ACCORDING TO AGRICULTURAL PRODUCTION TYPE AND ECONOMIC CLASS SIZE IN THE EUROPEAN UNION MEMBER STATES IN 2009

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Abstract. The aim of this article was to state the structure of farms in accordance with the FADN economic class sizes and type of production in different EU countries. The paper presents the level of total subsidies - excluding those on investments (SE605) per 1 ESU of economic size. Economic strength and the type of farming were taken into account. The obtained results show that there was a differentiation between the level of subsidies per ESU and labour unit on farms classified according to the type of farming for classes of varying economic strength. Most types of farming showed a tendency of visible increase in the level of subsidies along with the growth of economic size of farms, although the level of this phenomenon varied.
Key words: farms, total subsidies-excluding on investment/ESU, European Union, FADN.
JEL code Q120

Introduction

Member States of the European Union are characterised by diversified environmental and production conditions as well as different structures of farms. The farm income level is determined by many factors and it depends on the characteristics of production, usually referred to as the production type. Income is undoubtedly influenced by the production potential of the state, intensity of production measured as the level of expenditures on the current assets per hectare of agricultural land, and instruments of the agricultural policy (Poczta et al., 2008, 2009; Szeles, 2003), including, in particular, various subsidies. All farmers in the Member States of the European Union are subject to the Community income support system, which is based mainly on subsidies. The average subsidies rate in the EU countries was about 36% in 2002, EUR 18 000 per 1 adjusted worker and EUR 775 per 1 ha of agricultural land (Svatos, 2008). Depending on the research objective, various studies assess different aspects of agriculture both on the national level and in cross-national analyses, taking into account some or all of the European Union Member States. For instance, Polish studies include the article by Roman Sass (2008) who has presented an assessment of milk-producing farms, while the studies of Tadeusz Sobczynski (2008, 2009) have been dedicated to sustainability of farms and effectiveness of work.

Annual calculation of income of farms operating within the territory of the Community and their assessment in terms of implementation of tasks of the Common Agricultural Policy is conducted on the basis of the FADN. Farms that participate in the system of collection and use of accountancy data on the FADN holdings are classified according to two criteria, i.e. economic size (strength) and type of farming[2]. The economic size (strength) of farms is determined on the basis of the total of standard gross margin for all activities carried out on a particular farm. It is expressed in European Size Units (ESU). The equivalent of one ESU is EUR 1200. It seems necessary to emphasise the differences in the value of subsidies for individual farms, depending on their production type and economic size. In the European agriculture, there are clear potential differences between farms. Existing instruments of the agricultural policy are designed to maintain farmers' incomes and its end usefulness is a more frequently examined issue. Conducted literature review indicates that there is a need for checking whether the level of subsidies is equal by the same types of farms and the same economic class size.

This article includes three tasks formulated for the research

1) to state the structure of farms in accordance with the FADN economic class sizes in different EU countries;
2) to state the structure of farms in accordance with the FADN type of production in different EU countries;
3) the present the level of support granted to farms per unit of economic strength, taking into account the economic strength and the type of farming.

The analysis was conducted on the basis of published data from farms qualified according to the type of farming and the economic size class, obtained from the published FADN database. These data served as a basis for characterisation of farms in the EU Member States. In order to indicate the differences in the subsidy system, the subsidy value was converted to the economic strength units for farms in groups established in accordance with the FADN classification.

In 2009, among the Member States of the European Union (EU-27), the highest number of farms participating in the FADN was found in Romania (17.2%, including 16.2% farms of the economic strength up to 4 ESU), Poland (15.5%), Italy (14.9%) and Spain (12.3%) as well as Greece (10.3%). The most numerous group of farms consisted of units classified in the lowest economic strength category of up to 4 ESU. The share of these amounted almost to 30% of all farms participating in the

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[2] The type of farming is expressed as the share of standard gross margin (SGM) values for individual types of activity in the total SGM value of a particular farm

Table 1

Total subsidies - excluding on investments (SE605) in EUR per 1 ESU according to the farming type in 2009

Economic Size Class	Total subsidies - excluding on investments (SE605) in EUR per 1 ESU								
	(1) Field-crops	(2) Horticul-ture	(3) Wine	(4) Other perma-nent crops	(5) Milk	(6) Other grazing livestock	(7) Grani-vores	(8) Mixed	Total
(1) 0 - <4 ESU	743.46	226.40	280.00	623.23	509.60	1108.89	267.20	612.00	693.08
(2) 4 - <8 ESU	743.56	110.51	148.59	280.00	643.44	1298.50	304.83	680.52	585.25
(3) 8 - <16 ESU	686.81	57.85	119.67	204.07	574.17	1034.24	270.51	535.65	498.22
(4) 16 - <40 ESU	618.05	52.01	74.51	179.57	518.21	829.11	184.98	545.32	491.23
(5) 40 - <100 ESU	512.23	40.28	62.63	128.53	406.93	632.47	147.14	457.01	393.23
(6) >= 100 ESU	423.23	24.80	41.90	96.79	316.82	422.37	65.71	401.13	257.43

Source: author's calculations based on the EU FADN Database

FADN. States characterised by very high shares of farms of the economic strength of 4 ESU or less were Romania, Bulgaria, Lithuania, Cyprus, Latvia, and Slovenia. In Portugal, Hungary, and Poland, the share of these farms was also high. This influences quite significantly the average results achieved in these countries. In nine Member States of the European Union, namely, Denmark, Slovakia, France, Luxembourg, Malta, Austria, Finland, Sweden, and Great Britain, the representative sample of farms of the economic strength below 8 ESU is not taken into account, while in Belgium, Germany, and the Netherlands, the farms in this sample have more than 16 ESU. In total, the share of farms with the economic strength in the following classes: 4 to 8 ESU, 8 to 16 and 16 to 40 ESU was similar in the European Union, and it amounted to 17-18% in 2009. The share of the strongest farms, included in the category above 100 ESU, constituted only 6% of the total number of farms. However, the share of the strongest farms was the greatest in Denmark, the Netherlands, and Slovakia, meaning that they largely determined the results obtained by farms in these countries.

The most numerous group of farms according to farming type were field crop type farms, as their share amounted to more than 30% of all farms participating in the FADN. The states characterised by a very high share of field crop type farms included Romania (almost 6.5% of all farms participating in the FADN), Italy, Poland, Greece, and France. The second most often-encountered farming type in the European Union was mixed farms – one in every five farms represented this type. A high percentage of farms, belonging to this type, were found in Romania and Poland (share above 6% in the total number of farms participating in the FADN). The third largest farming type in the European Union relates with other permanent crops. In 2009, the share of farms of this type amounted to 17%. Most of these could be found in the Mediterranean countries, i.e. Italy (5.2%), Spain (4.9%), and Greece (4.6%). The share of farms engaged in production of milk was about 10%, and that of farms owning other grazing livestock was on the level of 12%. Most milk-producing farms could be found in Romania (2% of all farms participating in the FADN), Poland (1.4%), Germany (1.3%), and France (1.1%), while the other grazing livestock category was dominated by farms from Romania (1.8%), France (1.4%), Italy (1.4%), and Spain (1.2%). The share of other types of farming was small, amounting to: wine – 4.7% of all the FADN farms (with most farms located in Italy), horticulture – 3.3% (most farms located in Spain, Italy, and Poland) and granivores - 2.8%, dominated by farms from Poland, Italy, and Romania (the total share of these amounting to 1.7%).

Research results

Table 1 presents the level of total subsidies - excluding on investments (SE605) per 1 ESU of the economic strength in individual classes of economic strength, divided by types of farming. The breakdown indicates a visible differentiation of the level of subsidies "generated" by the economic strength unit between farms representing different types of farming and of varying economic strength. There is a visible tendency, however, the economic strength increases with the decrease of the level of subsidies. An exception to this rule was a group of the weakest farms (of the economic strength up to 4 ESU), where the subsidies – in most types of farming – were usually lower in comparison with the class of 4 to 8 ESU.

The highest level of subsidies per economic strength unit was recorded in the other grazing livestock category and the lowest - in horticulture. Horticultural farms of the highest economic strength (lowest subsidies per 1 ESU) received only 2% of the total value of subsidies received by farms in the other grazing livestock category of economic strength of 4 to 8 ESU (the group of farms with the highest subsidies per 1 ESU). The greatest diversity in the level of subsidies on farms of varying economic strength could be observed among farms belonging to the other grazing livestock category. Farms of the highest economic strength received three times lower subsidies in comparison with those of the economic strength of 4 to 8 ESU. Among farm types receiving the lowest subsidies per unit of the economic strength and among those, where

the subsidies tended to decrease visibly along with the increase of economic strength (horticulture, granivore), the greater diversity was observed among farms differing in terms of economic strength. In general, the higher were the subsidies received by farms engaged in a certain type of farming, the less diversified were the subsidy levels among groups of farms of varying economic strength, while the subsidy level tended to decrease along with the increase in the economic strength of the farms.

The highest subsidies (on a similar level of 422-423 EUR/ESU) on farms of the highest economic strength were observed in the production of field crops and other grazing livestock, slightly lower – among mixed farms (401 EUR/ESU) and milk-producing farms (316 EUR/ESU). The difference in the level of subsidies between field crops and other grazing livestock and farms engaged in horticulture (subsidies of about 25 EUR/ESU) was as high as seventeen times – meaning that horticulture in a group of economically strongest farms "provided" only 5% of subsidies available to farms of the same economic class engaged in the production of field crops and other grazing livestock.

Farms characterised by the lowest economic strength (up to 4 ESU) received subsidies from 226 EUR/ESU (horticulture) to 1108 EUR/ESU (other grazing livestock); thus, in the case of small-size farms, horticulture "generated" only 20% of subsidies available to farms of the same economic size engaged in the production of other grazing livestock.

The value of subsidies per economic size unit in the group of farms of the lowest economic strength (up to 4 ESU) was as follows for individual types of farming:

— horticulture (average – 226 EUR/ESU) – from 82 EUR/ESU (Hungary) to 586 EUR/ESU (Bulgaria), i.e. 7.1 times;
— granivores (average – 267 EUR/ESU) – from 102 EUR/ESU (Romania) to 493 EUR/ESU (Bulgaria), i.e. 4.8 times;
— wine (average – 280 EUR/ESU) – from 161 EUR/ESU (Portugal) to 193 EUR/ESU (Romania), i.e. 1.2 times;
— other permanent crops (average – 623 EUR/ESU) – from 189 EUR/ESU (Romania) to 722 EUR/ESU (Greece), i.e. 3.8 times;
— milk (average – 510 EUR/ESU) – from 272 EUR/ESU (Bulgaria) to EUR/ESU 1382 (Latvia), i.e. 5.1 times;
— mixed (average – 612 EUR/ESU) – from 339 EUR/ESU (Romania) to 2909 EUR/ESU (Estonia), i.e. 8.6 times;
— field crops (average – 743 EUR/ESU) – from 486 EUR/ESU (Romania) to 1951 EUR/ESU (Slovenia), i.e. 2.3 times;
— other grazing livestock (average – 1109 EUR/ESU)– from 521 EUR/ESU (Romania) to 4904 EUR/ESU (Estonia), i.e. 9.4 times.

According to the above, the highest differences in the level of subsidies "generated" per economic strength unit were observed among farms producing other grazing livestock and mixed farms which, at the same time, recorded the highest level of total subsidies. The lowest subsidies per 1 ESU in this class of economic strength were recorded among the most numerous Romanian farms, while the highest amounts were obtained by farms in Estonia (representing only two types of farming - other grazing livestock and mixed).

The value of subsidies per economic size unit in the group of farms of the economic size from 4 to 8 ESU was as follows:

— horticulture (average – 111 EUR/ESU) – from 7.5 EUR/ESU (Italy) to 255 EUR/ESU (Bulgaria), i.e. 34 times;
— wine (average – 149 EUR/ESU) – from 59 EUR/ESU (Italy) to 535 EUR/ESU (Greece), i.e. 9.1 times;
— other permanent crops (average – from 280 EUR/ESU) – from 136 EUR/ESU (Romania) to 687 EUR/ESU (Slovenia), i.e. 5,0 times;
— granivores (average – 305 EUR/ESU) – from 229 EUR/ESU (Hungary) to 334 EUR/ESU (Poland), i.e. 1.4 times;
— mixed (average – 681 EUR/ESU) – from 257 EUR/ESU (Italy) to 2722 EUR/ESU (Estonia), i.e. 10.6 times;
— milk (average – 643 EUR/ESU)– from 388 EUR/ESU (Bulgaria) to EUR/ESU 1124 (Estonia), i.e. 2.9 times;
— other grazing livestock (average – 1298 EUR/ESU) – from 488 EUR/ESU (Romania) to 4178 EUR/ESU (Czech Republic), i.e. 8.6 times;
— field crops (average – 744 EUR/ESU) – from 490 EUR/ESU (Romania) to 1504 EUR/ESU (Slovenia), i.e. 3.1 times.

The lowest level of subsidies per 1 ESU in this class from 4 to 8 ESU of the economic strength was recorded among the Italian and Romanian farms, while it was the highest among the farms in Ireland (other grazing livestock only) and Estonia (the highest among farms engaged in production of other grazing livestock and among mixed farms). In classes of farms of low and very low economic strength, a lower level of subsidies per unit of strength was recorded among the EU Member States in the South, while it was higher in the North (among those states, in which these groups of farms were present).

In the economic class of farms of the strength of 8 to 16 ESU, the total subsidies among individual types amounted to:

— horticulture (average – 58 EUR/ESU) – from 2.5 EUR/ESU (Italy) to 199 EUR/ESU (Malta), i.e. almost 80 times;
— wine (average – 120 EUR/ESU) – from 59 EUR/ESU (Italy) to 534 EUR/ESU (Greece), i.e. 9.0 times;
— granivores (average – 270 EUR/ESU) – from 127 EUR/ESU (Bulgaria) to 345 EUR/ESU (Spain), i.e. 2.7 times;
— other permanent crops (average – 204 EUR/ESU) – from 135 EUR/ESU (Italy) to 472 EUR/ESU (Slovenia), i.e. 3.5 times;
— field crops (average – 686 EUR/ESU) – from 267 EUR/ESU (Malta) to 1827 EUR/ESU (Finland), i.e. 6.8 times;
— mixed (average – 536 EUR/ESU) – from 289 EUR/ESU (Italy) to 1385 EUR/ESU (Latvia), i.e. 4.8 times;
— other grazing livestock (average – 1034 EUR/ESU) – from 307 EUR/ESU (Italy) to 3904 EUR/ESU (Latvia), i.e. 12.7 times;
— milk (average – 574 EUR/ESU) – from 403 EUR/ESU (Spain) to EUR/ESU 1115 (Latvia), i.e. 2.8 times.

In the class of farms of the economic strength from 8 to 16 ESU, the lowest level of subsidies per unit of economic strength for most types of farming was recorded in the states of Southern Europe (Cyprus,

Table 2

Total subsidies - excluding on investments (SE605) in EUR per 1 ESU for farms of economic class 16-40 ESU according to the farming type in 2009

Country	Total subsidies - excluding on investments (SE605) in EUR per 1 ESU								
	(1) Field-crops	(2) Horti-culture	(3) Wine	(4) Other perma-nent crops	(5) Milk	(6) Other grazing livestock	(7) Grani-vores	(8) Mixed	Total
(BEL) Belgium	392.09	-	-	-	-	617.61	-	-	420.48
(BGR) Bulgaria	863.37	50.61	-	136.82	654.67	-	0.96	549.01	652.89
(CYP) Cyprus	253.67	-	-	191.60	-	-	-	-	255.75
(CZE) Czech Republic	755.60	1.55	-	-	739.23	3989.05	-	1086.38	1039.96
(DAN) Denmark	546.08	123.64	-	-	-	-	-	666.54	554.54
(DEU) Germany	702.04	54.76	47.81	94.18	489.19	933.72	201.47	597.40	546.51
(ELL) Greece	665.67	68.52	300.88	283.68	-	743.11	-	489.39	520.70
(ESP) Spain	579.66	17.15	95.02	185.04	344.97	565.36	44.43	473.93	325.61
(EST) Estonia	936.80	-	-	-	914.29	-	-	-	972.19
(FRA) France	495.51	48.69	23.60	134.28	472.29	912.25	108.56	584.09	533.97
(HUN) Hungary	715.59	41.79	225.02	281.58	561.64	1709.05	174.45	871.58	611.59
(IRE) Ireland	1035.88	-	-	-	483.44	1306.75	-	1147.41	1040.83
(ITA) Italy	370.23	7.15	65.06	143.83	276.63	299.17	79.82	285.12	231.99
(LTU) Lithuania	812.49	-	-	-	884.94	-	-	919.69	842.41
(LUX) Luxembourg	-	-	-	-	-	1238.98	-	1130.92	878.91
(LVA) Latvia	938.49	-	-	-	1210.54	-	-	1382.74	1123.19
(MLT) Malta	184.27	199.84	-	-	775.52	-	365.28	-	272.64
(NED) Netherlands	305.97	-	-	-	-	224.58	22.82	-	199.96
(OST) Austria	1122.88	-	158.38	131.76	776.85	948.01	319.22	693.20	749.85
(POL) Poland	737.98	61.96	-	195.35	375.45	461.88	230.15	413.35	402.21
(POR) Portugal	589.08	19.49	174.25	325.98	458.23	767.29	-	598.51	447.99
(ROU) Romania	1394.05	113.09	-	164.26	641.13	796.41	233.85	213.99	981.00
(SUO) Finland	1664.98	-	-	-	1101.48	1672.72	-	1488.57	1382.67
(SVE) Sweden	725.76	-	-	-	692.53	1930.20	-	1013.70	902.71
(SVK) Slovakia	841.36	-	-	-	-	5244.63	-	-	1711.69
(SVN) Slovenia	-	-	-	-	598.50	636.74	-	688.57	639.96
(UKI) United Kingdom	665.53	-	-	110.40	360.32	1332.35	62.68	887.63	970.59
Total	618.05	52.01	74.51	179.57	518.21	829.11	184.98	545.32	491.23

Source: author's calculations based on the EU FADN Database

Spain, Malta, Italy, Romania, and Bulgaria), while it was the highest in the Scandinavian countries of the Northern Europe (Finland, Sweden).

Table 2 presents detailed information on total subsidies per unit of economic strength for farms of the economic strength from 16 to 40 ESU. Table 2 indicates that the highest level of subsidies was recorded among the Slovak (5244 EUR per 1 ESU of economic strength) and Czech (3989 EUR per 1 ESU of economic strength) farms engaged in production of other grazing livestock. In the same category, the lowest subsidies were obtained by farms in the Netherlands. The subsidy level per unit of economic strength generated, received by the Dutch farms, amounted only to 4.3% of the amount obtained by the Slovak farms and 5.6% of the subsidies granted to the Czech farms. Farms engaged in production of field crops were characterised by the level of total subsidies ranged from 184 EUR per 1 ESU in Malta and 254 in Cyprus to 1665 EUR per unit of economic strength (ESU) in Finland.

The level of total subsidies was very low for horticultural farms where the subsidy amount ranged from slightly more than 1 EUR (Czech Republic) to almost 200 EUR (Malta), and for wine producing farms, ranging from 24 EUR per 1 ESU (vineyards in France) to 301 EUR per 1 ESU (Greece).

The value of subsidies per unit of economic strength in the group of farms of the economic size (40 to

Table 3

Total subsidies - excluding on investments (SE605)/AWU and Farm Net Value Added/AWU (SE425) according to the type of farming and economic size class

ESU	Values in the type of agriculture in EUR								
	(1) Field-crops	(2) Horti-cultu-re	(3) Wine	(4) Other perma-nent crops	(5) Milk	(6) Other grazing livestock	(7) Grani-vores	(8) Mixed	Total
Total subsidies - excluding on investments (SE605)/ AWU									
(1) 0 - <4 ESU	1522	337	620	1894	801	1983	543	1085	1335
(2) 4 - <8 ESU	3815	334	1045	1906	2423	5729	1203	2667	3000
(3) 8 - <16 ESU	6868	354	1237	1990	3893	8974	2110	4000	4454
(4) 16 - <40 ESU	11913	567	1394	2914	9347	15655	3124	9343	8581
(5) 40 - <100 ESU	18011	685	1807	3279	15079	20630	5615	16799	12653
(6) >= 100 ESU	19600	1001	1575	3621	16805	22162	5799	16016	12071
Farm Net Value Added/AWU (SE425)									
(1) 0 - <4 ESU	3234	2425	3643	3853	2332	3114	2709	2003	2732
(2) 4 - <8 ESU	6904	4934	4642	7003	3082	6531	9258	3218	5781
(3) 8 - <16 ESU	9257	8918	9480	9893	6395	10682	8984	5874	8878
(4) 16 - <40 ESU	14392	12419	14683	14170	14032	17013	13579	11609	14264
(5) 40 - <100 ESU	22764	16722	23606	20914	23568	27379	26927	23316	23032
(6) >= 100 ESU	31713	28602	38308	26669	34991	39787	46764	24466	31976
Average	13352	17815	21138	12561	16257	14344	26084	8562	13873
Share total subsidies - excluding on investments (SE605) in Farm Net Value Added/AWU (SE425)									
(1) 0 - <4 ESU	47.06	13.89	17.01	49.16	34.36	63.67	20.05	54.17	48.86
(2) 4 - <8 ESU	55.25	6.78	22.51	27.22	78.61	87.72	12.99	82.87	51.89
(3) 8 - <16 ESU	74.19	3.96	13.05	20.12	60.87	84.01	23.49	68.10	50.17
(4) 16 - <40 ESU	82.78	4.56	9.49	20.56	66.62	92.02	23.01	80.48	60.16
(5) 40 - <100 ESU	79.12	4.09	7.66	15.68	63.98	75.35	20.85	72.05	54.94
(6) >= 100 ESU	61.80	3.50	4.11	13.58	48.03	55.70	12.40	65.46	37.75

Source: EU FADN Database and author's calculations based on the EU FADN Database

100 ESU) in 2009 was as follows according to the farming type:

- other permanent crops (average – 128 EUR/ESU) – from 7.4 EUR/ESU (Netherlands) to 314 EUR/ESU (Hungary), i.e. more than 42 times;
- horticulture (average – 40 EUR/ESU) – from 8.5 EUR/ESU (Czech Republic) to 413 EUR/ESU (Finland), i.e. 49 times;
- wine (average – 63 EUR/ESU) – from 20.5 EUR/ESU (France) to 210 EUR/ESU (Austria), i.e. 10.3 times;
- granivores (average – 147 EUR/ESU) – from 35 EUR/ESU (Bulgaria) to 798 EUR/ESU (Finland), i.e. 22.8 times;
- milk (average – 407 EUR/ESU) – from 190 EUR/ESU (Italy) to EUR/ESU 1047 (Latvia), i.e. 7.7 times;
- field crops (average – 513 EUR/ESU) – from 197 EUR/ESU (Cyprus) to 1115 EUR/ESU (Slovakia), i.e. 5.7 times;
- mixed (average – 457 EUR/ESU) – from 200 EUR/ESU (Netherlands) to 1540 EUR/ESU (Finland), i.e. 10.6 times;
- other grazing livestock (average – 632 EUR/ESU) – from 205 EUR/ESU (Netherlands) to 6057 EUR/ESU (Czech Republic) and 5187 EUR/ESU (Slovakia), i.e. 29.5 times and 25.3 times.

The lowest level of subsidies per 1 ESU in this class from 40 to 100 ESU of the economic strength was observed for most types of farming among the farms of the Netherlands and Italy, while it was the highest among the Slovak and Czech farms (except for horticulture). In the class of farms characterised by high economic strength, the level of subsidies was relatively higher in countries with a relatively high share of larger farms in the structure of farms. According to the analysis of the Hungarian agriculture conducted by Krisztian Keszthelyi (2005), the amount of subsidies received from the government per size unit is almost equal in all economic size classes.

Table 3 presents the level of total subsidies - excluding on investments (SE605) per 1 AWU in different classes of the economic strength according to the type of farming. The breakdown indicates a visible differentiation in the level of subsidies per unit of work between farms representing different types of farming and differing in terms of economic strength. However, there is a visible tendency of increase in the level of subsidies with the

increase of the economic strength. The conducted research shows that on average, one half of the value of labour productivity, measured by the Farm Net Value Added/AWU, was obtained from total subsidies (converted to AWU). The highest average share in labour productivity was recorded in the group of farms of economic strength from 16 to 40 ESU, and it was accompanied by a very high diversity from 4.6% (horticulture) to 92% (other grazing livestock). The lowest level of total subsidies/ AWU and the lowest labour productivity were recorded among the weakest farms (up to 4 ESU).

The highest productivity (more than 3.8 thousand EUR/AWU) and also a high share of subsidies in the Farm Net Value Added/AWU (49%) in this group was observed among farms engaged in production of other permanent crops. The highest labour productivity was achieved among farms of the highest economic strength (above 100 ESU), where the value of subsidies was the highest (although, the level of subsidies was relatively the lowest) per person hired for most types of farming (except wine and mixed farms). Therefore, it can be concluded that the least numerous farms, recorded in the FADN, characterised by the highest economic strength, attained the highest labour productivity regardless of the type of farming, also excluding the subsidies.

Summary

The level of total subsidies - excluding on investments (SE605) per 1 ESU of economic strength in various classes of the economic strength, according to the type of farming, indicates a visible differentiation with a tendency of decrease in the level of subsidies with the increase of the economic strength of farms in most types of farming. The highest level of subsidies per economic strength unit was observed among farms engaged in production of other grazing livestock (average about 12.5 thousand EUR/ESU); it was the lowest among those engaged in horticulture (average about 0.5 thousand EUR/ESU). Moreover, the higher was the level of subsidies granted to farms belonging to a certain type, the less differentiated were the subsidy levels between groups of farms of varying economic strength. This applied to comparison of types of farming across the entire European Union as well as to comparison of countries for individual classes of economic strength.

The conducted research indicates a visible differentiation between the level of subsidies per labour unit on farms classified according to the type of farming for classes of varying economic strength. On average, one half of labour productivity measured on the basis of the Farm Net Value Added/AWU was obtained from total subsidies/AWU. Most types of farming showed a tendency of visible increase in the level of subsidies along with the growth of economic strength of farms, although the level of this phenomenon varied.

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ECONOMIC EVALUATION OF COMBINED SOIL PREPERATION, FERTILIZING AND SEEDING MACHINERY USED IN GRAIN PRODUCTION PROCESS

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Abstract. The aim is to compare several soil preparations (that include soil preparation, fertilizing and seeding) technologies: single operation, power-harrow seeder, and direct seeder technologies. This comparison is done including labour costs, machinery depreciation and maintenance costs and fuel costs. The actual fertilizer costs have not been taken into consideration. To proceed successfully with calculations, an economic model of a grain production farm has been created, where it is possible to compare different types of technologies and include any number of agricultural operations in the calculations. The model uses a sophisticated algorithm to determine soil preparation costs at any given land area, calculating the machines' efficiency at any given moment and also giving the possibility to calculate the total number of hours needed to prepare one ha of land for seeding and to seed. The results are compared in the form of a line chart and a data table. Based on these results, each farmer can compare his current technology and machinery to a new different setup of machinery or a completely new technology. It is also possible to see what the land increase limit using the current technology is, because the model also shows how well the current technology complies with the previously set up agro-terms. Therefore, it is possible to plan for the future improvements (new machinery, increase of the land area) and to compare if a technology change is more cost effective.
Key words: combined agricultural machinery, soil preparation efficiency, economic substantiation of the soil preparation technology.
JEL code: Q12

Introduction

As in every business, in agriculture the main goal is to reach the maximum possible profit with the least resources used. There are a few possibilities to increase the profits of a grain farm: you can increase the productivity, therefore increasing the income; you can upgrade machinery efficiency, therefore lowering the running costs of the machinery; and you can choose the most suitable technology for your farm and your needs. The best solution is for each farm owner to decide, however by using the correct agricultural technology, the farm can both increase the income and lower the costs

The main tasks of the soil preparation are to optimize soil physical properties, provide the best conditions for the seed embedding, germination and growing, weed leftovers and fertilizer embedding, weed, and insect combating. The aim of this research is to find the optimal soil preparation method for the given land area and available machinery that is the most cost effective and the least time consuming.

By analyzing the traditional technologies used in grain farms, it has been noted that soil preparation that includes weed control, fertilization, tillage, ploughing, and levelling is done separately with simple agricultural machinery. Due to this fact, the number of passes the tractor has to make on the field is very large, sometimes, if the agricultural conditions are bad, reaching more than five times. That leads to soil compaction, which influences the productivity of the field and can greatly reduce the crop yield (up to 20% yield reduction in places where the soil has been compacted the most).

Using of simple agricultural machinery can also increase tractors' fuel consumption. While using many agricultural machines, it is necessary to switch among them and also to carry each of them to the working field individually, so there is a lot of transport work between the operations which increases the fuel consumption per hectare. Due to many passes that a tractor has made on the field, there will be places with high soil compaction degree. Therefore, this soil will increase much more resistance than a normal soil, which will increase the tractors' fuel consumption when working in these areas.

Every type of agricultural work is limited to several days (agro-terms) when it needs to be done, and with a limited number of tractors available there is a risk that the agro-terms will not be met, which can lead to yield decreases.

The soil preparation is a very important part of the grain production process as it is essential to maximize the possible yields. The mechanical soil preparation aids better water and air circulation and fertilizer dissolving in the ground, which can boost the grain yield. There are several ways to improve agricultural machinery of soil preparation, and the major ones are related to increasing their work efficiency, lowering machineries' resistance and power needed to operate it, thus reducing the fuel consumption of the tractor and increasing and combining several machines into one and reducing the passes needed to prepare the seedbed.

There are several combined machinery variations that can combine the following operations: tillage, ploughing, fertilizing, seeding, and levelling. The simplest combined

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Table 1

The technologies chosen with corresponding machinery used

Operation	Single operation technology	Power-harrow seeder technology	Direct seeder technology
Tractor power, hp	120	135	135
Ploughing	Four-body reversible plough	Four-body reversible plough with packomat (tilling equipment)	Four-body reversible plough – used every fourth year
Tilling	Cultivator, 6.0 meter working width		Direct seeder, 4.0 meter working width
Fertilizer spreading	Fertilizer spreader, 12.0 meter working width	Fertilizer spreader, 12.0 meter working width	
Seeding	Mechanical seeder, 4.0 meter working width	Power-harrow seeder, 4.0 meter working width	

machinery consists of two types of machinery, e.g. ploughing and tilling, tilling and seeding.

Starting from the year 2007, with the help of the European Union funding the number of combined machinery that has been bought in Latvia has increased and has led to more productive farming with increased yields and lower running costs. The need for combined machinery is based on the land area, crop types, technology used, soil, and climate. Often the climate is the principle reason to change agricultural technology and switch to combined machinery, thus lowering the risk of not meeting the agro-terms due to extreme weather conditions.

Research results and discussion

The research regarding soil tillage and direct and combined seeding machinery technologies was performed within the years 1999 to 2001. However, it concentrated on the grain yield and quality parameters, and the main conclusions were that at least the same grain yield can be achieved using combined seeding machinery as with traditional seeding methods and reducing the seeding costs at the same time. Moreover, the field conditions were considered as good, therefore, it did not affect the final grain yield very significantly.[1]

In this research, three different technologies were chosen: single operation, power-harrow seeder and direct seeder technology. The single operation technology is based on the principle that every agricultural operation has to be done with separate agricultural machinery. The power-harrow seeder technology uses a combined seeder with a power-harrow. The direct seeder technology uses an advanced seeder that combines seedbed preparation, seeding fertilizing and levelling operations. These technologies include the following operations and corresponding machinery. To determine the total costs for using each soil preparation technology, the authors used an algorithm, which incorporates the following costs: labour costs, depreciation costs, running and maintenance costs, and fuel costs. To calculate the depreciation costs for a tractor, a yearly workload of 1200 motor-hours has been used (which includes all other operations not connected directly to the soil preparation, fertilizing and seeding, which include, e.g. transport, road maintenance, and forestry works). To calculate the costs for all other agricultural machinery, a yearly workload has been calculated based on the machinery working width, working speed, and land area. All costs are calculated per hectare. This algorithm incorporates all variables present.

$$TC = \sum_{i=1}^{n} TC_i \quad (1)$$

$$TC_i = LC + DC_t + DC_m + MC + FC \quad (2)$$

$$LC = \frac{Hourly\ rate}{WE} \quad (3)$$

$$DC_t = \frac{PC_t * MWL}{YWL * DP * WE} \quad (4)$$

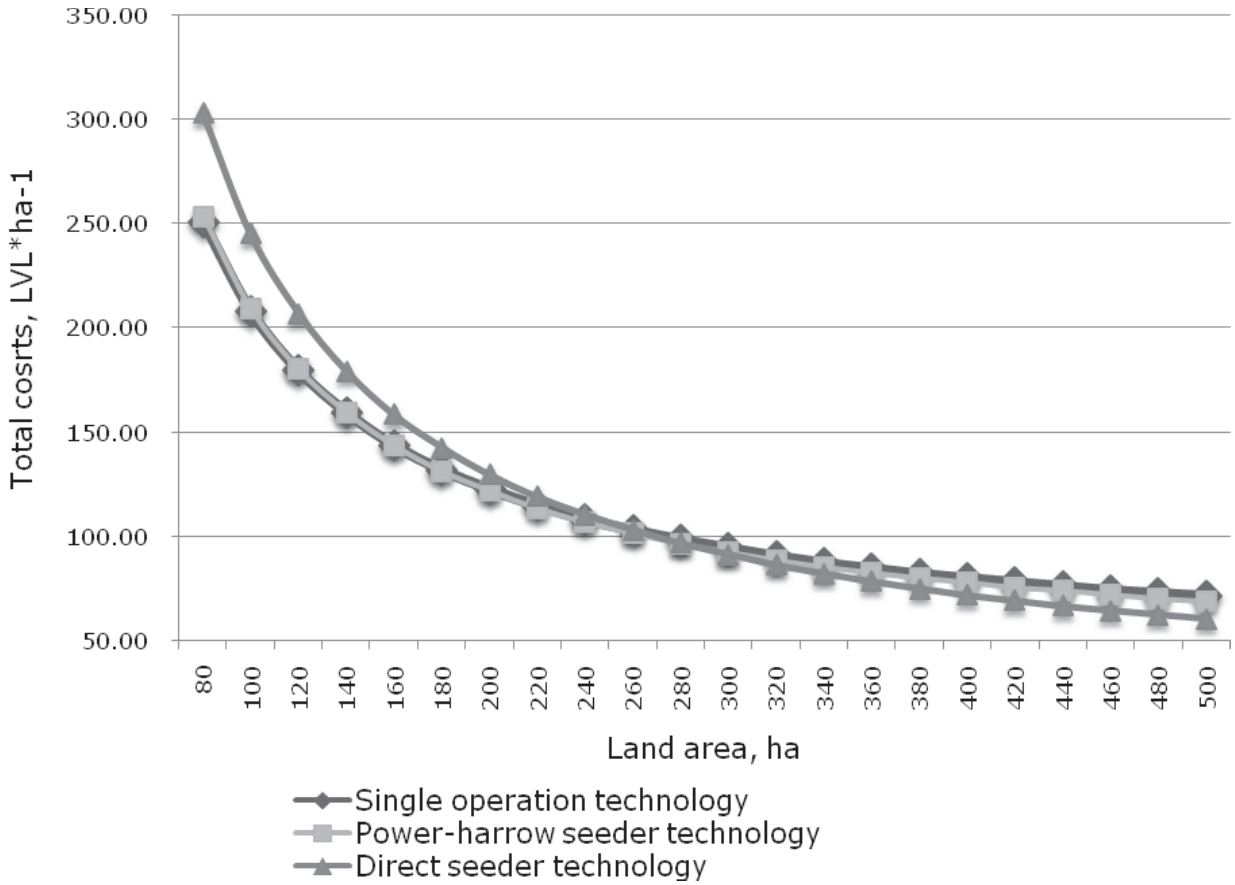
$$DC_m = \frac{PC_m}{DP * MWL * WE} \quad (5)$$

$$MC = \frac{YMC}{WE} \quad (6)$$

$$FC = \frac{C * P_m * FP}{FD * 1000} \quad (7)$$

*TC – total costs of soil preparation, fertilizing and seeding, LVL*ha^{-1}*
*TCi – total costs of one agricultural operation, LVL*ha^{-1}*
i – operation (e.g. tilling, ploughing etc.)
*LC – labour costs, LVL*ha^{-1}*
*DCt – depreciation costs, tractor, LVL*ha^{-1}*
*DCm – depreciation costs, machinery, LVL*ha^{-1}*
*MC – maintenance costs, LVL*ha^{-1}*
*FC – fuel costs, LVL*ha^{-1}*
*Hourly rate – hourly rate for the labour costs, LVL*h^{-1}*
*WE – work efficiency of the machinery for doing the "i" operation, ha*h^{-1}*
PCt – purchase price of the tractor, LVL
PCm – purchase price of the machinery, LVL
MWL – machinery working load, h
YWL – yearly working load of the tractor, h
DP – depreciation period, years

[1] Influence of soil tillage… (2003)



Source: authors' calculations based on the developed economic model of grain production process

Fig. 1. **Total costs of soil preparation, fertilizing and seeding dependent on the land area workable**

C – fuel consumption of the tractor, kg(kW*h)$^{-1}$*
Pm – Required power for the machinery, kW
*FD – density of fuel, kg*m^{3} $^{-1}$*
*FP – fuel price, LVL*l^{-1}*
*YMC – yearly maintenance costs, LVL*h^{-1}.*

After the data input into the model, the results showed that every technology has the lowest costs at a certain land area that has to be worked, Moreover, the land area at which the farm should choose another technology very much depends on machinery cost because a great deal of all the costs are the machinery depreciation costs. This model uses only new machinery (made in the European Union) average prices. The machinery depreciation costs would be lower if already existing machinery is used. It is also possible to buy used machinery and lower the technology switch costs. Consequently, as stated before the prices of new agricultural machinery were used in this calculation to show an adequate comparison of the three technologies.

The figure shows that the lowest total costs can be achieved by working with the single operation technology on the land area up to 145 ha. The power-harrow seeder technology is the most cost effective from 145 ha to 280 ha. Whereas, for land areas starting from 280 ha a farmer should choose the direct seeder technology as it is the most effective technology for large field areas. The costs difference between single operation and power-harrow seeder technologies cannot be considered as significant.

When searching for the best technology to be used, the agro-terms have to be taken into consideration. All the three technologies have one common agricultural operation, and that is seeding, so it is best to use it for comparison of the agro-term abidance. If the optimal agro-term for seeding is eight days, and we propose that there are 10 hours of work each day, then the maximum workable area for each technology (using all the agricultural machinery that was mentioned before) is as follows:

— single operation technology – 198 ha;
— power-harrow seeder technology – 216 ha;
— direct seeder technology – 308 ha.

If this land area is exceeded, there is a risk to loose potential grain yield 0.05 t/ha for every day exceeding the agro-terms.

Therefore, taking into consideration the total costs and agro-terms the optimum usable land area for each technology with its corresponding equipment would be:

— single operation technology: 0 – 145 ha;
— power-harrow seeder technology: 145 – 216 ha;
— direct seeder technology: 280 – 308 ha.

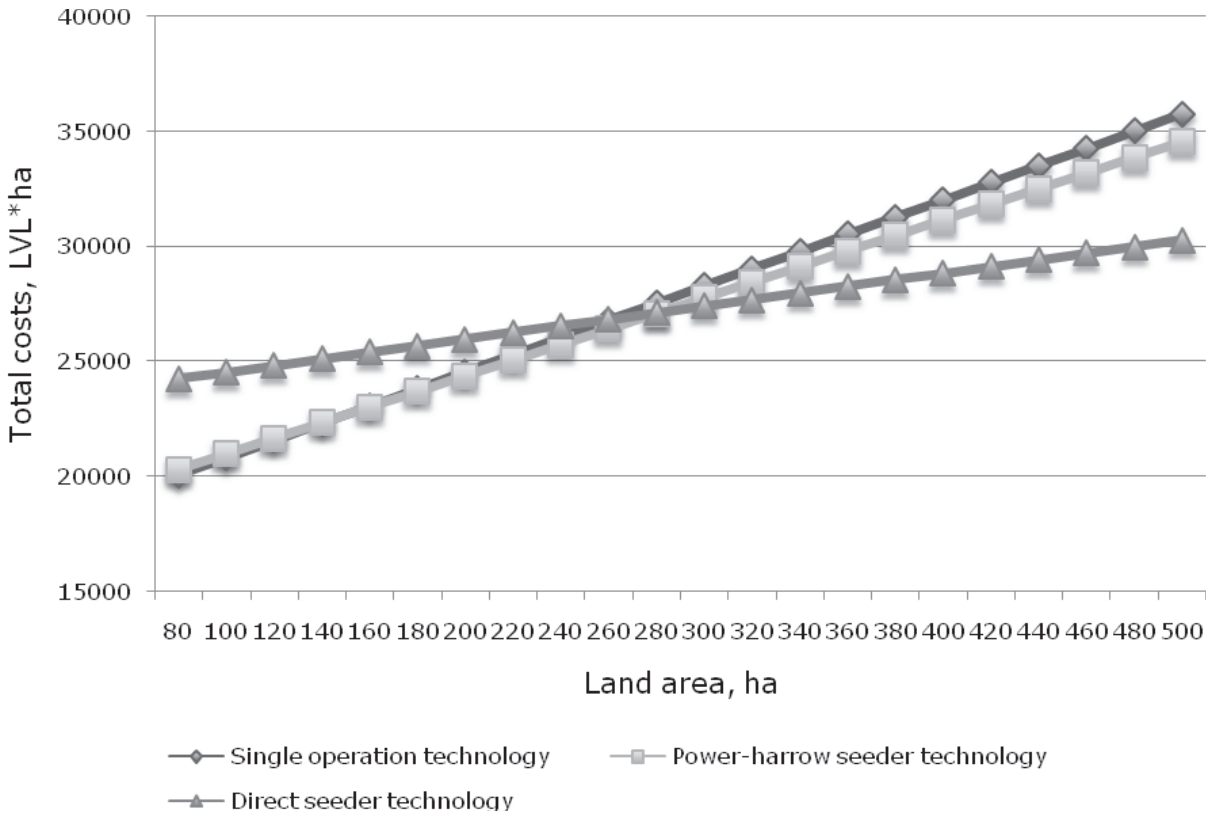
When calculating the total costs for a certain type agricultural operations, the results can be given differently, either per one ha of the land, or per one grain

Table 2

Corresponding grain growing technologies for seedbed preparation, fertilizing and seeding technologies with their average yields

	Single operation technology	Power-harrow seeder technology	Direct seeder technology
Corresponding grain production technology	Traditional technology	Combined technology	Intensive technology
Average grain yield per ha, t*ha^{-1}	3.5	4.5	6

Source: authors' construction based on Optimization of grain...(2012)



Source: authors' calculations based on the developed economic model of grain production process

Fig. 2. **Farms' total costs of soil preparation, fertilizing and seeding based on the land area**

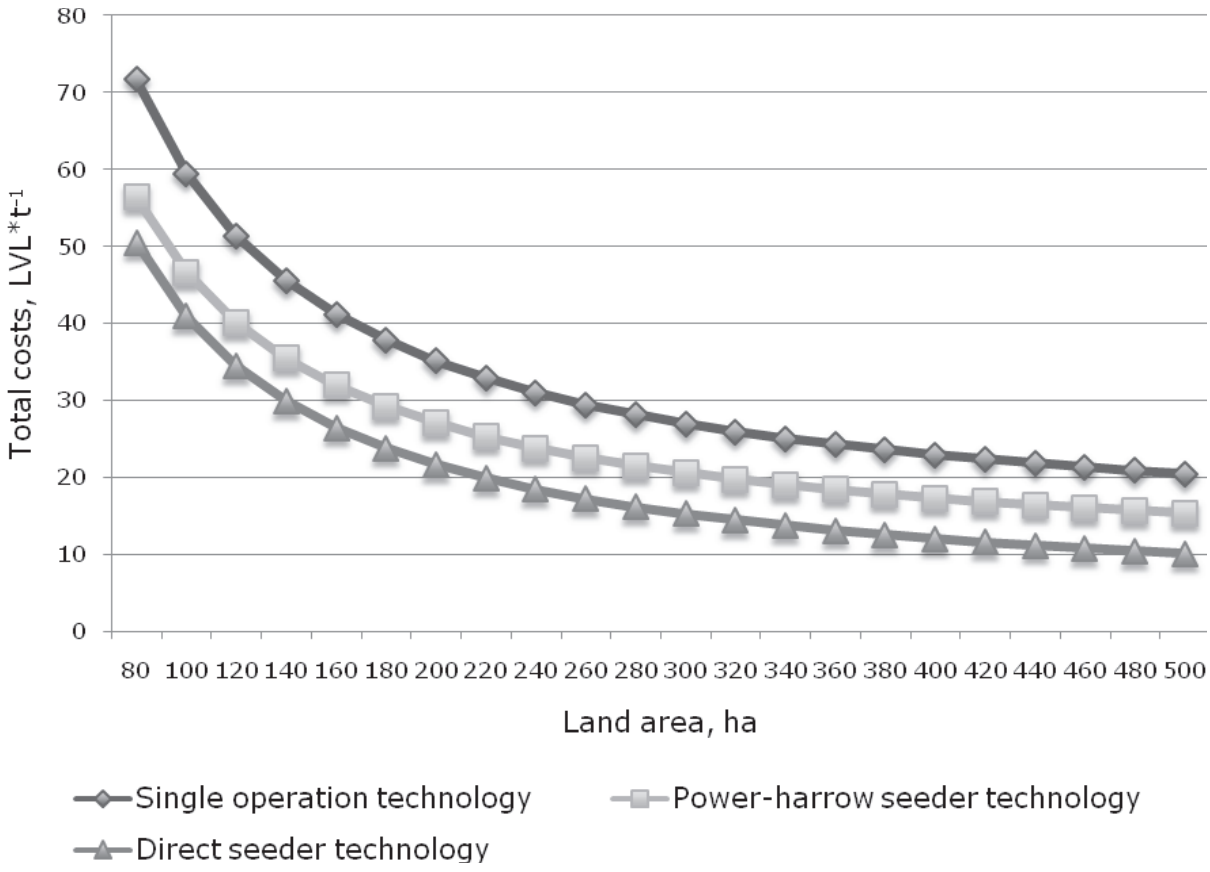
ton produced. The three soil preparation, fertilizing and seeding technologies used in this research correspond to the three technologies of grain production, which use different amounts of fertilizers, herbicides, pesticides, and fungicides. The corresponding technologies and their average grain yield are given in the table.

Based on the farms total grain yield and total costs of seedbed preparation, fertilizing, and seeding; it is possible to calculate each technology's corresponding costs based on one grain ton produced by using particular technology.

The total costs per hectare and total costs of all operations share the same results as the lowest costs for the single operation technology are when the land area does not exceed 45 ha. The power-harrow seeder technology is the most cost effective within 145 to 280 ha, whereas for land areas starting from 280 ha the lowest total costs are reached by working with the direct seeder technology.

Finding the most suitable technology can be aided with knowing which technology would produce the lowest costs per grain ton produced. However, these are only the running and operating costs, not including the seeds, fertilizers, herbicides, fungicides, and pesticides costs, which differ for each technology. The single operation technology would need less fertilizers, herbicides, pesticides and fungicides because of the higher mechanical degree of soil preparation, and the direct seeder technology would need them much more due to the low soil mechanical preparation and the need to combat weeds with the use of chemicals.

If only the operating and running costs are taken into consideration, it is obvious that the most cost effective technology would be the direct seeding technology



Source: authors' calculations based on the developed economic model of grain production process

Fig. 3. **Total costs of soil preparation, fertilizing and seeding for one ton of grain produced based on the land area**

because of the much higher potential grain yields that can be achieved with this technology. In addition, this technology has fewer risks not to meet the agro-terms because it has a lower number of operations that has to be done to reach the optimum grain production conditions of the soil, fertilize it and seed.

No material costs (fertilizers, fungicides, herbicides, and pesticides) have been taken into consideration in this calculation. To reach an average yield of six t/ha^{*-1} using the direct seeder technology, it is necessary to use a lot of chemical substances to enrich the soil and to combat weeds, fungus, bacteria, and insects. With time, this intensive use of chemical substances degrades the soil, and that is why at least once in every four years the soil must be ploughed to restore its natural condition.

Qualified labour has been a problem in Latvia in the past five years starting from 2007 due to workforce migration to the other European Union countries, and many farms are struggling for finding new workers. For this reason, it is also very important how many hours have to be spent to prepare the soil for seeding and seed for each technology. The comparison between the three technologies is made in h*ha^{-1}:

— single operation technology – 1.55 h*ha^{-1};
— power-harrow seeder technology – 1.32 h*ha^{-1};
— direct seeder technology – 0.47 h*ha^{-1};

It is clear that the less labour intensive is the direct seeder technology, followed by the power-harrow seeder and single operation technology, which is the most labour intensive. In fact, the direct seeder technology requires 3.3 times less work than the single operation technology, and due to the great lack of qualified workforce and increasing labour costs it is becoming more efficient to use a technology that requires less work.

Conclusions, proposals, recommendations

1. According to the economic model of farms' grain production, the most cost effective soil preparation, fertilizing and seeding technology is the direct seeding technology for land areas exceeding 280 ha, and the power-harrow seeder technology is the most cost effective for land areas from 145 to 280 ha. Whereas, if the land area is no more than 145 ha, the least expensive way to prepare it and seed would be using the single operation technology.
2. If the agro-terms are taken into consideration, the most effective operation range for each technology is: single operation technology: 0 – 145 ha; power-harrow seeder technology: 145 – 216 ha; direct seeder technology: 280 – 308 ha.

3. Using the direct seeder technology is the a less labour intensive solution for the farm requiring only 0.47 working hours per one hectare of land, which is 3.3 times less than it is required for the single operation technology.

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THE IMPORTANCE OF LOGISTICS IN AGRIBUSINESS SECTOR COMPANIES IN POLAND

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Abstract. The paper shows the importance of logistics in the enterprises of the agribusiness sector in Poland. The research was conducted in 452 companies. In most analysed companies, logistics was not particularly important. As a rule, the companies did not have a separate logistics department, and the contribution of the logistics expenses into the overall costs was very low. In general, a separate logistics department existed in the companies with higher scale of activity. It was detected that the type of the sector had an influence on the manner of performing the stock accounting and on plans for the future in terms of logistics. The performed analysis in the agribusiness companies confirms high impact of activity scale on organisation of logistics, methods of stock management, and selection of transportation vehicles. The enterprises constantly focus on production activity, which is confirmed by the planned investments in the production resources.
Key words: agribusiness, logistics, size of companies
JEL code: D-24

Introduction

The meaning of the term "logistics" may be interpreted in many ways. Various authors put emphasis on different aspects of its definition. Logistics is defined as process of planning, execution, and supervision over the robust and cost-effective flow and storage of the raw materials, stock in use, ready-made products and the related services and the appropriate information from place of origin for use in order to satisfy the requirements of the customers (Nowosielski S., 2008). Subject matter of logistics is providing appropriate product in an appropriate amount, in appropriate condition, to appropriate place, on appropriate time, for appropriate user, and at appropriate cost (Fijalkowski J., 2003). Ability to manage the flow of loads "from one hand" allows for shorter time from manufacturing to delivery of the product to its final purchaser (Logistyka, 2008). Logistics enables covering time and distance within the process of execution of flow of goods (Logistyka, 2009). The most important operations within the logistics include moving and transport, storage and safekeeping, packing, handling materials, stock control, order execution, demand foreseeing, customer service, locating facilities and warehouses, collecting and disposal of wastes (Coyle J.J., 2007).

Agribusiness is a segment of the national economy consisting of many sectors and types of activity. We can distinguish the production sector; the sector of distribution of tools and equipments for agriculture, farming, food industry and wholesale trade of raw material for farming, wholesale of food products, retail sales of food products; and the sector of the catering services (Wos A., Zegar J.S., 1983). Activity of the agribusiness companies is affected by many macroeconomic and microeconomic factors (Golebiewski J., 2011).

There is not much detailed research on management of logistics in the agribusiness companies (Klepacki B., 2008). In the beginning of the 21st century, the logistics determines operation and development of enterprises (Pfohl H.Ch., 2010). Logistics fulfils the tasks that are put before science, such as ability to put in practice the achieved knowledge (Runowski H., 2009). The agribusiness companies differ in terms of seasonality, type of the required transportation vehicles, employed storehouses, and storage periods (Rokicki T., Wicki L. 2010). Strong interdependence between enterprises and raw material suppliers and purchasers exist (Przygocka R., 2010). In the Polish agribusiness sector, internal flows within the sector, i.e. internal trade, are dominating (Mrowczynska-Kaminska A., Poczta W., 2009). Chain dependence of agribusiness companies provide benefits to all members of the chain (Drelihowski L., 2010). Improvement of relationships in a supply chain of raw materials as well as processed products and better information circulation in the whole production cycle improve organisation of production and distribution and increase customer satisfaction by offering progressively higher level of service and quality of the delivered products (Motowidlak U., 2009). In order to satisfy the most important customer needs, robust logistics in the company is necessary.

The aim of this paper is to determine the importance of logistics in the companies of the agribusiness sector. The author will discuss the solutions applied in this sector as well as future plans related to logistics. The data has been collected from surveys that were performed in the period from December 2009 to March 2010. The surveys were sent to all the companies classified as small, middle, and large enterprises active in the food processing industry and present in the REGON (national business registry number) database as well as to randomly selected 1.5 thousand micro-enterprises. In total, 10 thousand enterprises participated in the survey. In the survey, 452 answers were obtained (4.52%). The data for this paper was used in an unprocessed condition; the analysis excluded only the records where there were no data. The research was focused on the

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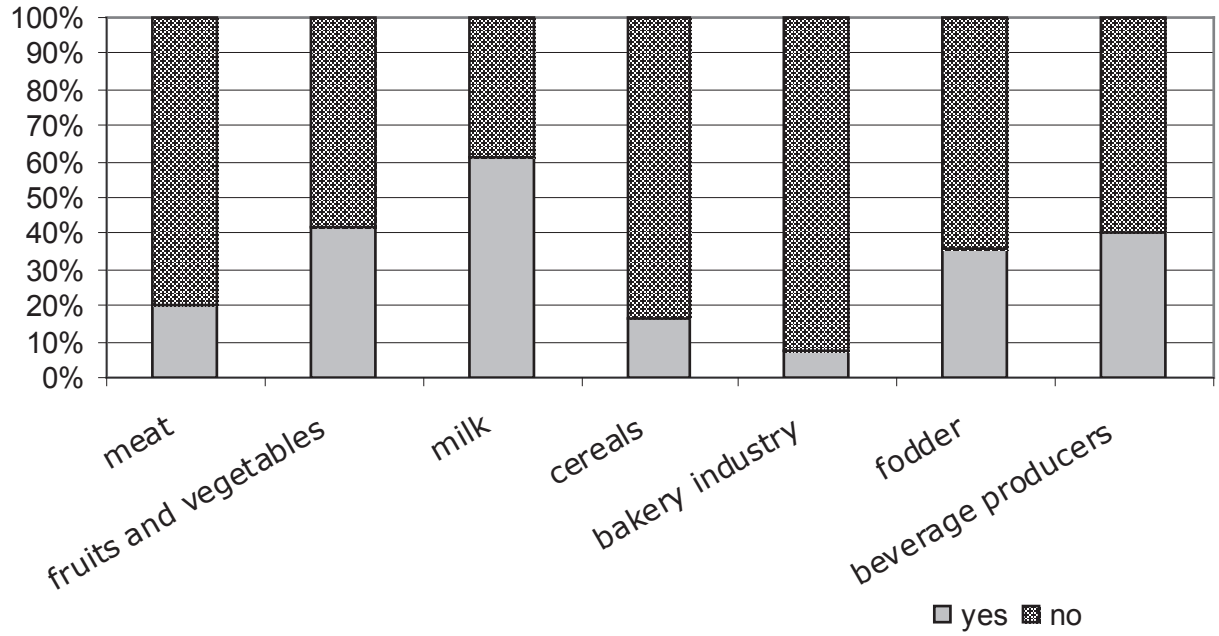


Source: results based on author's research.

Fig. 1. **Existence of a separate logistics department in agribusiness sector enterprises (%)**

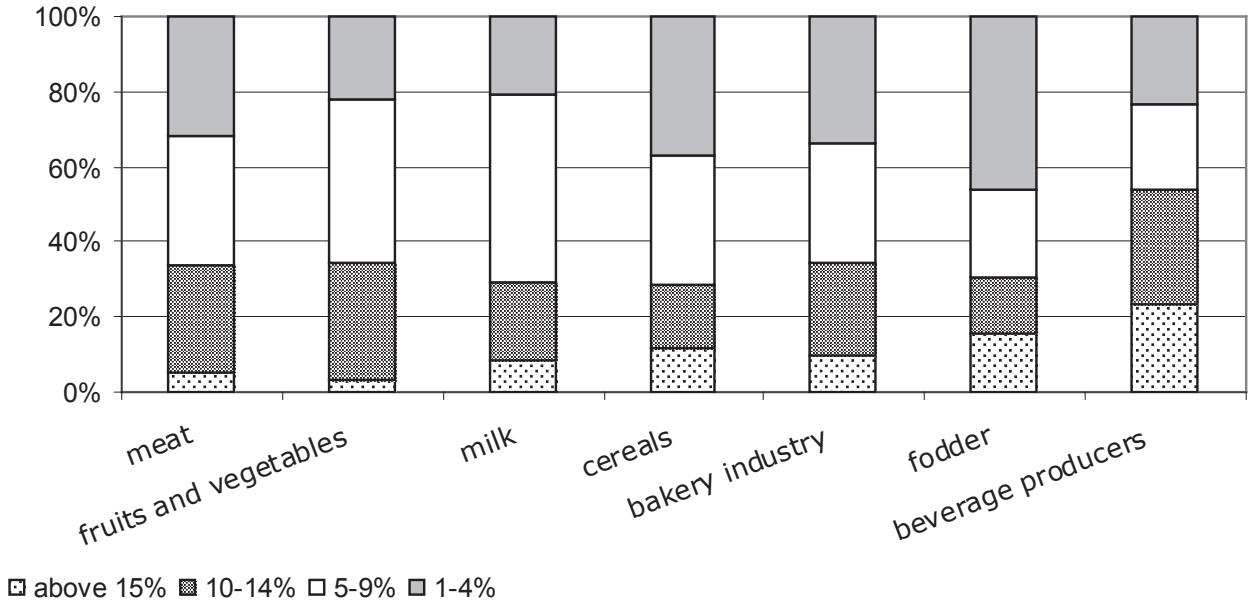
enterprises, from which at least 10 answers were achieved. The companies of the agribusiness sector such as meat production and processing, processing of fruit and vegetables, manufacture of dairy products, manufacture of grain mill and starch products, manufacture of bread and flour products, manufacture of animal fodder, and manufacture of drinks, were selected for analysis. The tables and graphical analysis were primarily used for data processing due to the nature of the data obtained in the nominated scale or ordinal scale. In order to determine the correlations between the selected traits, the author also employed the chi square statistical test.

Research results

The companies of the agribusiness sector are quite diverse, primarily in type of the processed materials. Use of any logistics solutions depends on capabilities of each enterprise. The financial condition of most companies was defined as good. The most optimistic assessments concerned processing milk, whereas the most pessimistic ones concerned processing drinks. Good financial condition of the enterprises gave grounds for more sophisticated logistics solutions. Most companies did not have a separate logistics department (Figure 1). This regularity has been confirmed, in particular, in the bread companies (about 92%). The highest number of companies that declared to have a separate logistics department was the companies of the dairy sector (about 60%). The conducted chi^2 test for independence of variables showed high dependence between the size of the company and existence of a separate department responsible for logistics ($chi^2_{emp.}$ = 92.06, $chi^2_{0.005}$ = 9.34, p-value = 0.0000, df = 3). The chi^2 test for independence of variables showed high dependence between the scale of activity and existence of a separate department responsible for transport ($chi^2_{emp.}$ = 68.31, $chi^2_{0.05}$ = 7.82, p-value = 0.0000, df = 3), packaging management ($chi^2_{emp.}$ = 44.37), storage ($chi^2_{emp.}$ = 29.15), and low dependence in terms of the logistics information management ($chi^2_{emp.}$ = 14.37) and stock control ($chi^2_{emp.}$ = 13.18).

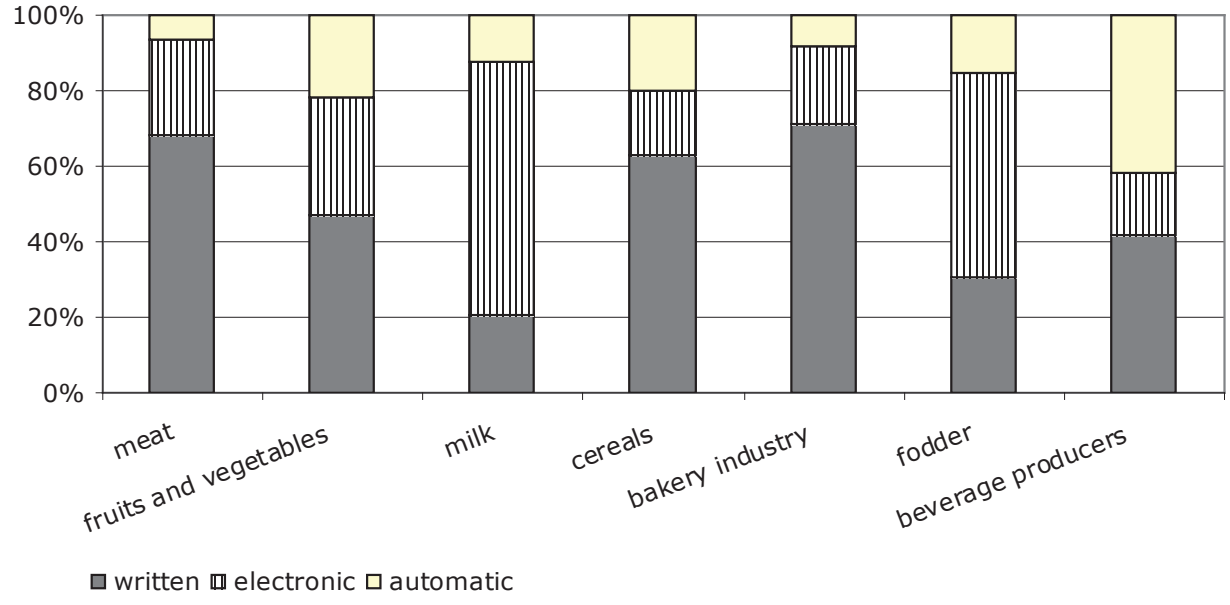
The importance of logistics can be confirmed with contribution of the related costs into the total expenses of the company. We should not save on logistics. On the other hand, companies try to reduce their costs in order to achieve a competitive advantage. As a rule, the companies borne the cost on the level of 5-9% (Figure 2). In most enterprises, the logistics expenses were low or very low. Such a situation existed in the sectors where high percentage of companies with a separate logistics department existed.

The stock accounting in most companies was conducted in a written form and less frequently – electronically (Figure 3). The least companies employed electronic stock accounting with automatic reading and recording of stock changes. Such a modern technology requires high financial expenses. The analysis of the independence of variables with a chi-square test has confirmed this clearly defined dependence. The hypothesis on lack of dependence between the sector and the manner of stock accounting was rebutted ($chi^2_{emp.}$=71.22, $chi^2_{0.005}$=18.55, p-value = 0.0000, df = 6). The hypothesis on lack of dependence between the scale of activity and the manner of determining the safe level of ready-made product stock was also rebutted ($chi^2_{emp.}$=21.42, $chi^2_{0.05}$=12.59, -value = 0.01, df = 6). The performed chi^2 test for



Source: results based on author's research

Fig. 2. **The share of logistics costs in total costs of the agribusiness sector enterprises (%)**



Source: results based on author's research

Fig. 3. **Used methods of stock records in agribusiness sector enterprises (%)**

independence of variables showed dependence between the scale of activity and the manner of determining the safe level of the ready-made product stock ($chi^2_{emp.}$ = 48.19, $chi^2_{0.05}$ = 12.59, p-value = 0.000, df = 6). There was dependence between the scale of activity and the use of comprehensive transportation services of the forwarding agents ($chi^2_{emp.}$ = 45.01, $chi^2_{0.05}$ = 7.82, p-value = 0.000, df = 3). Similarly, high dependence existed for the use of services of individual carriers.

The survival and development of companies depend on appropriate decision-making at the operational and strategic level. Regarding logistics, the enterprises most often planned purchases of transportation vehicles, building storehouses, and investments in the packaging equipment (Table 1). There were differences within each sector. The investments in modern IT solutions and introduction of cost balance were of less importance. The list does not cover the plans that have been preferred by small percentage of enterprises, such as outsourcing the

Table 1

Investment plans of the agribusiness sector enterprises (%)

Sector	Investment plans (%)				
	modern IT	logistics costs account	investment in storage areas	investment in means of transport	investment in equipment for packaging
meat	7.32	3.17	7.07	16.59	8.29
fruit and vegetables	3.41	0.49	4.39	3.41	2.20
milk	2.20	1.22	2.20	4.39	2.20
cereals	0.98	0.73	2,.20	5.37	3.17
bakery industry	7.56	2.44	10.00	27.80	11.22
fodder	0.49	0.49	0.49	0.98	0.24
beverage producers	0.98	0.24	0.98	1.46	0.49

Source: results based on author's research

transportation means or storage space or trainings in the field of logistics.

The performed tests for independence of traits showed independence of size of the company and investments in the transportation means ($chi^2_{emp.}$=1.85, $chi^2_{0.05}$=7.82, p-value = 0.6, df = 3). Similar dependence was noted in terms of investments in the packaging equipment. It did not depend on the size of the company ($chi^2_{emp.}$=4.62, $chi^2_{0.05}$=7.82, p-value = 0.2, df = 3). However, high dependence existed between the sector and specific plans for the future. This finding was confirmed by the performed independence tests.

Conclusions

1. The importance of logistics in economy is growing. The same situation was observed in the agribusiness companies. However, the good financial condition in the companies does not reflect in greater employment of logistics. In the companies, the most emphasis was still put on the production goals. Small percentage of companies with a separate logistics department confirms the weakness in this scope. In general, the contribution of the expenses related to logistics in the overall costs also was low.
2. The companies use a written form for stock accounting, whereas, electronic form is used much less frequently. Only a few companies used automatic recording. Future plans of the companies confirmed the importance of logistics. They mainly concerned investments in storage resources, transportation vehicles, and packaging equipment. Deployment of modern IT solutions, logistics cost balance, and trainings of the personnel in field of logistics were mentioned as a goal for the future less frequently.
3. The conducted chi square independence tests allowed us to determine the dependence between the size of the company and existence of a separate logistics department. Investments in the transportation vehicles and packaging equipment did not depend on the size of the company. However, there was high dependence between each sector and specific types of investments. The dependence also existed between each sector and the manner of stock accounting.

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ECONOMIC EFFECTIVENESS OF VEGETABLE GROWING FARMS[1]

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Abstract. The study presents economic effectiveness of vegetable growing farms during the period 2004-2009, engaged in accountancy within the framework of the FADN system (227 farms) located in five provinces characterised by the highest concentration of vegetables. On the farms examined, the overall production level has increased by 39%, taking into account inflation at the level of 22%. Land productivity has increased (by 23.7%) as well as productivity of labour (by 36.4%) and assets (by 26%). The total costs of the examined farms increased by 45.4%. General farming costs increased (by 59.7%) as well as direct costs (by 49.1%). In the analysed period, the income of vegetable growing farms increased by 53.2%. However, per one full-time employed person it constituted about 91% of the net average salary of the national economy.
Key words: vegetable growing farms, economic effectiveness
JEL code: O12, Q12

Introduction

Vegetable growing plays a significant role in Poland. Production of vegetables in the recent years amounted to approximately 5-5.7 million tons. In terms of production size, Poland is the fourth largest producer of vegetables in the European Union, lagging behind only Spain, Italy and France. In 2009, the global production of vegetables in Poland amounted to PLN 5.6 billion according to current prices, which constituted more than 7.0% of the global agricultural production and 7.2% of commodity agricultural production. In 2009, the commodity production of vegetables in Poland amounted to more than PLN 4 billion, which constituted more than 13.4% of the global plant production and 16.6% of commodity plant production in 2009. The value of export of vegetables and vegetable products exceeded PLN 2.7 billion (about 638 million EUR), constituting more than 27.3% of export of plant products (Rocznik statystyczny rolnictwa, 2010).

The functioning of farms is associated with high risk. A determinant of success of individual enterprises is effectiveness and development capacity. Under the conditions of strong competition, effectiveness determines the ability to gain a competitive advantage over other entities operating on the market. Effectiveness is the ability to use the resources at hand.

Materials and methods

The objective of the study is to determine the economic effectiveness of vegetable growing farms. Research encompassed all vegetable growing farms (227) which, in years 2004-2009, continuously engaged in FADN accountancy, in five provinces characterised by the highest concentration of vegetable production in Poland (mazowieckie, lodzkie, lubelskie, malopolskie, and wielkopolskie). In 2008, the share of these provinces, both in terms of vegetable crops area and of vegetable harvest in total in Poland, amounted to more than 58%. The selection of farms participating in the research was based on the share of sale of vegetables in total sales exceeding the level of 50%[3].

The following research tasks were implemented:

— to determine land productivity, labour effectiveness, and productivity of fixed assets;
— to analyse the profit and loss account and the balance sheet;
— to determine the level of income and profitability of farm resources.

The following measures of farm assessment were used: total value of production per 1 hectare of agricultural land; total value of production per 1 AWU[4]; total value of production per 100 PLN of assets; total production costs per farm, including direct costs, general farming costs, costs of external factors (mortgage payments, hired work, loan interest), income from farming per 1 AWU, income per 100 PLN of assets, and income per 1 hectare of agricultural land.

Moreover, the study referred to the index-based assessment of financial condition of farms. Due to the short period of analysis, the author used comparative methods, tabular and descriptive methods.

Research results and discussion

1. Characteristics of vegetable growing farms

The farms examined were characterised by agricultural land area greater than the national average. During the period 2004-2009, the agricultural land area increased from 12.77 hectares to 14.35 hectares,

[1] Scientific work financed from science funds in years 2008-2013 as the research project no. N N310 148635
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[3] The research project encompassed farms with more than a 50% share of vegetables in total sales for the year 2007. Due to delays in collection, gathering and processing of the FADN data, at the time of selection of farms for analysis, this was the earliest year, for which the data were available.
[4] AWU (Annual Work Unit) – is the equivalent of time worked by one person employed full-time at a farm during one year.

Table 1

Characteristics of land resources of surveyed vegetable farms

Specification	2004	2005	2006	2007	2008	2009	2009/ 2004	Average annual growth
Utilised agricultural area [ha]	12.77	13.04	13.47	14.24	14.36	14.35	112.32	102.35
Arable land [ha]	11.48	11.69	12.13	12.89	13.03	13.00	113.25	102.52
Permanent pasture [ha]	0.84	0.88	0.87	0.87	0.84	0.88	105.50	101.08
Orchards [ha]	0.46	0.47	0.48	0.48	0.49	0.47	101.63	100.32
Total area [ha]	13.78	14.05	14.47	15.28	15.41	15.43	111.99	102.29

Source: author's calculations based on the data of the FADN of Poland

Table 2

Equipment in fixed assets of surveyed vegetable farms per one farm [thousand PLN] (current value)

Specification	2004	2005	2006	2007	2008	2009	2009/ 2004	Average annual growth
Land	29.4	22.2	28.3	47.4	45.7	28.1	95.7	99.1
Buildings	309.6	303.9	315.4	324.5	332.5	325.2	105.0	101.0
Machinery	61.2	58.3	60.1	63.0	71.7	83.7	136.9	106.5
Transportation means	54.3	51.9	53.1	53.1	55.5	61.6	113.5	102.6
Fixed assets in total	473.2	458.0	479.0	505.7	524.6	518.9	109.6	101.9

Source: author's calculations based on the data of the FADN of Poland

it is by 12.32% (Table 1). The average annual increase in the area of agricultural land was equal to 2.35%. In the examined period, the share of arable land in the total area of agricultural land amounted to about 90%. The arable land area in this period increased from 11.48 hectares to 13.00 hectares – it is, by 13.25%.

Only 45 households had greenhouses of the average area of 7153 m^2, while 75 households had polytunnels of the average area of 4811 m^2.

During the period 2004-2009, the labour resources in total ranged from 3.06 to 3.17 AWU. The number of persons employed per 100 hectares of agricultural land at the examined farms decreased from 24.0 AWU/100 hectares of agricultural land to 21.8 AWU/100 hectares of agricultural land (by almost 10%). The total labour expenditures of the farms examined were almost 2 times higher in comparison with farms with a typical agricultural production profile (12.9 AWU per 100 hectares of agricultural land in 2009), which was mainly due to characteristics of vegetable growing activity (Rocznik statystyczny rolnictwa, 2010).

Vegetable production requires involvement of substantial capital. Fixed assets at the examined farms increased from PLN 473.2 thousand in 2004 to PLN 518.9 thousand in 2009, it is, by 9.6% (Table 2). The average annual increase in the analysed period amounted to 1.9%. If, on the other hand, we take into account inflation (index of prices of investment expenditures, fixed prices of 2004), the value of fixed assets has decreased by 12.7%. The value of fixed assets, taking into account inflation, has decreased from PLN 473.2 thousand to PLN 417.1 thousand.

Buildings represented the highest share in the fixed assets of farms examined, although their share in the structure in the examined period decreased from 65.4% to 62.7%. The value of buildings on the farms examined increased from PLN 309.6 thousand in 2004 to PLN 325.2 thousand in 2009, which indicates a 5% increase in their value. The highest value increase was observed in the group of machines and transport vehicles – by 36.9% and 13.5%, respectively. On average, the value of machines increased by 6.5% annually to reach PLN 83.7 thousand in 2009. The share of machines in fixed assets increased from 12.9% to 16.1%. On the other hand, the value of transport vehicles increased on average by 2.6% per year to reach PLN 61.6 thousand in year 2009. The value of land in the analysed years was changeable; moreover, a change of the land valuation method occurred during the same period. The land value at the examined enterprises was determined based on free market prices in the vicinity of the farm. The value of land calculated based on market prices may not reflect the real value due to the individual nature of such valuation.

During 2004-2009, the value of current assets increased from PLN 77.6 thousand to PLN 88.8 thousand (increase by 14.5%) (Table 3). The average annual increase in the current assets was greater than the increase in the value of fixed assets, amounting to 2.7%. The increase in the inventory of products (by 19.1%) indicates mainly the fact of storage of products for the purpose of their sale at much higher prices in the 1st or 2nd quarter of the following year. The increase in the value of cash in hand (by 9.8%), on the other hand, provides the farmers with a higher margin of financial safety in the functioning of the farms. The share of short-

Table 3

Equipment in current assets of surveyed vegetable farms per one farm [thousand PLN] (current value)

Specification	2004	2005	2006	2007	2008	2009	2009/ 2004	Average annual growth
Inventory	33.2	34.2	36.7	43.4	38.8	39.3	118.4	103.4
Materials	8.8	8.4	8.6	9.3	12.4	12.0	135.7	106.3
Products	23.0	24.6	27.1	32.2	26.5	27.4	119.1	103.6
Receivables	2.5	3.6	4.5	3.8	3.8	5.0	196.5	114.5
Cash	36.5	36.7	40.2	41.2	37.5	40.0	109.8	101.9
Total current assets	**77.6**	**79.5**	**87.1**	**92.7**	**85.2**	**88.8**	**114.5**	**102.7**

Source: author's calculations based on the data of the FADN of Poland

Table 4

Value of production categories on the surveyed vegetable farms per one farm [thousand PLN]

Specification	2004	2005	2006	2007	2008	2009	2009/ 2004	Average annual growth
Total production [thous PLN]	194.0	215.5	230.8	257.7	249.2	269.6	139.0	106.8
Agricultural production [thous PLN]	192.3	214.7	228.9	255.4	247.6	268.1	139.4	106.9
Plant production [thous PLN]	172.3	194.3	207.4	230.0	235.1	251.3	145.9	107.8
Animal production [thous PLN]	13.7	15.0	13.8	13.5	11.0	13.2	96.5	99.3
Production of the most import ant vegetables [thous PLN]	155.1	177.9	191.7	215.2	219.1	228.0	147.0	108.0
Share of the most import ant vegetables in the total production [%]	80.0	82.5	83.0	83.5	87.9	84.6	105.8	101.1
Share of subsidies in the total production [%]	1.0	2.4	4.1	2.8	5.0	5.1	509.9	138.5

Source: author's calculations based on the data of the FADN of Poland

term receivables in current assets increased from 3.3% to 5.6%.

Correlation between current assets and fixed assets in the examined period on the vegetable growing farms increased from 0.16 to 0.21 (almost by 30%). This means that penetration of fixed assets with current assets has increased, which may indicate rationalisation of investment.

2. Production at vegetable growing farms

During the period 2004-2009, the overall value of production increased from PLN 194.0 thousand to PLN 269.6 thousand per farm (increase by 39%) (Table 4). The average annual increase in the examined period amounted to 6.8%. If we take into account inflation, the overall increase in the production in the examined period amounts to 22%, whereas the average annual increase – to 4.1% (agricultural product sales index, fixed prices of 2004). In the overall production, farms engaged mainly in agricultural production, including plant production, accounted to the highest proportions of the total structure. B. Golebiewska (2010) observed similar correlations among the development-oriented farms. In farms, characterised by decreasing role of income from agriculture, non-agricultural services were dominant. In the analysed period, the value of plant production of the examined farms increased from PLN 172.3 thousand to 251.3 thousand (by more than 45%). The average annual increase in plant production amounted to .8%.

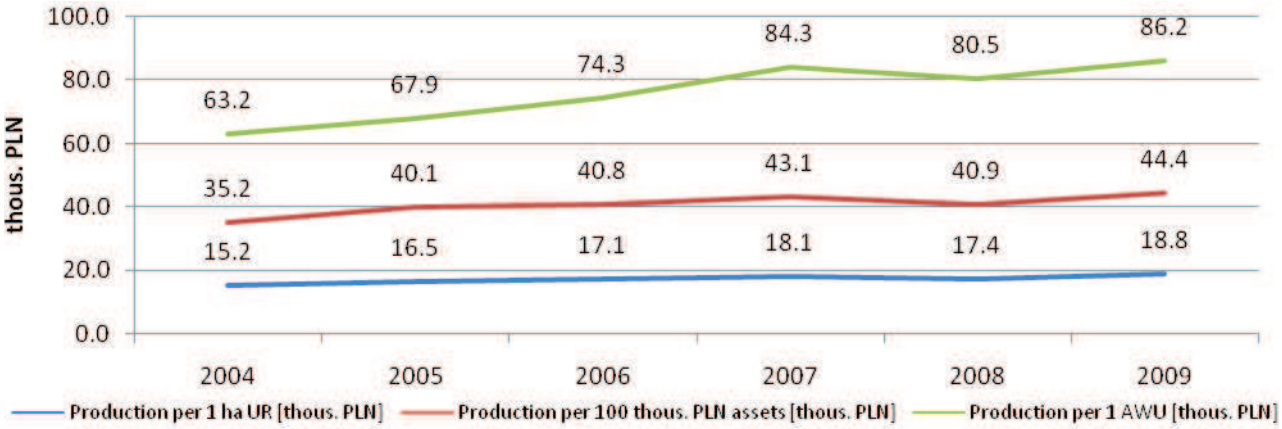
Animal production on the farms examined was low. Its share in the overall production has decreased from 7.1% to 4.9%.

The production of vegetables[5] on the examined farms increased from 155.1 thousand in 2004 to 228 thousand in 2009 (increase by 47%). The average annual increase in production amounted to 8%. During the period 2004-2009, their share in the total production increased from 80% to 84.6%.

Worth noting is the increase in the share of total subsidies in total production (by more than five times). The subsidies increased from PLN 1.9 thousand in 2004 to more than 13.6 thousand in 2009.

During the years 2004-2009, land productivity (value of total production per 1 hectare) at the examined vegetable production enterprises was increasing (Figure 1). The average annual increase in land productivity amounted to 4.4%. The value of production per 1 hectare increased from 15.2 thousand to

[5] Due to a very high number of plants grown on the farms, 5 key vegetables of the highest production value were selected for the farms analysed, recorded in the FADN database



Source: author's calculations based on the data of the FADN of Poland

Figure 1. **Productivity of production factors in surveyed vegetable farms**

Table 5

Cost categories in surveyed vegetable farms per one farm [thousand PLN]

Specification	2004	2005	2006	2007	2008	2009	2009/ 2004	Average annual growth
Costs, incl.								
Seeds	11.9	11.7	13.1	14.7	14.6	15.4	129.8	105.4
Mineral fertilisers	16.4	16.9	18.5	18.9	23.3	24.5	149.1	108.3
Plant protection	6.7	7.2	7.7	8.3	9.3	9.6	143.8	107.5
Direct costs	**52.6**	**55.6**	**60.4**	**66.0**	**69.8**	**72.1**	**137.0**	**106.5**
Energy	2.9	3.4	3.9	4.4	5.0	6.1	207.9	115.8
Fuels	7.0	8.0	8.3	8.7	9.7	8.2	117.7	103.3
Repairs	5.4	5.7	7.0	7.3	7.1	7.6	140.9	107.1
Overall farm costs	**45.7**	**49.7**	**54.6**	**60.7**	**68.6**	**73.0**	**159.7**	**109.8**
Indirect costs	98.3	105.2	115.0	126.7	138.4	145.0	147.6	108.1
Taxes	1.2	1.3	1.4	1.4	1.0	1.0	82.2	96.2
Depreciation	25.9	26.8	27.5	28.5	31.5	33.1	127.6	105.0
Hired labour	12.4	13.5	14.7	17.0	20.7	21.8	175.4	111.9
Land rent	0.7	0.5	0.8	1.3	1.7	2.0	280.8	122.9
External production factors	15.9	16.5	17.6	20.9	25.7	26.4	166.2	110,7
Production costs	141.3	149.8	161.4	177.6	196.6	205.6	145.4	107,8

Source: author's calculations based on the data of the FADN of Poland

18.8 thousand (by 23.7%). The increase in land productivity was mainly due to the increase in the value of production obtained (by 39%).

Economic labour effectiveness measured by the total value of production per 1 full-time employee (AWU), like labour productivity, increased from PLN 63.2 thousand in 2004 to 86.2 thousand in 2009 (increase by 36.4%). The average annual increase in economic labour effectiveness was greater than land productivity and it amounted to 6.4%. This was associated with the increase in the total value of production attained on the aforementioned vegetable growing farms, since the number of full-time employees in the examined period was similar. More or less the same productivity trends were observed across the entire agricultural sector in Poland (L. Wickiego, 2012).

In the examined period, productivity of assets also increased on the vegetable growing farms; the increase was lower than labour productivity (26%). Productivity of assets increased from PLN 35.2 thousand per PLN 100 thousand of assets to PLN 44.4 thousand per PLN 100 thousand assets.

3. Costs of vegetable growing farms

Table 5 presents the costs according to the type for the examined vegetable growing farms during

Table 6

The income from a family agricultural farm in terms of the basic factors of production in the surveyed vegetable farms

Specification	2004	2005	2006	2007	2008	2009	2009/ 2004	Average annual growth
Income [thous PLN]	49.6	61.8	72.6	85.2	62.5	76.0	153.2	108.9
Income per 1 ha [thous PLN]	3.9	4.7	5.4	6.0	4.3	5.3	136.4	106.4
Income per 1 AWU [thous PLN]	16.2	19.5	23.4	27.9	20.2	24.3	150.3	108.5
Income per 100 PLN of assets [PLN]	9.0	11.5	12.8	14.2	10.2	12.5	138.8	106.8
Share of subsidies in the income [%]	3.9	8.2	13.1	8.6	20.0	17.9	462.7	135.9

Source: author's calculations based on the data of the FADN of Poland

the period 2004-2009. The total production costs of vegetable growing farms increased in the examined period from PLN 141.3 thousand to 205.6 thousand (increase by 45.4%). The average annual increase in total production costs in the examined period amounted to 7.8%, and it was greater than the total production increase (6.8%).

Direct costs of these farms increased from PLN 52.6 thousand in 2004 to 72.1 thousand in 2009 (increase by 37%). The greatest increase among direct costs was recorded in terms of costs of mineral fertilizers (increase by 49.1%) and the costs of plant protection agents (increase by 43.8%).

General farming costs of vegetable growing farms increased from PLN 45.7 thousand in 2004 to 73.0 thousand in 2009 (increase by 59.7%). The average annual increase in general farming costs was greater than the increase in direct costs, amounting almost to 10%. The highest increase among the general farming costs in the examined period was recorded in terms of costs of electrical energy (more than 2 times) and renovation costs (by 40.9%).

The highest increase was recorded for the group of costs of external factors (increase by 66.2%). Among these, the highest increase was recorded for mortgage charges (almost 3 times) and the costs of hired work (increase by 75.4%). The average annual increase in mortgage charges amounted to as much as 22.9%. The share of costs of hired work in the costs of external factors increased from 5.5% to reach more than 82.5% in 2009. In the examined period, the share of costs of hired work in the total production costs increased from 8.8% to 10.6%.

4. Income and ratio analysis of vegetable growing farms

The level of farming income[6] is presented in Table 6. The average income of vegetable growing farms during the period 2004-2009 increased from PLN 49.6 thousand to 76 thousand (increase by 53.2%). In the examined period, an average annual increase in farming income by 8.9% was recorded (Table 6). The highest farming income was generated by vegetable growing farms in 2007 – it amounted to PLN 85.2 thousand per farm. In 2008, the income decreased by 26.7% in comparison with the previous year, which was due to the reduction of prices of sale of vegetables and the increased production costs (by more than 10%).

Farming income per 1 hectare (land profitability) increased in this period for the farms examined from PLN 3.9 thousand per 1 hectare to PLN 5.3 thousand per 1 hectare (increase by 36.4%). The average annual increase in farming income per 1 hectare amounted to 6.4%.

In 2004, farming income per one full-time employee (AWU) increased from PLN 16.2 thousand to PLN 24.3 thousand (increase by 50.3%). The average annual increase was the highest for farming income per one AWU, and it amounted to 8.5%. However, the vegetable growing farms did not reach the level of the average total net salary in the national economy of Poland, which in 2009 amounted to about PLN 2 227.61 per month. Therefore, the income from a family farm per one AWU at the examined vegetable growing farms constituted only 90.9% of the monthly average net salary in the national economy.

In the examined period, income from a family farm per value of assets committed increase from 9 PLN per 100 PLN of assets to 12.5 PLN per 100 PLN of assets (increase by 38.8%). The most significant increase of income in relation to committed assets was observed during the years 2005 and 2009, when it amounted to 27.6% and 22%, respectively.

A prerequisite for effective management of a farm is analysis of the achieved results (Wasilewski, 2004). A farm is managed effectively only if the farmer is able to assess properly the effectiveness of decisions made in the past. The economic results of activity achieved may, on the one hand, confirm the rightness of the decisions made, or, on the other hand, enforce the need to change the previous modes of action (Czekaj J., Dresler Z., 1998). Therefore, financial analysis – including the ratio analysis – is of utmost importance.

Table 7 presents the ratio analysis for the examined vegetable growing farms during 2004-2009. In the analysed period, the liquidity ratios of the examined farms decreased by about 23-25%. In agricultural holdings,

[6] Farming income according to the FADN terminology is referred to as income from a family farm.

Table 7

Ratio analysis of balance sheet and profit and loss account of the surveyed vegetable farms

Specification	2004	2005	2006	2007	2008	2009	2009/ 2004	Average annual growth
Liquidity ration								
Current ratio	4.29	4.42	3.71	3.57	3.11	3.32	77,31	94.98
Quick ration	2.45	2.52	2.15	1.90	1.69	1.85	75.31	94.49
Immediate ratio	2.02	2.04	1.71	1.59	1.37	1.49	74.13	94.19
Profitability ratios								
Return assets [%]	9.00	11.49	12.83	14.24	10.24	12.50	138.82	106.78
Return on equity [%]	11.23	14.26	16.40	17.96	12.71	15.47	137.75	106.62
Return on sales [%]	25.57	28.67	31.47	33.07	25.06	28.18	110.20	101.96
Debt ratios								
Total debt [%]	19.84	19.42	21.80	20.70	19.43	19.22	96.87	99.37
Debt to assets [%]	24.75	24.10	27.87	26.11	24.11	23.79	96.13	99.21
Long term debt [%]	20.25	19.64	21.43	19.66	17.60	16.20	79.99	95.63
Efficiency ratios								
Average collection period	0.41	0.,50	0.52	0.59	0.58	0.65	157.65	109.53
Assets turnover	2.50	2.71	2.65	2.78	2.93	3.04	121.41	103.96
Inventory turnover [days]	62.48	57.91	58.05	61.43	56.87	53.24	85.21	96.85
Receivables turnover [days]	4.75	6.13	7.05	5.32	5.58	6.72	141.39	107.17

Source: author's calculations based on the data of the FADN of Poland

the stocks, due to the concentration of production, often determine general liquidity ratios, and thus they are usually higher than in other sectors of economy. Current liquidity decreased in the examined period from 4.29 to 3.32, and it was much higher than generally recommended (1.2-2.0). Decreasing of the liquidity ratios, including current liquidity, was mainly due to the increase in the level of current liabilities (by 48.1%) and not due to the increase in the level of current assets (increase by 14.5%). Immediate and quick liquidity ratio were higher than recommended (by about 1 and 0.2-0.5, respectively), which indicates higher security of operation.

Assessment of management effectiveness was conducted based on the values of the fixed asset turnover ratio, current asset turnover ratio, the inventory turnover ratio, the receivables turnover ratio, and the liabilities turnover ratio. The fixed asset turnover ratio shows the effectiveness of use of fixed assets engaged in the production process. On the farms examined, the fixed asset turnover ratio increased from 0.41 in 2004 to 0.65 in 2009 (increase by 57.6%). Due to the value of the fixed assets engaged, these ratios are relatively low; on the other hand, utilisation of fixed assets is improving. The share of fixed assets in the total assets exceeded 85%.

The current asset turnover ratio indicates the pace of turnover of current assets. The current asset turnover ratio, like the fixed asset turnover ratio, increased from 2.5 to 3.04 (however, the increase was less visible and amounted to 21.4%). These ratios should not be too high to make sure they do not interfere with the rhythm of production and continuity of sales, while hindering utilisation of production capacities due to inventory shortages. On the other hand, they should not be too low, either, in order to prevent freezing of net working capital in current assets (Sierpinska M, Jachna T., 2005). However, the value of these ratios depends largely on the trade, and thus on the length of the production cycle and terms of payment for the products sold.

The inventory turnover ratio in the examined period increased from 5.84 to 6.86 (increase by 17.3%). The inventory cycle in days decreased from 62 days to 53 days. This change is favourable, as it leads to decreasing in the costs of freezing of working capital and the costs of storage, and the risk of loss of value of the products manufactured decreases as well.

The values of the receivables turnover ratio at the examined farms decreased from 76.8 to 54.3, while the receivables cycle measured in days increased from 4.75 days to 6.72 days. Despite lengthening of the waiting time, the value of these ratios remains relatively low; however, the period of crediting of their recipients by farmers is increasing. Liabilities to suppliers increased from the average of PLN 2.4 thousand to PLN 3.5 thousand per farm. Tax liabilities of the farms examined also increased from PLN 0.3 thousand to the average of PLN 1.4 thousand per farm.

Conclusions, proposals, recommendations

1. Gardening production, including vegetable growing, is of high significance in Poland. Poland is the fourth

largest producer of vegetables in the European Union. In 2009, the global production of vegetables exceeded PLN 5.6 billion, constituting more than 7% of global agricultural production and more than 13.4% of global plant production. Export of vegetables and vegetable products exceeded EUR 638 million, which constituted more than 27.3% of export of plant products.

2. Production of the examined farms increased in total by 39%, taking into account inflation at the level of 22%. The average annual increase in production during 2004-2009 amounted to 6.4%. Land productivity in the examined period was also increasing, mainly due to the increase in the production. Greater increase in the productivity was observed in labour expenditures. Economic effectiveness of labour, which is measured by the value of production per one full-time employee, increased by 36.4%. An increase in the total productivity of assets by 26% was also observed during the examined period.
3. Overall, costs at the examined farms increased by 45.5%, meaning that the increase was greater than that of production. The average annual increase in production costs throughout the examined period was at the level of 7.8%. The increase in the level of general farming costs (59.7%) was greater than that of direct costs (increase by 49.1%). In terms of direct costs, the highest increase was recorded in terms of costs of mineral fertilisers and plant protection agents. In general farming costs, the highest increase was recorded in the category of costs of electricity and renovations, while fuels constituted the largest share of costs.
4. During the period 2004-2009, the income of vegetable growing farms increased by 53.2%. The highest increase of income was recorded in the case of income from a family farm per one full-time employee (increase by 50.3%) and per engaged assets (increase by 38.8%). Nevertheless, the income from a family farm per one full-time employee constituted about 91% of the average net salary in the national economy.
5. The ratio analysis of the balance sheet and the profit and loss account indicates a good economic and financial condition of the examined vegetable growing farms. Despite the fact that the financial liquidity ratio values decreased in the examined period, they still remained higher than recommended, which indicates a high level of security of business operation. Profitability ratios in this period were positive. Total debt remained more or less the same. Long-term debt values decreased. Ratios of rotation of fixed assets, current assets, inventories, and the current liabilities cycle ratio increased. The values of the ratio of turnover of receivables, and the inventory cycle and turnover of current liabilities decreased.
6. The author found that during 2004-2009 vegetable growing farms in Poland were undergoing processes of concentration of resources (mainly land and capital) and specialisation of production. In the future, the dynamics of these processes will depend upon availability of agricultural land in the vegetable production regions, willingness of the farmers to establish marketing groups to cooperate with large supermarkets, and the possibilities of export of vegetables, which will contribute to increasing of the scale and specialisation of production.

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LAND AS MAIN PRODUCTION FACTOR ON DAIRY FARMS IN POLAND

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Abstract. This paper presents the issues of land resources on dairy farms of various scale of production. Using a dynamic scope, it analyses the shaping of parameters such as the area of own and rented land, share of rented land in the whole area of land, share of arable land, and the technical development of land factor in accordance with the number of dairy cows. Distinct dependencies between the shaping of parameters and the scale of production have been observed in the research. Data from the Polish FADN for the years 2004-2009 were used in the paper.
Key words: factors of production, land, milk production, scale of production.
JEL code: Q12

Introduction

Agricultural production is a result of combining live work, land, and capital. Live work is a personal production factor, while land and capital are material production factors (Grabowski S., Kowalski A., Adamowicz M., 1998).

As Czyzewski A. (2007) indicates, land, work, and capital function correctly on the market conditions when the agricultural sector can produce food on its own and regenerate wealth engaged in the production. It allows attaining the ability to cumulate and conduct expanded production and, thus, enables the dynamic equilibrium in the agricultural and food sector.

The task of farmers is to manage the designated production factors. It is quite complicated because of the special character of production processes, which are dependent on natural and weather conditions, or presence of live organisms, which is confirmed in the thesis of M. Urban (1981). It states that the effects of production in agriculture cannot be easily predicted as in the industry because not all elements of agricultural production are known nor governed.

Managing the production factors on the conditions of market uncertainty on the one hand and long production cycle on the other is problematic. It frequently causes low flexibility of agricultural production and inadequate rate of reaction to the changes of economic situation. Changes, which take place in agriculture all over the World and in the European Union in particular, force a number of adaptation processes in land, capital, and work management.

Land resources have a special role in agriculture by being one of basic production factors on a farm. Production of food could not have existed without the use of land. As W. Zietara indicates (1998), greenhouse production without the use of land (production of flowers and glasshouse vegetables) is an exception. It might be hydroponic cultures (cultivation using nutrients in water solution) or cultivation using mineral wool. L. Wicki indicates that despite technical progress and increasing role of industrial expenses, land is and will be the basic production factor. It results from its double role in agriculture. First, it is the place where the production happens and second, it is a production factor, which means that it influences the results of production process.

Land is a key element of natural environment, life on the Earth and processes that take place on the Earth. According to S. Grabowski (1998), land in agriculture takes the function of soil and climatic environment in which plant growing takes place due to various biochemical and agrotechnical processes (controlled and not controlled by humans). A. Parzonko (2004) states that land is a specific means of production in agriculture, which undergoes processing in the production process (e.g. because of cultivation procedures). B. Klepacki (1998) opines that land is also a means of work by which the plants are influenced and farm animals are influenced using plants. M. Urban (1981) also indicates that land can be enhanced as a product of nature and human work.

Using land resources, farmers interact with its few distinct features, which include land's own production potential, immovability, unincreasability, and indestructibility. The most perceivable and important for the farmer is the quantity of land connected with unincreasability and the quality of resources, which is determined by a farmer's own land production potential. In Poland, agricultural land resources are about 60% (18.5 million hectares) of the total country area. As L. Wicki indicates, agricultural land resources, structure and quality are one of the factors, which decide on agricultural production in a particular country.

The quality of farmland in Poland is one of the worst in Europe and it requires large expenditures. The share of high-quality land (Class I and II) is only 2.3% of the total agricultural land, while the worst (Class V and VI) is more than 30%.

According to W. Zietara (2009) and H. Runowski (2009b), the scale of activity might be understood as an area of farming. Agrarian structure in Poland is also unfavourable – the average size of a farm was 10.15 ha in 2009. In comparison, the average size of a farm in Germany was five times bigger.

The aim of the research was, among others, to establish relations between the number of dairy cows on a farm and shaping of such parameters as the area of own and leased farmland, share of leased land in the total area of farmland, share of arable land in the

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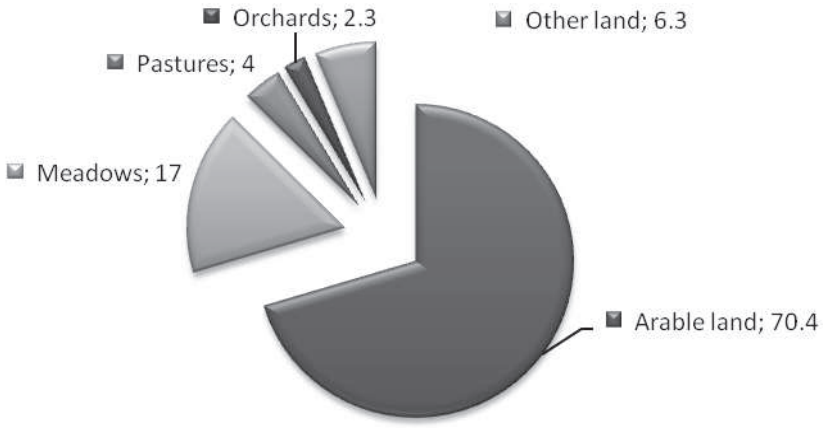
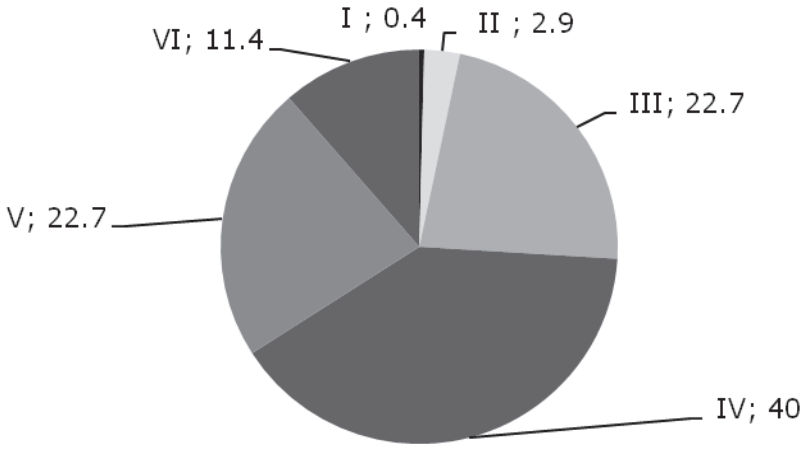


Source: authors' construction based on the data of the Central Statistical Office

Fig. 1. **Structure of farmland in Poland in 2010, %**



Source: authors' construction based on the data of the Central Statistical Office

Fig. 2. **Quality of farmland in Poland (share of different soil evaluations in %)**

whole area of farmland, and technical development of the land.

The research formulated two research hypotheses: 1. The agricultural area increases with the increase in the number of cows in the herd; 2. The scale of production increases with the greater share of leased area in the total area.

Research results and discussion

The data from the Polish FADN for the years 2004-2009 were used for empirical research. The surveyed region covered 795 holdings of the FADN (Mazovia and Podlasie), which includes the following counties: Mazowieckie, Podlaskie, Lubelskie, and Lodzkie. It is an area, which has a dominant significance in the country's milk production.

The objects were chosen purposefully. For analytical aims, farms specialising in milk production were chosen according to the FADN methodology, which is based on variable SO (standard production) classification. The research was conducted on individual farms.

On the chosen farms, the amount of production of milk and dairy products was on average at least 60% of all production. Moreover, the amount of dairy cows was at least 10 or more. According to the FADN rules, the groups consist of at least 15 objects for the research to be published.

The farms under scrutiny were divided into 5 groups. The criterion for division was the amount of dairy cows (Table 1):

A – small farm (10 to 20 cows);
B – medium - small farm (20-30 cows);
C – medium – large farm (30-40 cows);
D – large farm (40-50 cows);
E – very large farm (50 and more cows).

The ranges are closed off at the bottom, according to the equation:

$$10 \leq A < 20 \leq B < 30 \leq C < 40 \leq D < 50 \leq E$$

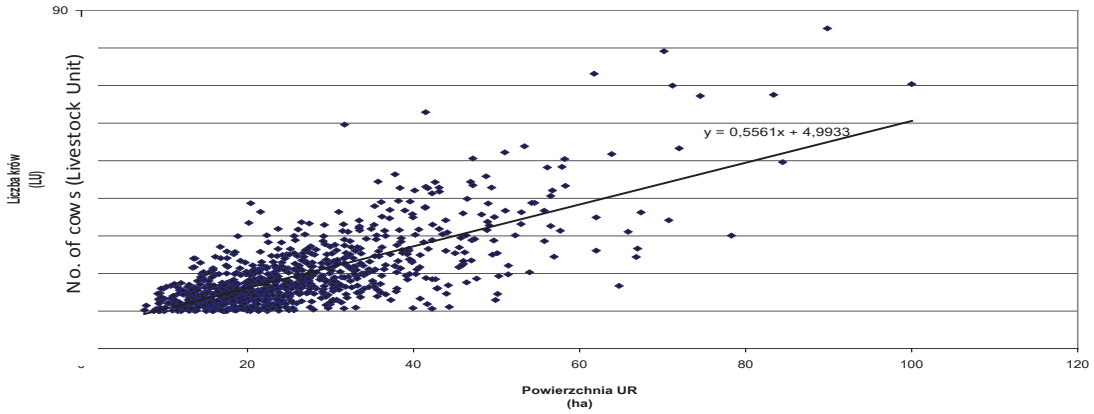
The division is an effect of the authors' self-research and analysis of available literature. The accepted expert method classifies objects under scrutiny in uniform groups, identical in size. The authors share the opinion

Table 1

Number of farms under scrutiny by groups

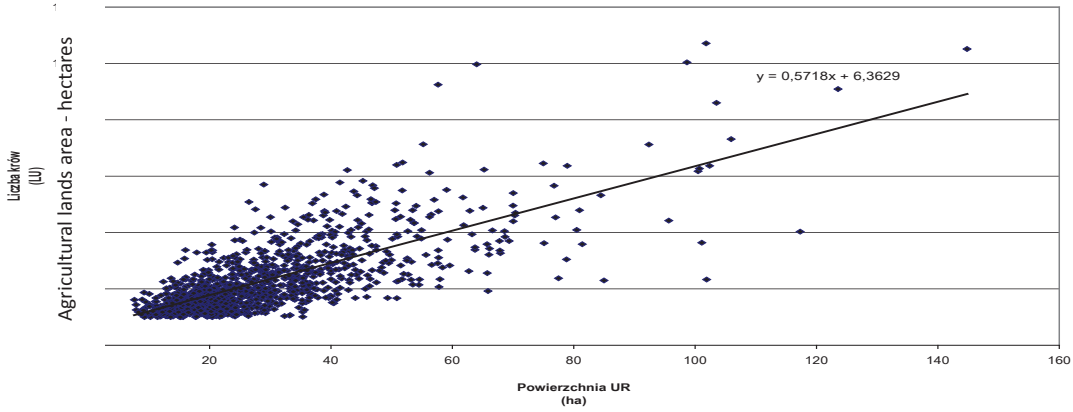
	A (10-20 cows)	B (20-30)	C (30-40)	D (40-50)	E (over 50)
2004	565	206	68	20	15
2005	547	272	72	35	16
2006	545	278	76	40	20
2007	582	290	98	31	31
2008	565	293	123	46	29
2009	582	314	140	64	45

Source: authors' construction based on the data of the FADN



***Source: authors' construction based on the data of the** FADN*

Fig. 3. **Number of cows vs. area of farmland in 2004**



Source: authors' construction based on the data of the FADN

Fig. 4. **Number of cows vs. area of farmland in 2009**

of, among others, S. Juszczyk (2005) that the amount of cows on a farm illustrates adequately the scale of production and other connected aspects.

There were, correspondingly, 874, 942, 959, 1032, 1056, 1145 dairy farms under scrutiny in the years 2004-2009. The amount was systematically increased every year.

Study of literature, descriptive method and basic statistical methods were used in this paper. Source materials included books, scientific articles, statistical data from ARR, GUS, and the FADN data. Results of the research were presented in tables and figures.

The area of agricultural land on farms under scrutiny was substantially bigger than on an average Polish

Table 2

Area used, ha

	A (10-20 cows)	B (20-30)	C (30-40)	D (40-50)	E (over 50)
2004	21.37	30.88	41.07	48.42	64.64
2005	20.89	30.35	39.69	46.48	68.29
2006	20.94	29.88	41.02	47.13	63.19
2007	20.91	30.76	40.95	50.62	62.67
2008	20.72	30.29	40.63	49.75	62.93
2009	21.32	31.33	40.23	50.09	64.55

Source: authors' construction based on the data of the FADN

Table 3

Area of rented farmland, ha

	A (10-20 cows)	B (20-30)	C (30-40)	D (40-50)	E (over 50)
2004	4.88	7.93	14.12	16.10	17.28
2005	5.19	8.71	11.32	14.71	23.01
2006	5.09	8.64	14.73	16.85	21.10
2007	5.11	9.38	14.80	19.50	24.60
2008	4.78	9.33	14.08	19.79	26.84
2009	5.32	9.96	13.09	20.03	27.31

Source: authors' construction based on the data of the FADN

farm and amounted to around 20 ha in Group A to over 60 ha in Group E. According to the data in Figures 3 and 4, the average area of agricultural land was covariant with the number of cows on the farm. It is confirmed by statistically crucial correlation factors $r_{2004} = 0.724$ (p=0.00) and $r_{2009} = 0.733$ (p=0.00).

Farms with the smallest number of cows used area, which was 3 times smaller than that of the biggest farms (Table 2). There were no substantial area changes in the corresponding groups during the analysed period. Small fluctuations were observed only in Groups D and E. The biggest farms have noted a short-term increase of area in 2005, which decreased to 63.19 ha the next year (5 ha change).

The biggest increase in farming area (about 2 ha) during the analysed six years was observed on farms having 40-50 cows. A slight increase was noted on farms in Group B (about 0.5 ha). All other groups used less land in 2009 than at the beginning of the surveyed period (very small decreases).

Using the same quantity of land in consecutive years might result from difficulty in farmland availability and lack of ability to increase the amount of this resource. It might also effect from the fact that an optimal amount of farmland corresponding to the amount of cows was reached thereon. It has been observed that the area of farmland was increasing by 10 ha on average in every group.

The difficulties in obtaining the farmland resulting from raising prices or lack of farmland to purchase lead to an increase of significance of renting as a way to acquire farmland for production.

Farms under scrutiny used rented land[3] quite substantially. A favourable dependence was observed between the size of cows herd and rented farmland area with an increasing strength of relationship during the period under scrutiny. It is confirmed by correlation factors $r_{2004} = 0.151$ (p=0.00) and $r_{2009} = 0.217$ (p=0.00).

Farms having 10-20 cows rented 5 ha of land on average, whereas those having more than 50 dairy cows – from 17 to 27 ha. A significant raise in rented land, reaching up to 60%, was noted in the group of large objects.

The rest of farms also increased their rented land area in the researched time scope (Group A by 9% - 0.44 ha; Group B by 25.5% - 2.03 ha; and Group D by 24.4% - 3.93 ha) with the exception of Group C, which noted a slight decrease (7.2% - 1.03 ha). It might be thus stated that there was a raising trend in majority of the groups. The bigger the farm was, the bigger was the share of land it rented.

The significance of rented land in objects under scrutiny was traced by analysing the share of leased land area in the total area of the farm. As the data in Table 4 show, the share of rented land is increasing with the number of dairy cows on a farm.

On large and very large farms, this share was over 40% last year and it was almost twice as big as in the group of small farms. About 30% of the land was rented on the medium – small and medium – large farms.

It should be noted that a raise in the share of rented land in almost all groups of farms (except for Group C) has been noted since 2004. It was most prominent in Group E where the share increased by 15.6 percentage

[3] Land leased by owner according to a lease deal for a period of at least a year (price paid in cash or natural resources)

Table 4

Share of rented land in total area of farmland, %

	A (10-20 cows)	B (20-30)	C (30-40)	D (40-50)	E (over 50)
2004	22.84	25.68	34.37	33.26	26.73
2005	24.85	28.71	28.51	31.65	33.69
2006	24.32	28.93	35.92	35.75	33.40
2007	24.42	30.50	36.15	38.53	39.25
2008	23.08	30.79	34.65	39.78	42.65
2009	24.95	31.78	32.54	39.99	42.31

Source: authors' construction based on the data of the FADN

Table 5

Share of arable land in total area of used land

	A (10-20 cows)	B (20-30)	C (30-40)	D (40-50)	E (over 50)
2004	65.37	62.28	63.71	66.99	59.78
2005	66.25	63.49	62.32	58.47	69.24
2006	68.22	64.95	68.33	64.24	67.54
2007	68.16	66.73	67.23	67.18	67.56
2008	66.86	66.09	69.00	69.48	68.36
2009	67.08	66.86	65.05	64.74	69.06

Source: authors' construction based on the data of the FADN

points (from 26.7% to 42.3%). In Groups B and D, the increase was 6.1 percentage points and 6.7 percentage points, respectively. Small farms used the smallest share of leased lands: the share was lower than 25%. These farms, though, have shown an increase in rented land they used by 2%.

It can be noted that farmers producing milk in order to acquire land, resorted to rented land more frequently. This trend was most visible on large and very large farms. This effect gained in strength after 2004 for almost all farms under scrutiny. This trend will probably be maintained in the next years, subordinating milk producing to lease of land.

In the structure of the land used by objects under scrutiny, arable land was one of the main elements. As the data in Table 5 show, the share of arable land in the land structure was far more than 60%. It has increased in almost every group compared with 2004. Biggest fluctuations of this variable were noted on large and very large farms, especially in the year 2005.

Large farms having more than 50 cows have increased their share of arable land by almost 9% in the analysed period. In other groups, the share increased by 2, 4 and 1.5% in Groups A, B and C, respectively. Only farms in Group D have noted a decrease by about 2.5%.

A slight raising trend in the share of arable land has to be noted. Group D, despite a substantial decrease in 2009, also participated in that trend in the years 2005-2008. Increasing significance of arable land might effect, especially on very large farms, from the changes in intensity of production and feeding the cows. Intensive production of forage feed is moving in the direction of cultivating corn for silage, legume, or even grass cultivated on arable land in order to increase production results.

Technical land development is a very important issue connected with land resources. As W. Poczta implies (2008), this issue, called also filling the land with capital, is useful in measure of agricultural production on a farm. According to K. Grotkiewicz and R. Michalek (2009), the influence of technical means on creating the optimal conditions of highly efficient animal and plant production is transposed directly to the land efficiency factor, which, in turn, is the measure of framing competitiveness. U. Malaga – Tobola (2009) indicates, in turn (after Kubon, Kwasniewski, 2006; Wojcicki, 2008), that to improve the effectiveness of agricultural production, system agriculture improvement based on technical progress (modern machinery and new or modernised buildings and structures) is essential. Modern technical development determines higher harvests and animal productivity, while simultaneously lowering individual production costs.

A covariance has been found between technical land development and number of cows in a herd. It is indicated, among others, by correlation factors r_{2004} = 0.106 (p=0.002) and r_{2009} = 0.265 (p=0.00). Technical land development has increased with raising scale of production. The relationship between these two variables has increased in the researched period.

On surveyed farms, the above-mentioned factor was calculated as a relation of the value of assets (buildings + machinery and appliances) to the area

Table 6

Technical land development (PLN/ha)

	A (10-20 cows)	B (20-30)	C (30-40)	D (40-50)	E (over 50)
2004	11 704.46	12 712.35	12 491.12	13 366.57	15 607.75
2005	11 421.97	12 460.75	12 585.22	13 571.61	13 183.79
2006	11 989.87	13 083.57	14 123.51	15 028.34	16 872.39
2007	12 345.74	13 256.43	14 483.21	17 206.60	15 580.86
2008	12 901.92	14 422.78	15 877.33	17 603.31	16 322.83
2009	13 068.80	15 208.16	18 470.25	19 655.03	18 547.19

Source: authors' construction based on the data of the FADN

of land used. According to the data in Table 6, all systematic groups were increasing their technical land development, which was fluctuating from PLN 11.5 thousand per hectare on average on small farms to almost PLN 20 thousand per hectare on the big ones. It is worth mentioning that in 2004-2006, this factor indicated a distinct covariance with the number of dairy cows, while from 2007, the big objects indicated the highest level of engaging assets per 1 hectare of used land, distorting the previous situation. In Group C, this factor equalled the one in Group E.

Conclusions

1. On farms under scrutiny, the area of used land indicated a covariance with the number of cows on a farm. The area of used land increased with the increase of the scale of production. It confirms the fact that production of milk is significantly dependent on the area of used land, where, among others, production of forage feed, which is unavailable on the market in satisfactory quantities, takes place.
2. Analysed farms rented land. A positive dependence between the size of the herd and the area of rented land was observed in the research. The share of rented land area in the total area of used land was increasing with growing size of the herd. The significance of renting increased the fastest on big and very big farms, that can evidence further dependence of concentration of milk production in Poland on the lease of land.
3. A covariance between technical land development and number of cows in a herd was affirmed. Technical land development increased with the increase of scale of production. The strength of relationship between these two variables has increased in the period under research.

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FOOD SUPPLY CHAIN FORMATION NECESSITY IN ZEMGALE REGION

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Abstract. Consumers increasingly consider the origin and harmlessness of raw materials of products when purchasing food. Therefore, the issue of the possibilities for purchasing human-health-friendly food becomes topical. The present research was performed to identify the necessity for forming a food supply chain in three municipalities of Zemgale region: Dobele, Auce, and Tervete. An expert group, which engaged in designing a questionnaire, was formed to carry out the research. A survey was conducted in the territory of the municipalities of Dobele, Tervete, and Auce, engaging both consumers and businessmen. The present paper is based on the survey findings. It concludes that, presently, consumers most often choose to buy food at supermarkets; yet, they are very interested in purchasing food produced within a food supply chain, and the main product groups are meat and dairy products, meat, milk, and eggs. From the viewpoint of businessmen, the number of food suppliers and the quantity of food offered by them are small; thus, the assortment of food products has to be enlarged.
Key words: home production, food supply chain, consumer, food.
JEL code: Q13

Introduction

Food, including food products consumed to raise the feeling of comfort of oneself and family, play an important role in every individual's daily life. Before purchasing food, consumers increasingly study the origin of food products, the place of origin of agricultural raw materials, and the harm caused by food, which encourages consumers to buy food products of local producers. Yet, a problem arises, as no information on purchase possibilities is available. Therefore, a need has emerged for a practical research to find out the opinions of consumers and businessmen regarding establishing a short food supply chain in the territory of the municipalities of Dobele, Tervete, and Auce which are located in Zemgale region.

It was concluded, after making an initial situation analysis, that a researcher L.Melece (2001., 2002, 2003a, 2003b, 2008a, 2008b) mainly focuses her research on milk and meat quality standards. However, she relates her research to large-scale producers but not to the level of households as well as researched food safety in Latvia; thus, contributing to providing the sustainability of food (Melece, 2011). Melece L., Praulins A., and Popluga D. (2009) have conducted pieces of research on environmentally friendly farming in Latvia, revealing some economic aspects and setting priorities for development.

A practical guidebook with guidelines for best practices was produced for those being engaged in crafts, including food processing (Rokasgramata labas…, 2011). However, not a single practical research regarding the situation in municipalities has been carried out, and the present paper may be considered a beginning of research on it, so that the research results may be adapted to and exploited in developing home production in other municipalities.

Several topics related with home production, for instance, uniting home producers in an association (Cepanone, 2012), diversifying products of home production (Klavina, 2012), development possibilities for home production (Majore – Line, 2012), home production as a job (Grutups, 2012) as well as small investments made by home producers (Misina, 2012) were addressed on the level of rural municipalities in 2012.

The research hypothesis is - the formation of a food supply chain creates a possibility for developing home production in municipalities.

Based of the hypothesis, the research aim is to ascertain the need for the formation of a food supply chain in the municipalities of Dobele, Tervete, and Auce.

To achieve the aim, several research tasks were set: 1) to identify consumers' opinions on the need for the formation of a food supply chain; and 2) to find out businessmen's opinions regarding the possibilities for forming a food supply chain.

To achieve the research aim, the survey was carried out, and the questionnaire was designed in cooperation with a group of experts which included the representatives of Dobele Consultancy Bureau of the Latvian Rural Advisory and Training Centre (LLKC), the Secretariat of the National Rural Network, Dobele County Council, the Association of Farmers, the Association of Latvian Rural Cooperatives, the Food and Veterinary Service, and the State Revenue Service, LLKC specialists in crop and livestock farming and in rural development as well as individuals who wanted to participate in establishing a food supply chain. The survey was conducted from September to November of 2012. The survey encompassed 343 respondents, including 220 consumers, 39 businessmen, and 84 farmers.

The following research methods were employed: 1) analysis and synthesis; 2) induction and deduction; 3) the graphic method; and 4) a sociological method – a survey.

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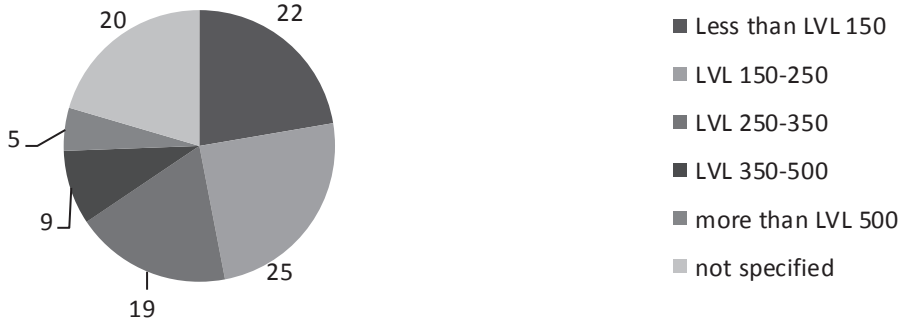

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Fig. 1. **Percentage distribution of the respondents by monthly income**

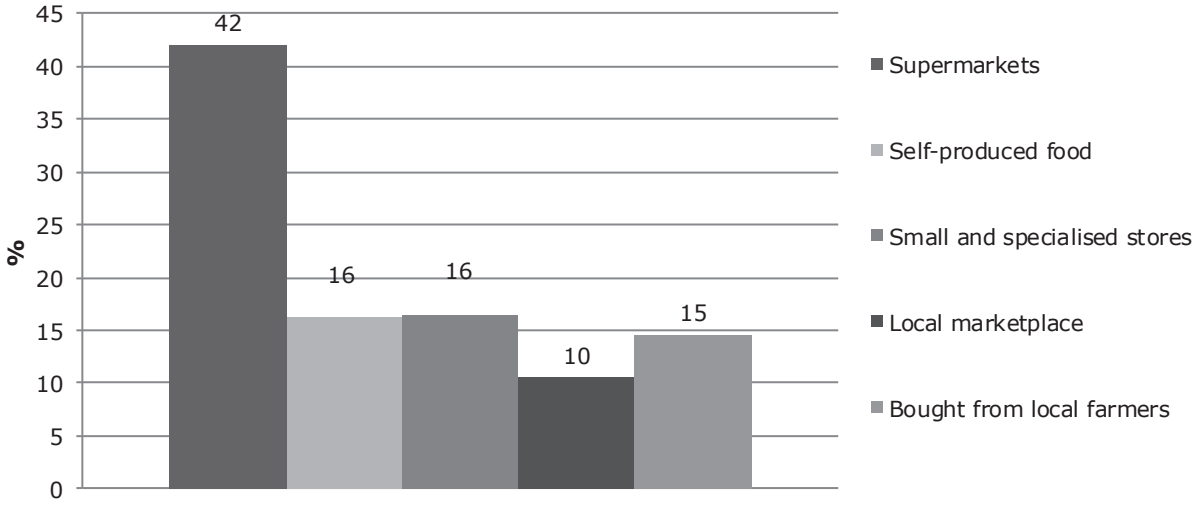

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Fig. 2. **Percentage distribution of the most popular shopping sites of the respondents**

Research results and discussion

1. Consumer opinions on creating a short food supply chain

Initially, consumer opinions were found out by surveying 220 respondents.

A significant indicator was the age structure of consumers, which indicated the interest of local rural residents in and their need for purchasing food. Potential customers of farmers and businessmen, which were interested in purchasing local food, were the population aged 26-55 years that comprised 71% of the respondents.

Of the respondents, 47% replied that their monthly family income was less than LVL 250, which indicated the low purchasing power of the respondents and negatively affected their demand for short food supply chain products. Of the questioned individuals, 19% had a family income within a range of LVL 250-350, and only 5% of them earned more than LVL 500 a month; 20% did not reveal their income (Figure 1).

Nowadays, there are various food purchase sites, thus, it was important to identify the most popular and preferable ones. The data are presented in Figure 2.

Supermarkets were specified as the most popular shopping sites by 80% of the respondents, 69% purchased their food at small stores, while 31% of the respondents produced agricultural products themselves for their own consumption. The frequency of shopping by the respondents is an indicator showing how frequently local producers have to supply their food products as well as what kind of trade is the most efficient and profitable. According to the survey, the greatest number of the respondents purchased food products for their family once a week, and 32% of them did shopping two or more times a week. Most often, the respondents preferred to buy meat and meat products as well as dairy products; yet, eggs, non-agricultural products, and fruit and berries were most rarely purchased.

While conducting the research on the need for introducing a short food supply chain, an important goal was to identify the interest of potential consumers in supporting local producers. Of the respondents, 72% said that such a possibility was necessary and confirmed their interest in it. Only 6% were sceptical about it.

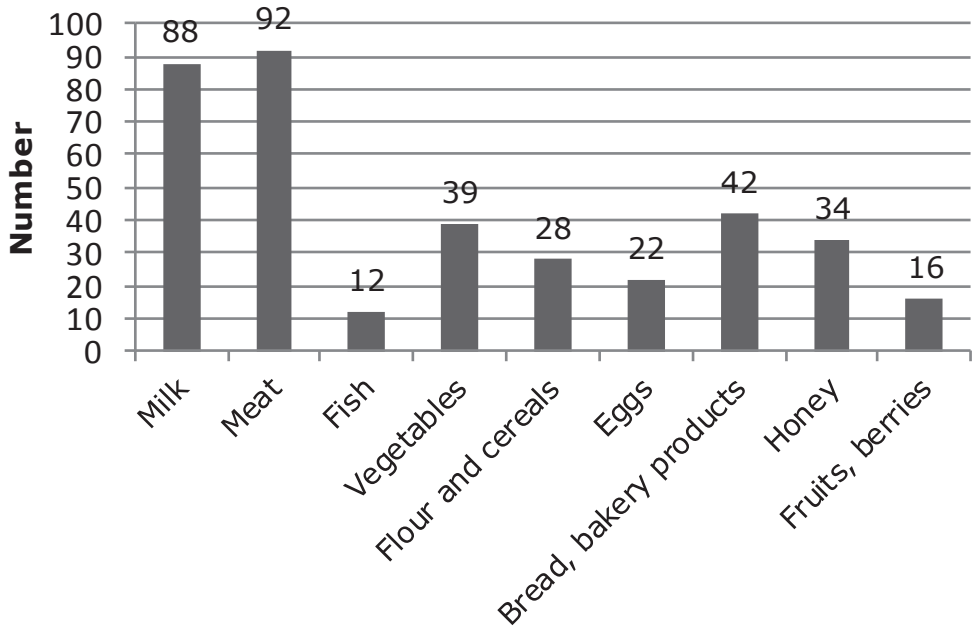

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Fig. 3. **Distribution of the respondents' most popular food products**

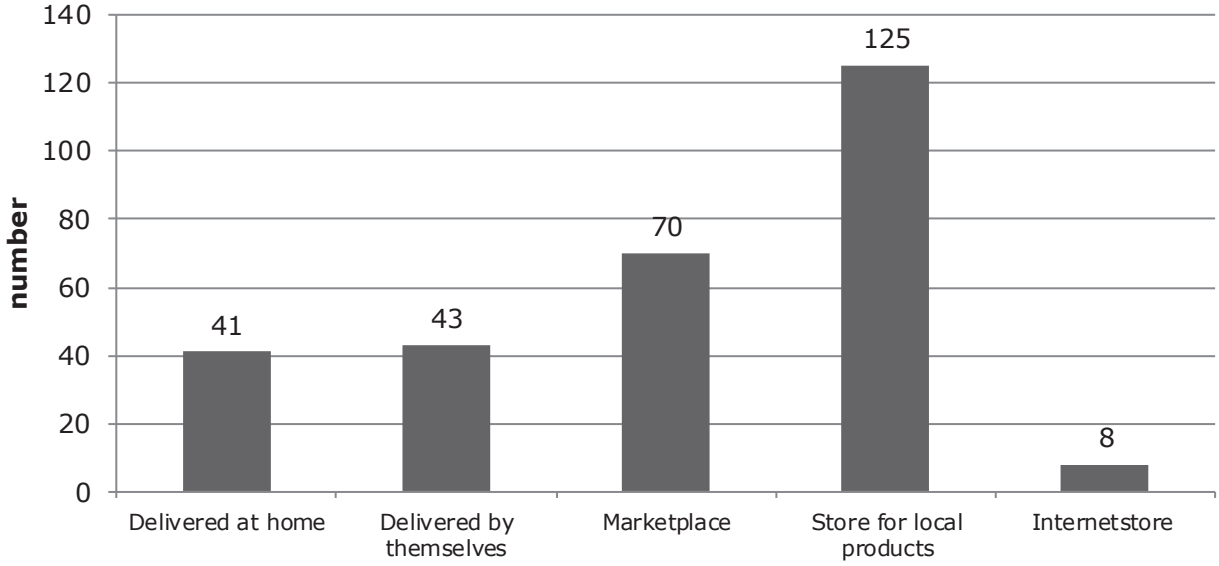

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Fig. 4. **Most popular shopping sites and ways for consumers**

The most popular food products and food groups were identified in the survey. According to the survey, meat as well as milk and dairy products were most often purchased from local producers – 92% of the respondents admitted it (Figure 3). They were also interested in locally produced bread and bakery products as compared with other food groups. However, fish products were not popular, which might be explained by the small number of fish farms in the researched territory.

When purchasing daily food products, several factors influence consumers. Food quality was one of the most significant factors for 75% of the respondents, followed by price for 69%, and the place of origin of products was the third most significant factor. Product packaging played a smaller role in attracting consumers, as only 11 respondents of 220 mentioned it.

For producers, it is very important to be located as close to consumers and their preferable shopping site as possible.

The survey revealed that 125 respondents (Figure 4) preferred to buy food products of local producers at a specialised store intended only for local producers, thus,

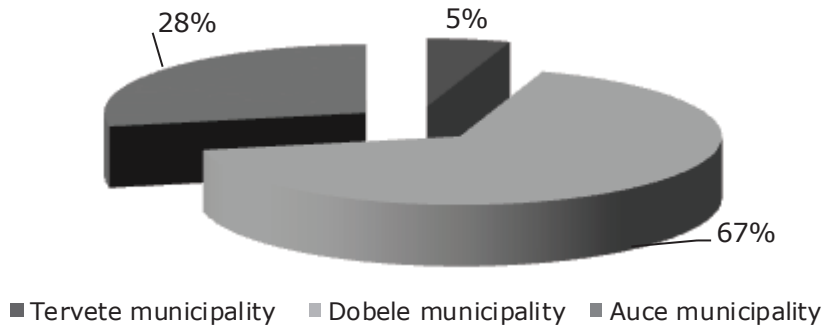

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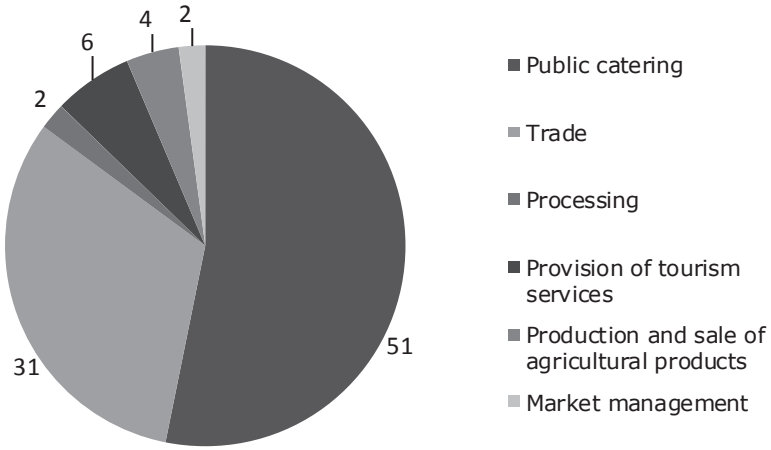
Fig. 5. **Percentage distribution of the surveyed businessmen by municipality**



Source: authors' construction

Fig. 6. **Percentage distribution of the surveyed businessmen by economic activity**

making mass products and products from producers from other regions not available. Of the respondents, 32% preferred to purchase local products at the marketplace, while 43% wanted to deliver such products from producers themselves. They were least interested in the sale site becoming increasingly popular now – the e-environment, as this way of shopping was not exploited by most of the consumers.

The consumer understanding of the processes presently taking place in the food industry was also ascertained as well as it was established what affects the low demand for local food products. Of the respondents, 58% pointed that the key obstacle for cooperation with local producers and for purchasing their products was the lack of information. One can conclude that the effect of advertising is confirmed one more time – the more products are advertised, the greater are their sales. For 52% of the respondents, shopping at a store was more convenient, and a high price of products was not important to become a customer for local producers.

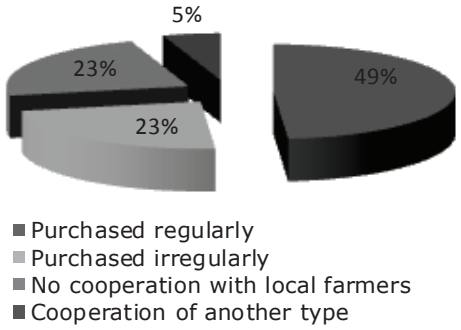
One may conclude that in consumers' opinion, the formation of a short food supply chain is necessary, and it would provide a possibility to buy products of local producers; yet, before establishing the chain, a detailed analysis of the supply of products has to be made, as the assortment of products in which consumers are interested in is limited.

2. Engagement of businessmen in forming a short food supply chain

Thirty-nine businessmen from the municipalities of Dobele, Tervete, and Auce who specialised in purchasing and processing agricultural commodities were identified during the survey. The respondents' resources and wishes, the need to support the short food supply chain as well as their opinion on the development of local producers in their municipalities were ascertained in the survey. Businessmen from Dobele municipality participated in the survey most actively, accounting for 67% of the total number of questioned businessmen and processors (Figure 5).

The majority of the respondents represented public catering organisations, which often were the purchasers and consumers of agricultural products (Figure 6).

Of the respondents, 51% provided public catering services, while 31% were engaged in the industry of direct sales – they were mainly owners of small and specialised stores. There were providers of tourism services, and producers and processors of agricultural products among the respondents.



Source: authors' construction

Fig.7. **Percentage distribution of the surveyed businessmen by frequency of cooperation with local farmers**

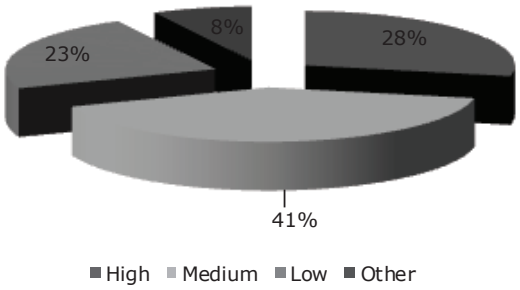


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Fig. 8. **Evaluation of the demand for agricultural products in the municipalities, %**

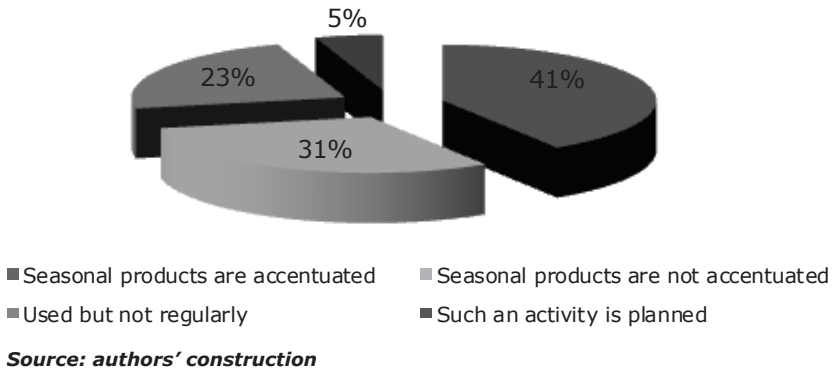

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Fig. 9. **Popularisation and accentuation of seasonal products in offers, %**

Cooperation with local businessmen and purchasers is necessary in order that producers of agricultural products could sell their products more efficiently. Of the respondents, 49% regularly cooperate with local producers, purchasing their products (Figure 7). Irregular purchases are specific to 23% of the businessmen, and the same proportion of them has not established cooperation. According to the businessmen and purchasers, a small supply and low prices on products, which would make their services more expensive and reduce the number of their customers, are the main reasons for it.

The majority of the businessmen pointed to the quality and availability of products of farmers as a positive factor of short food supply chains. Products are delivered fresh and in the required quantity as well as they are mainly environmentally and human-health-friendly. The businessmen believe that such cooperation has also psychological advantages – food suppliers are personally known, which builds additional confidence in products offered by them.

The businessmen pointed to high bureaucracy, filling in various documents, and product quality tests and certification as negative aspects for cooperation with farmers. Prices also change, and not always the price agreed upon is in force at the time products are delivered; besides, there is the risk that products may spoil earlier.

The businessmen noted that in order that stores can profitably buy products from a local farmer, a wide spectrum of products has to be supplied from one producer, as presently the demand for every product group is small. Consequently, it is not profitable to farmers, which produce only cabbage and carrots, to supply these products to stores in small quantities – it is too costly to the farmers to deliver ten cabbages and 10 kg of carrots once a week. This factor indicates that several businessmen have to cooperate for developing complex product offers.

Based on the respondents' replies, one can conclude that the customer demand for agricultural products is medium in the researched municipalities. If compared with the interest and opinions of consumers, it is a contradiction, which may be explained by poor consumer awareness and, consequently, the low demand.

The businessmen noted that they would want to buy and offer consumers more quality vegetables and dairy products mainly themselves. They were also interested in cooperation with farmers who produced berries, rhubarb, greenstuffs, tomatoes, cucumbers, processed meat, and dairy products – 18 respondents of 39 expressed their wish to start such cooperation in the near future if beneficial offers were available.

One of the best ways of attracting customers is to develop adequate offers for customers, as they have various tastes, wishes, and interests. Over the recent period, an increasing attention was paid to various products that highlighted and reinforced the local identity as well as were in line with seasonal topicalities.

Of the surveyed businessmen, 41% said that seasonal products were also accentuated in the assortment of their offers; 31% performed such activities irregularly, while 5% planned to popularise such products in the future.

The businessmen believed that seasonal offers as well as the use of local food recipes in public catering were certainly commendable and positive activities. More such offers are available in rural areas, and the only problem is to find farmers who would supply all necessary products at the best prices. The respondents said that such activities required careful marketing planning as well as increasing the value added of products. The price of offers has to be also analysed, as public catering organisations mainly offer what customers demand – quality products at the lowest possible price.

The businessmen pointed to the interest of farmers themselves in more active sales of their products as one of the most important prerequisites to promote cooperation with farmers. It is also necessary to amend the legal framework and reduce the present level of bureaucracy. A broader assortment of dairy products and vegetables is needed as well as greater attention has to be paid to the quality of products.

Conclusions

1. The purchasing power of rural residents is low, as 64% of the respondents had a monthly family income of less than LVL 350.
2. Food is most often bought at supermarkets (80% of the respondents), and only 1/3 of the respondents produced agricultural products for own consumption themselves.
3. Customers are mostly interested in purchasing locally produced meat and dairy products; they are very interested in fish products, locally produced bread, and other bakery products.
4. Customers wish to buy food products at the sites that are advantageous to them, i.e. at specialised stores selling products of local producers and at the local marketplace as well as they want to deliver such products from producers themselves. They most often wish to buy a "food basket" – "meat+milk", "meat+milk+vegetables+eggs". It indicates that consumers are interested in a wide assortment of local agricultural products.
5. The respondents are interested in supporting local producers – it is necessary to establish a "short food supply chain". This idea was supported by 72% of the respondents, and only 6% were sceptical. They mentioned the following advantages: quality products (75%), acceptable price (69%), and local place of origin. Only 5% of the respondents paid attention to the packaging of products.
6. The businessmen (49% of the respondents) who are already engaged in processing agricultural products regularly purchase products of local producers. Products are delivered fresh and in the required quantity as well as they are mainly environmentally and human-health-friendly. The businessmen would like a wider assortment and want to purchase regularly seasonal products: berries, rhubarb, greenstuffs, tomatoes, cucumbers etc.
7. The businessmen pointed to high bureaucracy – filling in various documents –, product quality tests and certification, a lack of offers, an insufficient assortment of products, and too high prices as negative aspects for cooperation with farmers.

Proposals, recommendations

1. The LLKC, in cooperation with interested institutions, has to elaborate a plan of measures for informing and consulting residents and producers on the Short Food Supply Chain.
2. Active businessmen have to be united, thus, establishing a cooperation network among producers.
3. In cooperation with local governments, public organisations, and producers, attractive sale sites have to be established as well as local cultural heritage has to be exploited, for instance, the renovated old marketplace in Dobele etc.

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DETERMINANTS AND POSSIBILITIES OF DEVELOPMENT OF THE ORGANIC PRODUCTS MARKET IN POLAND

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Abstract. The aim of the study is to present the current situation in organic farming in Poland. In the paper, the market of organic food is described with a particular focus on increase in the number of organic farms and processing companies in this field. The authors have identified some significant barriers of this market development and have described law regulations of organic farming. It was also stressed that there exist perspectives for development of the organic products market with emphasizing the necessity of co-financing for organic producers, increase in consciousness of customers as well as development of new distribution channels.
Key words: organic farming, organic food, organic farms, Poland.
JEL code: Q13, Q18, Q57

Introduction

The market of products of organic origin is nowadays one of the most quickly developing food markets in the world. The proportion of the sector of organic farming has been increasing not only in Poland but also in all the European Union countries. Customers, who have been expressing their significant increase in the demand for organic products, have influenced these changes. At the same time, an opinion on food health properties apart from only a nutritional function has been developing. That is why new producers offering organic products have been established, and already existing producers have been changing their conventional production into organic; all these activities have been taking place in order to meet increasing requirements of customers. The aim of this paper is to analyse the market of products of organic origin in Poland. The scope of the study includes issues connected with characteristics and development of organic farming and the organic food market in Poland. The authors have identified barriers and perspective for development of the organic food market. In order to realize the aim of the study, there was conducted a review of literature connected with the research subject. Moreover, Polish and European Union law regulations that determine functioning of this market were important sources of information; the authors also used reports of institutions focusing their interest on the organic products market.

Research results and discussion

Organic production is a general system of farm management and food production, which combines the best practices from the environmental perspective, a high level of biological diversification, protection of natural resources, use of high standards of animal welfare, and a production method which meets requirements of some customers preferring goods produced with use of natural substances and natural processes. As a result, the organic production method fulfils double social function; on the one side, it provides products for the specified market formed by demand for organic products, and on the other hand, it is an activity performed for public interest because it contributes to protection of the environment, animal welfare, and rural development (Council Regulation nr 834/2007).

Organic plant production contributes to maintaining and increasing in soil fertility and prevents its erosion. Plants are fertilized by soil ecosystems. Artificial fertilizers are not used. The basic elements of the system of organic plant production management are: soil fertility management, selection of kinds and varieties, multi-annual crop rotation, recycling of organic substances, and suitable farming techniques. Animal production plays a basic role for farming in organic farms because it provides organic substances and nutritional substances for the cultivated soil; in that way it contributes to improvement of soil state and sustainable farming development. Animal husbandry is based on obeying of high standards of animal welfare. Special attention is paid to animal health through diseases prevention. There are some important elements such as conditions in animal enclosure, husbandry practices, and stocking density (Council Regulation nr 834/2007).

To sum up, organic farms have:

1) not to use chemical plant protection treatments; first of all a good crop rotation, biological and agro-technical methods are used in order to prevent diseases, pests, and weeds;
2) not to use multi-hectares monocultures; cultivations are implemented in a mosaic system, on small plots, separated by cover crops as well as barriers established with trees and bushes, which are shelters for natural allies of farmers (birds and insects eating pests) improving microclimate;
3) to use green manure, especially of legumes, which combined with compost, manure and with liming allows to maintain a structure and fertility of soil at a proper level;

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Source: http://ec.europa.eu/agriculture/organic/eu-policy/logo_en

Fig. 1 **Symbol of organic farming in the European Union until 2010 and a new logo**

4) to use machines and instruments protecting soil, improving its structure, saving energy;
5) not to use active substances in animal breeding, such as antibiotics and hormones; fodder comes from own farm (it has known properties);
6) to run barn-reared animal production (Siebeneicher, 1997).

The most general approach to organic farming assumes that it is a new, contemporary modernized way of farming, which aims at saving and stability of the surrounding environment and protection of human health.

1. European Union and Polish legal regulations on rules of organic farming

Systematic increase in significance of organic production in the European agricultural sector forced improvement of legal regulations in this field. Since 1 January 2009, there have been in force the following EU regulations:

1) Council Regulation (EC) No 834/2007 of 28 June 2007 on organic production and labelling of organic products and repealing Regulation (EEC) No 2092/91 (published in Official Journal of the European Union L 189 on 20 July 2007, with later amendments);
2) Commission Regulation (EC) No 889/2008 of 5 September 2008 laying down detailed rules for the implementation of Council Regulation (EC) No 834/2007 on organic production and labelling of organic products with regard to organic production, labelling and control (published in Official Journal of the European Union L 250 on 18 September 2008, with later amendments);
3) Commission Regulation (EC) No 1235/2008 of 8 December 2008 laying down detailed rules for implementation of Council Regulation (EC) No 834/2007 as regards the arrangements for imports of organic products from third countries (published in Official Journal of the European Union L 334 on 12 December 2008, with later amendments).

Significant changes took place in regulations of the European Union concerning organic farming as a result of introduction of these regulations. They were connected especially with labelling of organic products, control of organic farms, and issuing certificates as well as changes of arrangements concerning import of organic products from third countries.

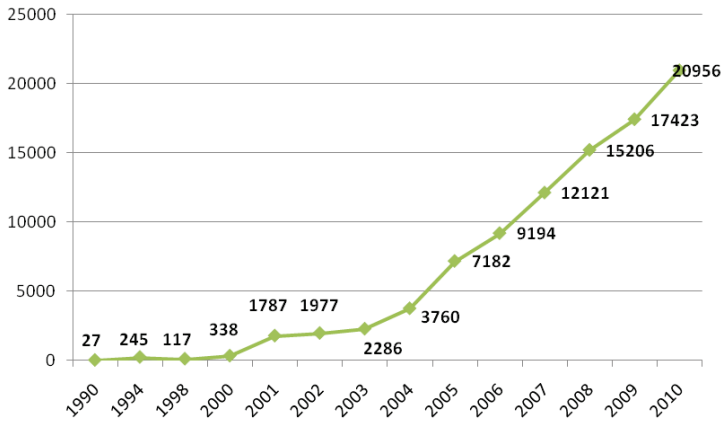
Together with changes in the EU regulations, it was necessary to prepare new domestic regulations in this field. The new Act on organic farming of 25 June 2009 (Journal of Laws 2009 No 116 Item 975) entered into force on 7 August 2009. After that, there were published regulations of the Minister of Agriculture and Rural Development, which described in details tasks of different institutions connected with organic farming. The mentioned act increased the role of the Agricultural and Food Quality Inspection as a state supervision in organic farming.

A control system based on private control (certification) was implemented in Poland, similarly as in majority of the EU countries. The Polish control system in organic farming consists of:

— Minister of Agriculture and Rural Development;
— Agricultural and Food Quality Inspection;
— certifying bodies – authorized to control and issue and withdraw certificates of organic farming. Nowadays, there are 11 of such bodies.

A label of each product that has received a certificate has to include a name and code of a certifying body supervising a producer. In the period since March 2000 until Poland's accession to the European Union, each packaging had to have a symbol "organic farming". In 1 July 2010, there was introduced a new EU organic farming logo "Euro-leaf" (Figure 1).

Before this symbol became compulsory for all products, a two-year transitional period was planned to enable companies to adjust to the new rules of labelling as well as to avoid wasting of existing packaging. The transitional period according to the EU rules of food labelling ended on 1 July 2012. The EU logo is now present on all organic packaged food within the European Union. It is also possible to use the logo on a voluntary basis for non-pre-packaged organic goods produced within the EU or any organic products imported from third countries. In that case, it is not obligatory and will not be in the nearest future. Private, regional, or national signs can be still placed next to the EU logo. "Euro-leaf" should be placed in a visible place. Next to the new EU organic logo, a code number of the control body should be displayed as well as the place where the agricultural raw materials composing the product have been farmed.



Source: author's elaboration based on the data of www.minrol.gov.pl

Fig.2. **Number of organic producers owning certificates in the period 1990–2010**

2. Development of organic food market in Poland

Organic farming is a base of production of organic food; it provides raw materials for this production. It is worth noticing that the popular term "organic food" is often used interchangeably with "health food", "natural product", "obtained from ecologically clean areas", "from green meadows" or simply "health". However, the first term means certified food, the next ones are generally only names for marketing purposes and do not introduce any defined standards.

Simplifying, it can be stated that purchasing food with the European logo we can be sure that:

— at least 95% of ingredients of this product were produced with organic methods,
— product fulfils requirements of the official certification system (Tyburski, Zakowska-Biemans, 2007).

Organic farming in Poland has had nearly 80 years of history. In 1924 in Kobierzyce, in the Lower Silesia, Rudolf Steiner presented a set of lectures with principles of bio-dynamic agriculture. Farming according to this method was started in 1930 by count Stanislaw Karlowski in Szelejewo, who operated there until the beginning of the war. The interest in this kind of agriculture occurred again at the turn of the 80s, especially from an initiative of a small groups of researchers and farmers clustered around professor Mieczyslaw Gorny (Kus, 2004).

In 1989, the first organization of organic farmers was established – EKOLAND Organic Food Producers Association. In 1990, this association ran a first inspection of farms and issued 27 attests for farms (http://www.fadn.pl).

Until 1998, the development of organic farming was very slow because this way of farming was not supported by the state, besides the possibilities of obtaining a higher price for these products were limited because of a low level of market organization. In 1998, 182 farms were under control; they used only 5.5 thousand hectares of farmland, i.e. about 0.03% of farmland in Poland. More dynamic growth of organic farming can have been observed since introduction of the payments for areas of organic crops in 1998 and after that introduction of legal regulations on organic farming in 2001 (Kus, 2004).

In 2000, 338 organic producers were registered in Poland, whereas one year later there were even 1977 of them. In 2009, this number was at the level of 17 thousand and in 2010 – 20 956. Figure 2 presents the number of organic farms in Poland in the period 1990-2010.

As far as the size of organic farms is considered – in 2010, the majority (24.3%) was represented by crop areas from 5 to 10 hectares. Farms with less than 5 hectares constituted 23.7%, whereas the largest ones with more than 100 hectares – 4.5% of the total number of farms. When the area of organic crops is analysed in particular regions (voivodships), it can be concluded that their spatial distribution is diversified. The largest area of organic crops takes place in such regions as: Westpomeranian Region, Warminsko-Mazurskie Region, and Mazowvia (Table 1). These three mentioned regions had 42.3% of organic farmland in Poland. The lowest proportions of such activity were registered in such regions as: Opole Region, Silesian Region, and Lodz Region.

The highest proportion of organic farmland is represented by meadows and pastures (42.3%). Plants for feedstuff (20.6%) occupy the second place. Cereals represent 19.6% of organic farmland, and the rest of the groups together form 17.5%, respectively. The detailed structure is presented in Table 2.

The majority of organic producers is represented by agricultural producers. In the period 2009-2010, they constituted about 98% of the total number of producers. Organic producers who run such activities as:

— processing of organic products;
— introduction of organic products imported from third countries;
— supply of certified seed;
— fruit harvest from the natural conditions (bilberries, mushrooms);
— bee-keeping represent only 2% of all organic producers.

The highest proportion of organic enterprises running activities in 2010 was engaged in fruit and vegetable processing – 32.4%. Production of other agricultural and food commodities was run by 32.1% of enterprises, whereas production connected with grinding of cereals

Table 1

Area of organic crops, number of farms and processing entities in the system of organic farming in Poland regions in 2010

Region (voivodship)	Area of organic crops (ha)	Number of organic farms	Number of organic processing entities
Lower Silesia	39 781.83	1248	11
Kuyavia-Pomerania	7 661.70	340	13
Lubelskie Region	34 754.60	2013	36
Lubuskie Region	36 376.21	839	5
Lodz Region	7 656.53	436	16
Malopolska	20 908.72	2183	27
Mazovia	44 748.16	2013	47
Opole Region	2 724.09	83	3
Podkarpackie Region	31 950.43	2127	22
Podlaskie Region	42 692.44	2040	6
Pomorskie Region	23 222.19	665	15
Silesian Region	4 443.57	243	13
Swietokrzyskie Region	13 276.36	1255	10
Warminsko-Mazurskie Region	76 768.57	2288	10
Wielkopolskie Region	31 346.57	791	36
Westpomeranian Region	100 215.10	2392	23
Total	**518 527.10**	**20956**	**293**

Source: the data of www.minrol.gov.pl/

Table 2

Structure of organic farmland in Poland in 2010

Crop category	Crop proportion in farmland area, %
cereals	19.6
potatoes	0.4
plants for feedstuff	20.6
legumes	0.9
industrial crops	0.7
vegetable	1.0
meadows and pastures	42.3
orchards and berry crops	13.3
other crops	1.2

Source: Zdrojewska, 2011

was respectively 19.4%. The proportion of tea and coffee processing was significantly lower – 6%, meat – 5.1%, and milk 2.7%.

In the European Union, there were 190 700 organic farms in 2009. They were the most popular in Italy (43000), Spain (25300), and Greece (23700). The area of organic farmland was 8.39 mln ha (Zdrojewska, 2011).

The market of organic food in Poland has been quickly developing with a significant potential. Similarly as in the other European countries, certified organic food has been more and more popular among customers in Poland. In 2010, the value of the market of certified organic food was estimated for 300-350 million PLN. It is forecasted that this market can double within a few years. Increased demand causes that production of organic food has been more and more popular among farms and processing enterprises. The most significant volume of organic food is sold in specialized shops – there were about 400 of them in Poland in 2010. This kind of products has become also more often accessible in super and hypermarkets. In addition, other channels of selling have been developing. The offer of eco-food has been widening, through both specialized as well as general internet stores. However, still accessibility has been insufficient. There are operating a few organic delicatessen chains in Poland. The largest one Organic

Farma Zdrowia SA has 22 shops in nine biggest Polish cities. However, despite dynamic growth and increasing interest of customers, the Polish market of eco-food is still immature. It is confirmed by a very small share of eco-food in the total food market and relatively low Polish customers' expenditures for organic food. Polish customers' expenditures for organic food have still been a few times lower than the expenditures of such European countries as Germany, Sweden, or Switzerland. Moreover, Poles often confuse terms of health, traditional, and organic food with products coming from countryside and they do not appreciate certificates. Nowadays, the certificate with the EU logo proves that a product is organic.

A high price of organic products is a problem of the Polish market of organic food; this aspect is often mentioned in many attempts of research as a main barrier of growth (Luczka-Bakula, 2007). Polish producers of organic commodities declare obtaining of prices higher by 10-20% than prices of conventional substitutes of products (Tyburski, Zakowska-Biemans, 2007). There are some factors that determine higher prices of organic products: undoubtedly higher input, higher quality of these products as well as use of production methods in accordance with requirements of the natural environment.

3. Perspectives of organic food market development

Organic food market development depends to a significant extent on co-financing for both producers, who will decide for a change from conventional farming to organic, as well as co-financing for present organic producers. Of course, increase in the demand for this category of food is an important factor deciding on growth of this market.

Elaboration of the national plan of activities concerning this sector was an advantageous operation for organic food market development. It was prepared by the Polish Ministry of Agriculture and Rural Development and named the Action Plan for Organic Food and Farming in Poland in 2011–2014. The plan was elaborated basing on "The European Action Plan for Organic Food and Farming". The objective of the plan implemented in June 2011 is to determine a set of actions that can contribute to the development of the market of organic products, increase in awareness of customers in the field of organic products, improvement of accessible production technologies and accessibility of information in this area. There are some activities proposed in the document aiming at organization of promotion campaigns of products of organic farming, promotion of organic food (participation in fairs and exhibitions, elaboration of promotion materials), organization of competitions, for example for the best organic farm, tests of knowledge on organic farming, etc. As far as foreign markets are concerned, there are undertaken actions allowing for establishment of business contacts in order to increase sale of organic products abroad.

Development of organic products sale in Poland will be more dynamic, if sales channels become diversified. It is necessary to establish partnerships between organic producers and large retail chains. Increase of organic products' sale in these distribution channels will allow to lower distribution costs and a profit margin; it will result in decrease in prices for final customers and, as a consequence, these products will become accessible for a wider group of customers (Pilarczyk, Nestorowicz, 2010).

Conclusions

1. Organic farming and production of organic food have been dynamically developing. Increase in awareness and the wealth level of the Polish society has been accompanied by increase in interest in organic products.
2. Customers attribute high quality to organic products, appreciate them for tasting values, and stress their positive influence on health. However, the low level of knowledge of organic products' labelling, the certification system, or rules of organic farming are still present.
3. Organic farming is an alternative method of farming for many farmers. It could be a chance of gaining income through sale of health and organic products. Commodities produced without use of chemical substance, preservatives and, what is more, are not genetically modified are searched, especially by a richer part of a society.
4. The data on increase in the number of organic farms and organic processing enterprises confirm the development of the organic products market. To sum it up, it should be stressed that the number of organic farms was at the level of 338 in 2000, whereas in 2011, there were respectively 23500 of such farms. Growth in the number of organic processing enterprises also took place from 55 in 2004 to 293 in 2010. These data prove the thesis on dynamic development of the organic products market in Poland.
5. Significant effort should be taken to ensure accessibility of eco-products for a possible largest part of customers both taking into account an assortment aspect as well as issues of prices and accessibility.
6. The attention should be paid to spreading knowledge about the essence of organic food and advantages that result from its consumption. This kind of knowledge is necessary to avoid confusing products of organic origin with conventional products.

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GAINS OF GRAIN PRODUCERS FROM HORIZONTAL MERGERS IN ZEMGALE REGION

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Abstract. The aim of the present research is to examine the gains of Zemgale region's grain producers from horizontal mergers. The authors selected the cooperative "LATRAPS" as a research object, since it is one of the examples of horizontal merger in Zemgale region. The authors based their research on the analysis of annual reports of 30 farms and the result of a questionnaire survey of 100 farms. It was concluded that the largest gainers from horizontal mergers were farms that farmed an area of 100–300 ha, and their major gains were as follows: a beneficial grain purchase price, a possibility to get premiums for high quality, beneficial prices on fertilisers and plant protection products, and a possibility to have additional services and stability in a long-term.
Key words: farms, horizontal merger, agricultural cooperative
JEL code: Q12, Q13, Q14, Q24

Introduction

Enterprises of the same industry merge into cooperatives to solve the industry's economic problems, which is one of the kinds of horizontal merger. In a horizontal merger, participants of cooperation remain absolutely independent economic entities, as such cooperation is most often limited to meeting the technical and trade requirements of production at each enterprise involved in it. It is similar to the most common mutual assistance among neighbours in rural areas, which is based on mutual gains and does not require making a special contract.

A cooperative is an instrument enabling farms to operate more efficiently, as in this way it is possible to reduce costs and increase the value of a product and competition (Herbert S., 2006; Aneraude B., 2010; Ewell P., 1972; Abrahamsen and Scroggs; 1957; Won W., 2005).

The nature of cooperation, according to various authors is interpreted differently, however, these explanations complement each other. Research on cooperation has been conducted by Kaufmans P., Kaupuss L., Kucinskis J., Miglavs A., Spogis K., Ozolins N., Zids S., Vedla A., et al. (Vedla A., 2000; Karmite L., 2001; Kucinskis J. 2004; Miglavs A., 1999; Spogis K., 1999; Kaupuss L. 2001; Ozolins N.,1998).

However, there is a lack of researches that would show what size farms (in terms of land area) are the greatest gainers from being a member of a cooperative, therefore, the authors set a **hypothesis** – large farms gain more from being a member of a cooperative than small and medium farms.

The authors chose the cooperative of agricultural services "LATRAPS" as the research object. The cooperative was founded on 22 April 2000 and was one of the cooperatives of horizontal merger. Its founders were 12 farms from the municipalities of Dobele and Jelgava. From a company of 12 members, the cooperative "LATRAPS" transformed into the largest grain/rapeseed cooperative in Latvia.

The **research aim** is to analyse the gains of crop industry enterprises from their membership in the cooperative "LATRAPS".

To achieve the aim, the following research tasks were set:

1) to analyse the indicators of Zemgale region's crop farming;
2) to describe the business fields of the cooperative "LATRAPS";
3) to examine the annual reports of 30 farms from Zemgale region.

The following research methods were employed in the preset research: the monographic method, induction and deduction, the graphic method, methods of marketing studies, and the expert method.

Research results and discussion

The sown area, output, and yield of grain in Zemgale, compared with the characteristics of the entire grain industry of Latvia, comprise a very significant share in the total sown area, total output, and yield of grain in Latvia. The data summarised in Table 1 prove it

As Table 1 shows, the share of sown area, output, and yield of grain in 2011 is almost the same as it was in 2009. The stability and significance of Zemgale region's grain industry is also indicated by the grain yield, although it changed from year to year, but in Zemgale region it exceeded the average yield in Latvia (on average 25.8% and even more for every year). An analysis of the grain output in Zemgale region in the period 2009-2011 shows that the grain output decreased by 112.6 thou. tons.

The greatest increase in output was observed from 2006 to 2009, when the sown area of grain sharply increased, which was affected by the increase in the total sown area, the introduction of new technologies (funding of SAPARD and the Structural Funds) as well as favourable climatic conditions.

The cooperative "LATRAPS" unites 624 farms from the entire Latvia. Of these farms, 354 are located in Zemgale region, 109 in Latgale region, 72 in Kurzeme region, 37 in Vidzeme region, and 52 in Riga region.

As Figure 1 shows, the membership in the cooperative "LATRAPS" increased year by year – from 12 members in

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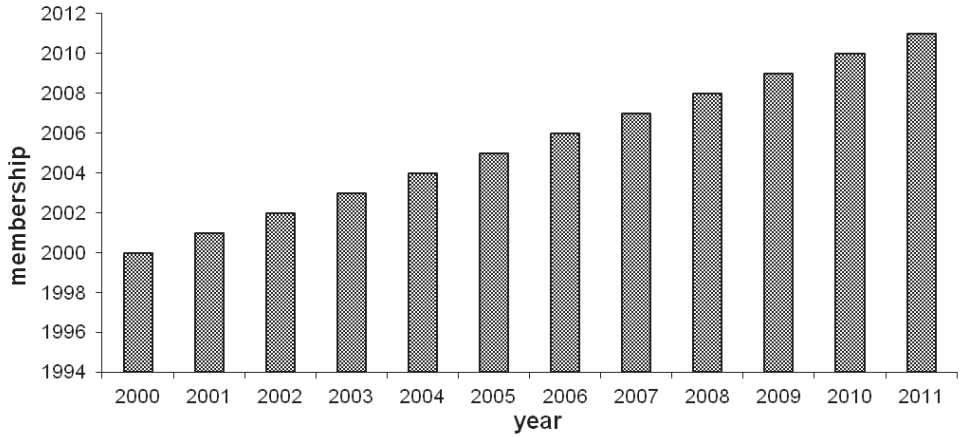
Table 1

Sown area, output, and yield of grain in Zemgale region and Latvia in 2009-2011

Indicator	2009			2010.			2011		
	Latvia	Zemgale	Zemgale/ Latvia, %	Latvia	Zemgale	Zemgale/ Latvia , %	Latvia	Zemgale	Zemgale/ Latvia , %
Sown area, thou. ha	1112.0	172.9	15.6%	1102.7	176. 8	16%	1086.7	169.8	15.6%
Output, tons	1663	677.1	40.7%	1435	614 .6	42.8%	1412	564.5	40.1%
Yield, tons ha^{-1}	30.8	39.2	127.3%	26.5	34.8	131.3%	26.8	33.2	123.9%

Source: authors' construction based on the CSB data, 2011



Source: authors' construction based on the cooperative "LATRAPS" data, 2012

Fig.1. **Changes in the membership of the cooperative "LATRAPS" in 2000–2011**

the year 2000 up to 607 in 2011, which indicates that the farms significantly benefit from their membership in the cooperative.

The cooperative "LATRAPS" expanded from a small company with a turnover of LVL 0.2 million in 2000 to an influential company of agricultural services with a turnover of LVL 56.4 million in 2011. Such a large turnover is made up by the sales of grain/rapeseed and resources for crop production (fertilisers and plant protection products).

The present research author, D. Glusaka, surveyed 100 Zemgale region's farms that were members of the cooperative "LATRAPS". After processing the survey data, it was found out that 25% of the respondents joined the cooperative because they were offered a higher price for their products, while 24% believed in the idea of cooperatives – stable operation in a long-term – as the feeling of security is very essential. Of the respondents, 18% were members of the cooperative because they could purchase resources that were necessary for production, cheaper. For many of the questioned farms (13% of the respondents), the most important was that the cooperative "LATRAPS" provided grain pre-processing and drying services, which was one of the determining reasons why the farmers wanted to be members of the cooperative "LATRAPS".

Over the years, the cooperative "LATRAPS" significantly expanded its activity, and the following additional services were offered for its members:

— supply of necessary raw materials;
— pre-processing and storage of grain and rapeseed;
— sales, including exports, of grain and rapeseed;
— trade of agricultural machinery;
— servicing and the supply of spare parts;
— production of rapeseed oil;
— production of biofuel from rapeseed grown by the cooperative's members.

Based on the data of questionnaires, one can conclude that the farmers used all the services provided by the cooperative "LATRAPS". The percentage distribution is quite similar, which means that every kind of services provided by the cooperative is very important to its members.

To analyse the gains of grain producers from horizontal mergers in Zemgale region, the authors summarised annual report data of thirty crop farms, of which fifteen were members of the cooperative "LATRAPS", whereas other fifteen were not its members. The area farmed by these farms ranged from 150 ha to 528 ha, this range

Table 2

Comparison of the gains of grain producers for farms with an area of more than 300 ha in 2011

Average indicators of farms	Five farms members of "Latraps" - C	Income and expenses, per 1 ha, for farms members of "Latraps"	Five farms non-members of "Latraps" - D	Income and expenses, per 1 ha, for farms non-members of "Latraps"
Farm size, ha	528	1	480	1
Premium to cooperative members for their produce, LVL	9 301	17.61	x	x
Income from grain and rapeseed, LVL	211 398	400.36	184 901	385.21
Total income, LVL	219 741	667.73	184 901	385.21
Expense on seeds, LVL	9 870	18.69	6 360	13.25
Expense on fertilisers, LVL	83 140	157.46	71 693	149.36
Expense on plant protection products, LVL	42 019	79.58	36 211	75.44
Expense on grain cleaning and drying, LVL	21 901	41.48	26 222	56.63
Total expense, LVL	156 930	297.22	140 486	292.68
Profit, LVL	**62 811**	**118.96**	**44 415**	**92.53**

Source: D.Glusaka's construction based on the data of farm annual reports, 2011

Table 3

Comparison of the gains of grain producers for farms with an area of 200 - 300 ha in 2011

Average indicators of farms	Five farms members of "Latraps" - E	Income and expenses, per 1 ha, for farms members of "Latraps"	Five farms non-members of "Latraps" - F	Income and expenses, per 1 ha, for farms non-members of "Latraps"
Farm size, ha	310	1	298	1
Premium to cooperative members for their produce, LVL	1 311	4.22	x	x
Income from grain and rapeseed, LVL	143 511	462.94	116 481	390.88
Total income, LVL	144 822	467.17	116 481	390.88
Expense on seeds, LVL	24 440	78.84	25 410	85.27
Expense on fertilisers, LVL	40 331	130.10	43 490	145.94
Expense on plant protection products, LVL	22 265	71.82	18 453	61.92
Expense on grain cleaning and drying, LVL	9 244	29.82	12 593	42.26
Total expense, LVL	96 279	310.58	99 946	335.39
Profit, LVL	**48 543**	**156.59**	**16 535**	**55.49**

Source: D. Glusaka's construction based on the data of farm annual reports, 2011

is quite large, and therefore, the gains of each farm are different. In order to better assess the gains from membership in a cooperative, the authors classified farms into three groups:

— farms with an area of more than 300 ha – the large farm group;
— farms with an area within a range of 200-300 ha – the medium farm group;
— farms with an area from 150 to 200 ha – the small farm group.

Table 2 presents the average income and expenses of five farms that were members of the

cooperative "LATRAPS" (farms "C") and five farms that were not members of the cooperative "LATRAPS" (farms "D"); the size of all the farms was within the range of 300-500 ha. One can see that the average income per 1 ha of farms "C" was just slightly greater than that of farms "D". A range of the prices offered at other grain purchase sites was not large, as grain prices were set at the commodity exchange; competition for customers among companies was tough, therefore, each of them tried to offer the best price.

Farms "C" sold their grain and rapeseed to the cooperative "LATRAPS" – the price of grain was 130 LVL/ton, and the price of rapeseed was 230 LVL/ton, whereas farms "D" sold their grain to Scandagra Latvia Ltd at 117 LVL/ton and their rapeseed to Linas Agro Ltd at 201 LVL/ton. The cooperative "LATRAPS" offered the best price, and although the price difference compared with other companies was small, a higher purchase price on grain and rapeseed might be regarded as a gain obtained from the cooperative "LATRAPS".

According to the survey, the gains of the large farms from the cooperative "LATRAPS" were different from the gains that were the most important for the small and medium farms. The broad market for sales and the developed logistics, which continued developing from year to year, provided by the cooperative "LATRAPS" were important to the large farms. Therefore, farmers did not have to deal themselves with sales of their grain, as the cooperative "LATRAPS" conducted market studies and sold its products at the best price in the domestic market as well as in foreign markets, which increased owing to the cooperative's logistics system.

In the present research, calculations were made on five farms that were members of the cooperative "LATRAPS" (farms "E") and five farms that were not members of the cooperative "LATRAPS" (farms "F"); the size of all the farms was within the range of 200-300 ha (Table 3).

As Table 3 shows, the average income per 1 ha of farms "E", which were the members of the cooperative "LATRAPS", was LVL 72.29 greater than that of farms "F", while the average cost per 1 ha of farms "E" was LVL 24.81 lower than that of farms "F". Therefore, farms "E" made an LVL 101.10 greater profit per 1 ha than farms "F". This large difference was made up by premiums paid for higher quality grain.

After processing the data of the survey, it was concluded that 21% of the medium farms believed that their greatest gain was a possibility to purchase raw materials needed for crop production at a lower price. The largest gainers were the farms of this particular farm group, as competing companies offered discounts, if raw materials needed for crop production were purchased at large quantities, which was beneficial to large farms, therefore, the small and medium farms gained from horizontal mergers.

Of the owners of small and medium farms, 19% considered a good grain purchase price a significant gain, as it was very important for small and medium farms to sell their products at a certain price, besides, there was a possibility to get a premium for high quality, which was, according to the owners of farms, a very important gain.

Table 4 presents calculations on five small farms which are members of the cooperative "LATRAPS" (farms "I") and five small farms which are not members of the cooperative "LATRAPS" (farms "J") (the area farmed was within the range of 150-200 ha).

An analysis of the data of Table 4 and their comparison with the data of Tables 2 and 4 showed that

Table 4

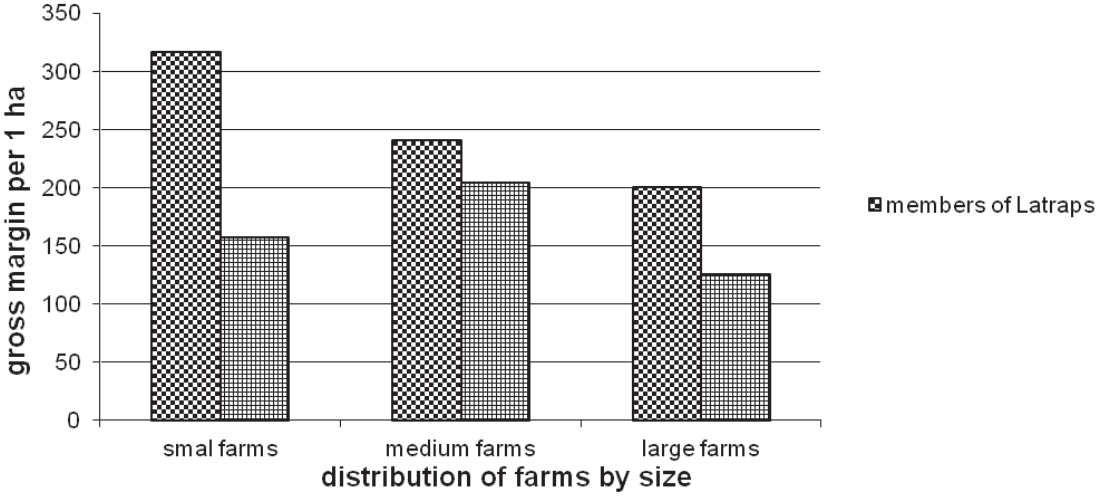
Comparison of the gains of grain producers for farms with an area of 150 - 200 ha in 2011

Average indicators of farms	Five farms members of "Latraps" - I	Income and expenses, per 1 ha, for farms members of "Latraps"	Five farms non-members of "Latraps" - J	Income and expenses, per 1 ha, for farms non-members of "Latraps"
Farm size, ha	150	1	179.5	1
Premium to cooperative members for their produce, LVL	154	1.02	x	x
Income from grain and rapeseed, LVL	74 296	495.31	37 328	207.96
Total income, LVL	74 450	496.33	37 328	207.96
Expense on seeds, LVL	11 713	78.09	0	0
Expense on fertilisers, LVL	10 567	70.45	6 264	34.90
Expense on plant protection, LVL	6 949	46.33	9 115	50.78
Expense on grain cleaning and drying, LVL	2 829	18.86	6 893	38.40
Total expense, LVL	32 059	213.73	22 272	124.08
Profit, LVL	**42 390**	**282.60**	**15 056**	**83.88**

Source: D. Glusaka's construction based on the data of farm annual reports, 2011

the largest gain from grain drying and cleaning services at the cooperative "LATRAPS" was obtained by small farms, which, according to the authors' classification, was from 150 to 200 ha and by medium farms, as mainly such farms did not have their own drying-house, therefore, it was important for them to consider the best offer.

In general, after comparing thirty various farms, the authors concluded that the farms that horizontally merged into the cooperative "LATRAPS" had a greater profit from crop production than the farms that did not join the cooperative "LATRAPS". The key gains of these farms from horizontal mergers were as follows: a higher price of grain purchase, a possibility to participate at



Source: D.Glusaka's construction based on the annual report data of selected farms, 2011

Fig.3. **Average gross margin per 1 ha for member farms of the cooperative „LATRAPS" and farms non-members of the cooperative in 2011**

Table 5

Evaluation of the gains of grain producers from horizontal mergers

Score	Strengths	1	2	3	4	5	6	7	8	9	10	11	12	13	14
10	Beneficial grain purchase price	x	1	1	1	5	6	1	1	1	1	1	1	1	14
1	Possibility to participate at informative seminars	x	x	2	4	5	6	7	8	9	10	11	12	13	14
1	Possibility to use services of an agronomist	x	x	x	3	5	6	7	8	9	10	11	12	13	14
1	Possibility to use accounting services	x	x	x	x	5	6	7	8	9	10	11	12	13	14
10	Possibility to get a quality premium	x	x	x	x	x	6	7	5	5	5	5	5	5	14
11	Beneficial price on fertilisers	x	x	x	x	x	x	6	6	6	10	6	6	6	14
9	Beneficial price on plant protection products	x	x	x	x	x	x	x	7	7	10	7	7	7	14
7	Possibility to get services of grain pre-processing and drying	x	x	x	x	x	x	x	x	9	10	8	8	8	8
6	Good logistics	x	x	x	x	x	x	x	x	x	9	9	12	13	14
8	Large market for grain sales	x	x	x	x	x	x	x	x	x	x	10	12	13	10
4	Quality and fast services of grain collection	x	x	x	x	x	x	x	x	x	x	x	11	13	14
5	Quality and fast servicing	x	x	x	x	x	x	x	x	x	x	x	x	13	14
8	Large capacity for grain collection and storage	x	x	x	x	x	x	x	x	x	x	x	x	x	13
10	Stability in a long-term	x	x	x	x	x	x	x	x	x	x	x	x	x	x

Source: authors' construction

seminars, a possibility to use services of an agronomist, a possibility to get a quality premium, and a better price for grain drying and cleaning services.

A comparison of gross margins per 1 ha for the farms being the members of the cooperative "LATRAPS" as well as the non-members show the gains as well (Figure 3).

D. Glusaka calculated a gross margin per 1 ha (income minus variable cost) for fifteen farms that were members of the cooperative "LATRAPS" and fifteen farms which were not members of this cooperative. As Figure 3 shows, the largest gross margin was observed for the farms being the members of the cooperative "LATRAPS". Besides, this indicator was grater among all the farm groups – small, medium, and large. The present research showed that the largest difference in gross margin per 1 ha existed between the large and medium farms, which were the largest gainers from horizontal mergers; the analysis of annual reports of farms and the survey results also indicated it.

The authors analysed the key gains by means of the matrix presented in Table 5, which was filled in by three experts from among employees of the cooperative "LATRAPS". A summary of the experts' opinions is presented in Table 5.

As Table 5 shows, the experts believed that the key gains were as follows: a beneficial grain purchase price, a beneficial price on fertilisers, a possibility to get quality premiums, and stability in a long-term. According to the analysis of annual reports and survey results, these gains were the most important for the members of the cooperative "LATRAPS".

The lowest score was assigned to the following gains: a possibility to participate at informative seminars and a possibility to use services of an agronomist and accountant, while the other gains were evaluated with a score that was close to the maximum boundary, which indicated that any gain provided by the operation of the cooperative "LATRAPS" was important. Besides, the importance of a gain depended on the size and development level of farms, which was proved by the authors while analysing annual reports and data of the questionnaire survey.

Conclusions

1. In the period 2009-2011, the sown area and output of grain in Zemgale region, compared with the characteristics of the grain industry of the entire Latvia, comprised a very significant share – 123 % and 41 %, respectively, but the average grain yield in Zemgale exceeded that of Latvia by 16 %.
2. The mot important gains of farms from their horizontal merger with the cooperative "LATRAPS" were as follows: a beneficial grain purchase price, a beneficial price on fertilisers, a beneficial price on plant protection products, a beneficial price on grain drying and cleaning services, and a possibility to get quality premiums.
3. According to D.Glusaka's calculations, the largest gross margin was observed for the farms being the members of the cooperative "LATRAPS". Besides, this indicator was grater among all the farm groups – small, medium, and large. The calculations showed that the greatest gains from horizontal mergers were obtained by medium and small farms.

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FACTORS AFFECTING WHEAT BREAD PRICES

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Abstract. Bread prices and the factors affecting them were studied in Latvia within an ESF project*. The research aim of the present paper is to identify the most significant factors affecting bread price fluctuations. The grain market was studied first to find out the most significant factors affecting a bread price. The most significant factors affecting grain prices in the world are weather conditions (which affect crop yields), currency exchange rate fluctuations, speculations on markets of agricultural goods, and political decisions. In Latvia, food-grade wheat prices have increased 2.4 times, while food-grade rye prices have increased 2.3 times from 2005 to 2011. Energy prices continue to increase in the world, which also affects the growth in food prices, including bread. A lot of manual work is used in the process of bread production, which might account, on average, for 37% of total variable cost in bread production. The average gross monthly wage has increased 2 times in Latvia in the period of 2005-2011. Owing to these factors, the retail prices of wheat bread, and rye and wheat bread have increased 2 times in Latvia in this period. After studying the bread prices before 2005, i.e. Latvia's accession to the European Union, one can find that the bread retail prices have had insignificant fluctuations, the range of which was analogous to that observed in Latvia's period of independence from 1925 to 1940. The paper's research **object** is wheat bread price changes affected by the respective factors. The paper's research **aim** is to identify the most significant factors affecting the price of wheat bread.
Key words: bread price, prices of grain, labour costs, affecting factors.
JEL code: L11, L66, R32

Introduction

According to a general theory (Saravacos G., 2008; Kunkulberga D., 2010; Marouli A.Z., 2005), production costs are composed of raw materials (including packaging materials), machinery (equipment), labour, maintenance (including expenses on energy), depreciation, and taxes. In food production, the main raw material is produced on the areas under crops (on farms). The costs of agricultural raw materials may account for 20%-50% of the total food production costs. Prices of agricultural products may differ across various countries owing to government subsidies granted to farmers. With the globalisation of markets, prices of agricultural products may adjust to market prices, and these prices converge among countries.

In the period of 2006-2008, the prices on raw materials, energy (including fuel), and labour and fixed costs sharply increased in the USA (Lambert David, 2010), thus, affecting food prices. The same process was observed in Latvia as well. In 2008, the price of fuel sharply rose in the USA (Mueller S. A., 2011), which affected also the market price of grain in Europe. In general, the world prices of food products rose by 15% in the period of 2002-2008. The costs of transportation increase with the increase in fuel prices. This, in turn, raises food prices. International transport services become more expensive due to the increase in fuel prices (Wilmsmeier G., 2009). If raw materials needed in food production have to be delivered from distant countries, it undoubtedly raises prices of food products. Based on the overall increase in prices of food products, it is important to identify the most significant factors affecting the price of bread in order to identify the most essential risk factors and to know the cost items in bread production that may cause a price increase.

The process of bread production is time intensive, as it takes some time to prepare dough and it may last up to 5-6 hours. After that, baking and cooling down the bread additionally requires 2 hours. Afterwards, the bread is packed or frozen, depending on the purpose of producing the bread. Labour is needed and wages have to be paid to do all these operations,. A lot of manual work is used in Latvia's bakeries, which increases the costs of labour that may account for even 37% of variable costs.

When the bread is baked and prepared for selling, it is necessary to deliver the bread to consumers. Usually, bread production companies have their own transport that delivers bread to grocery stores. Therefore, the sales price of bread is also affected by the transportation costs, which, first, are related with the cost of fuel consumption. As the prices on transportation services and fuel change in the course of time, bread production companies increasingly use services of logistics companies.

A long bread production cycle is specific to rye bread. Wheat bread has a significantly shorter production cycle, which allows current assets to circulate at a faster rate. This leads to greater competition among bread production companies on the wheat bread market. However, supermarkets, too, engage into competition along with traditional bread producers, since wheat bread is baked on the spot and offered still hot at supermarkets. The consumption of bread has decreased by half in Latvia over the recent two decades, besides, the consumption pattern has also changed, as wheat bread replaced rye bread. Therefore, the research object is wheat bread, the role of which has unfortunately increased, although, it is not the healthiest type of bread. The research subject is price changes and the factors influencing them.

The research **object** of the present paper is changes in the price of wheat bread affected by the relevant factors.

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Table 1

Average prices of food-grade wheat in Latvia, LVL/t

Year	January	April	July	October
2005	74	60	63	71
2006	78	74	71	87
2007	97	100	119	165
2008	165	171	150	95
2009	114	111	89*	91*
2010	88*	91*	130*	151*
2011	186*	172*	137*	130*
2012	146*	150*	179*	-

* prices at the European exchanges MATIF/LIFFE (euros converted into lats)

Source: authors' construction

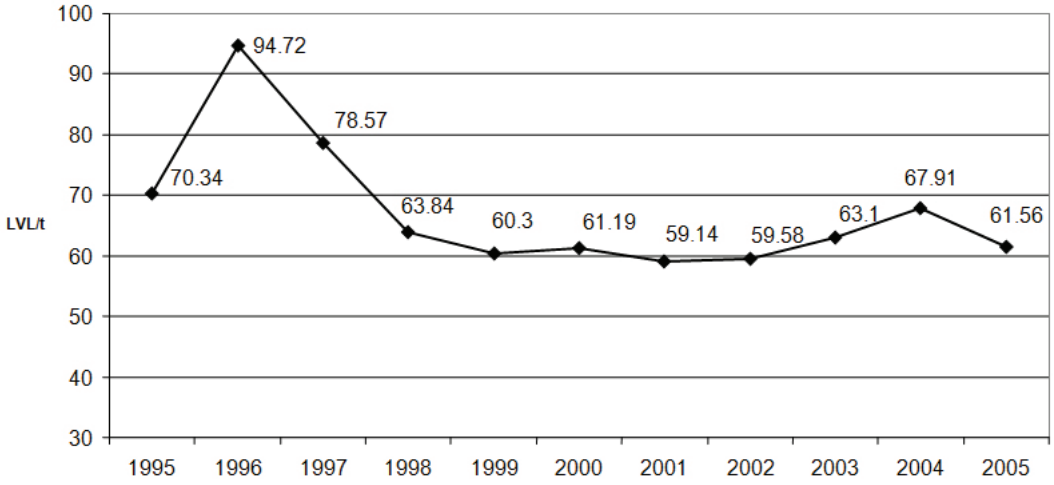

Fig. 1. **Purchase prices of food-grade wheat according to the CSB data**

The research **aim** is to identify the most significant factors affecting the price of wheat bread.

The research **tasks** are as follows:

1) to analyse the prices of food-grade wheat in Latvia;
2) to analyse the prices of energy in Latvia;
3) to assess the gross wage of employees in the food industry;
4) to identify the factors affecting the price of wheat bread.

The monographic method, the abstract and logical methods, the graphical method, and analysis and synthesis were employed in the present paper. Correlation analysis was used to process data and determine the significance level among the factors that affected the price of wheat bread.

Research results and discussion

Food-grade wheat prices and their effect on the price of wheat bread in Latvia

The grain market was first investigated to identify the most significant factors affecting the price of bread. The most significant factors affecting grain prices in the world are weather conditions (affecting crop yields), currency exchange rate fluctuations, speculations on the markets of agricultural goods, and political decisions. One of the political decisions affecting grain prices also in Latvia was the decision of Russia's president in 2010 to ban the export of grain to secure the domestic consumption of grain due to the grain yield decline in Russia by a third in that year. Similar situation emerged also in 2012 related with a drought in Russia, which affected grain yields; thus, one can forecast that the grain prices will increase in Latvia in the near future. The summer of 2012 was rainy in Latvia, which affected the quality of food-grade wheat. Irrespective of the high yield this year, grain contains too much moisture, which has to be removed; it requires large resources and, thus, one can forecast that the food-grade wheat would not meet the quality standard and a part of it would be sold as forage grain. An increase in the price of food-grade wheat in July 2012 already indicated it (Table 1). The analysis of food-grade wheat prices over the previous years shows that in Europe, the price of food-grade wheat rose to EUR 215 (LVL 151) a tonne in October 2010 (Table 1). Since the reserves of grain were not sufficient in Europe, the price of food-grade wheat continued to increase in the beginning of 2011, reaching EUR 265 (LVL 186) a tonne.

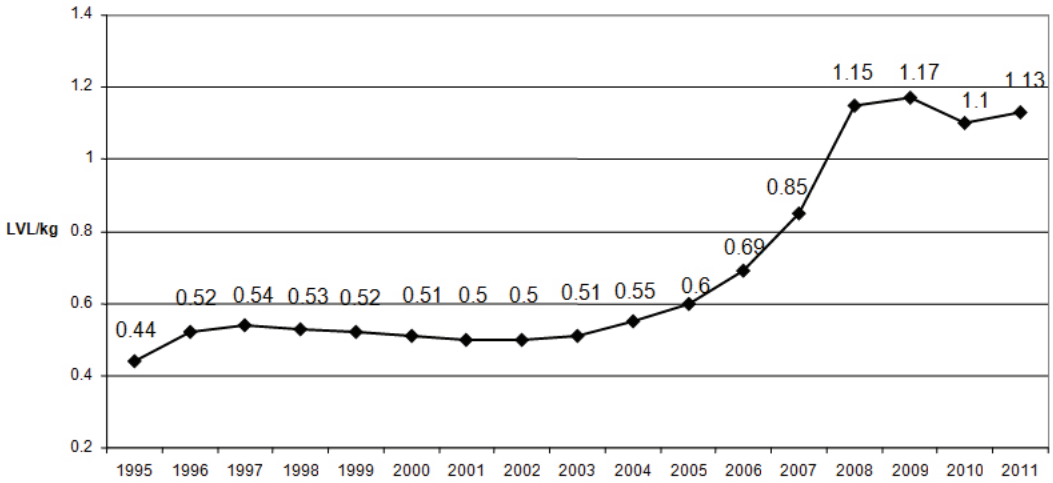

Fig. 2. **Retail price of wheat bread, according to the CSB data**

Table 2

Average natural gas tariff for enterprises, VAT excluded, LVL /thou. nm³

	01.01. 2005	01.01. 2006	01.01. 2007	01.04. 2008	01.10. 2008	01.01. 2009	01.07. 2009	01.01. 2010	01.07. 2010	01.01. 2011	01.07. 2011	01.01. 2012	01.07. 2012
Average tariff	117	123	121	205	286	261	181	166	246	211	232	267	287

Source: authors' construction based on the JSC Latvijas Gaze data

In the autumn 2007, a sharp increase in the price of food-grade wheat was associated with the high purchase price of this grain in the world, as the consumption of grain was high in the world but the output of grain was insufficient (the factor of weather conditions). Regardless of the high yield of grain in Latvia in 2007 and owing to the fact that grain purchase prices are set in accordance with the market conditions in Europe, the food-grade wheat prices did not fell. Based on the trends and seasonality of the previous years, one can forecast that the food-grade wheat prices and the price of wheat bread might reach the highest levels in 2013.

According to the Central Statistical Bureau data, the prices of wheat fluctuated on average from 60 to 70 LVL/t in the period of 1995-2005, which indicates that grain prices were affected only by the weather conditions before Latvia's accession to the European Union (Figure 1).

Following Latvia's entry into the European market, other significant factors have emerged that affect grain prices in Latvia. The demand for wheat increased in the entire world, including the increase in demand in the Asian market. So, the Latvian market has become dependent on the world's markets that are difficult to forecast and affect. Since Latvia has become dependent on decisions of other countries, it is possible to affect Latvia's economic and financial situation, which was observed already in 2010 and 2011 when Europe and the International Monetary Fund determined their terms for Latvia's economic growth.

A time delay is observed if the increase in the price of wheat bread is compared with the trend in prices of food-grade wheat (Figure 1 and Table 1). Already in 2007, there was a sharp increase in the prices of food-grade wheat, which significantly affected the price of wheat bread reaching 1.13 LVL/kg on average in 2011. The price of some sorts of wheat bread reached even 1.50 LVL/kg which was the highest price compared with the previous years in Latvia.

One can calculate an average price of wheat flour based on the increase of grain purchase price by 20% on average raised by grain processing enterprises. This increase of price might reach 25% and more considering the dependence of grain processing enterprises on energy prices. If grain prices fell by 30%, a decrease in the price of flour is only 10%, which indicates increases in other costs. Therefore, the next research object is energy prices in Latvia.

Energy (natural gas, electricity and fuel) prices and their forecast in Latvia

The price on natural gas was again raised on 1 July 2012. Businesses are affected by the increase of price on natural gas caused by an increase in the excise tax rate and an increase in the market price made by the company Gazprom. The prices of 2008 and 2009 were equal to the price of 2012 (Table 2) which was 286 LVL/thou. nm³ on average (VAT excluded), while the average price has been 287 LVL/thou. nm³ (VAT excluded) from 1 July 2012.

Natural gas prices might be very volatile, depending on the prices and resources of oil in the world, since the market prices of natural gas are set based on the price of oil on the market.

Table 3

Electricity tariffs, VAT excluded, for individuals and businessmen, LVL/kWh (for 0.4 kV power lines)

Category of customers	01.01.2004	01.03.2006	01.01.2007	01.04.2008	01.04.2011
Households	0.03814	0.04068	0.04857	0.6762**	0.0880*
Enterprises, average tariff	0.04237	0.04417	0.05140	0.06857	0.08505

* base tariff, as of 1 April 2011, households are charged differentiated tariffs

** start tariff, as of 1 April 2011, households are charged differentiated tariffs

Source: authors' construction based on the LATVENERGO data

Table 4

Average retail prices of petrol and diesel fuel in Latvia in 2005-2012 (February)

	2005	2006	2007	2008	2009	2010	2011	2012	2012/ 2005, %
Petrol (95E)	0.49	0.62	0.65	0.69	0.61	0.74	0.84	0.95	94
Diesel fuel	0.47	0.63	0.63	0.70	0.65	0.71	0.85	0.95	102

Source: authors' construction based on the AA Ireland data

Table 5

Average gross monthly wage of employees in food production by quarter, LVL

Year	Quarter 1	Quarter 2	Quarter 3	Quarter 4	On average a year
2005	172	185	194	205	189
2006	212	227	247	257	236
2007	271	301	315	327	304
2008	349	370	387	372	370
2009	362	362	362	337	356
2010	336	349	357	354	349
2011	350	362	367	370	362
2012	360	373	-	-	-

Source: authors' calculation based on the CSB data

The greatest changes in natural gas tariffs occurred in 2008 when a new methodology for calculating natural gas tariffs based on oil market prices was introduced on 1 October. It caused a hike in natural gas tariffs in the period from the end of 2007 to October 2008 (a speculative market trick that was made after introducing a new project), which was also observed for the prices of wheat grain and wheat bread.

Electricity tariffs have also increased in the course of time (Table 3). The electricity tariffs were also raised during the same period of 2007-2008. It has to be noted that the tariff rose 70% on average in 2008 compared with 2004. The electricity tariffs were raised on 1 April 2011, while natural gas prices were increased on 1 July 2011. In 2012, the electricity tariffs remained at the level of 2011; though, it is possible that these tariffs would increase in the future due to the increase of natural gas prices.

Table 3 shows the average tariff for enterprises, a price reduction of 30% or even more is possible for various connections, power lines, and zones as well as day and night hours.

Fuel prices and their changes in Latvia during the period from 2005 to February 2012 were analysed further in the present paper. According to the data of Table 4, the prices of petrol and diesel fuel have annually risen since 2005, except for February 2009 when the fuel prices fell, almost reaching the price level of 2005. In 2009, the decrease in fuel prices may be explained by the global economic crisis, which influenced the USA as one of the leading market participants on the oil market.

In March 2012, the price of petrol exceeded a level of LVL 1 per litre in Latvia, the price of petrol fell below LVL 1 during the summer months, while in August, it rose again and reached the level of LVL 1 per litre. Latvia's bread producers have to consider the ways of decreasing transportation costs due to the fluctuations of fuel prices. Thereby, bread producers search for companies of transportation services dealing with logistics services. However, there are risks that bread might not be delivered to grocery stores in time, which may affect the consumption of bread. Bread producers can also search for other solutions, for example, purchasing fuel in another country (like Estonia) where fuel is cheaper.

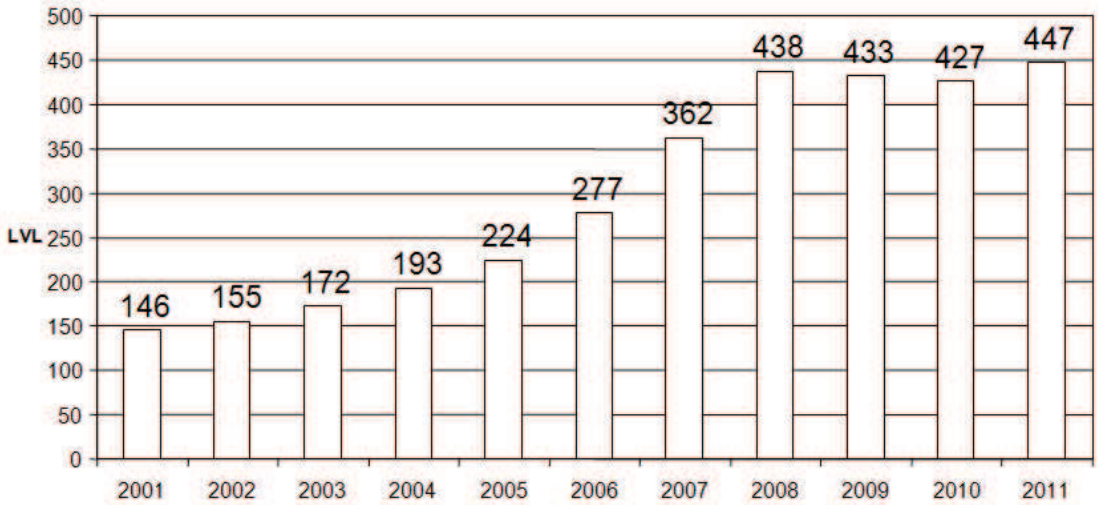

Fig. 3. **Average gross monthly wage of employees in the private sector, LVL (CSB data)**

Table 6

Identification of the factors affecting the price of wheat bread by means of correlation analysis

		Retail price of bread, LVL/kg
Prices of food-grade wheat, LVL/t	Pearson Correlation	0.705
	Sig. (2-tailed)	0.051
Petrol prices, LVL/l	Pearson Correlation	0.731
	Sig. (2-tailed)	0.039
Diesel fuel prices, LVL/l	Pearson Correlation	0.753
	Sig. (2-tailed)	0.031
Natural gas prices, LVL/thou. nm^3	Pearson Correlation	**0.937**
	Sig. (2-tailed)	0.001
Electricity prices for businessmen, LVL/1000 kWh	Pearson Correlation	**0.917**
	Sig. (2-tailed)	0.001
Gross wage in food production, LVL/month	Pearson Correlation	**0.975**
	Sig. (2-tailed)	0.000

Source: authors' calculation

Wages of employees in food production enterprises in Latvia

According to the information of Latvian Bakers Association on bread price formation (cost items), wages of employees is one of the most significant cost items, since baking bread and producing confectionery goods require a lot of manual work. Though, the largest bakeries start increasingly exploit equipment in their bread production process. Table 5 shows the average gross monthly wage in food production where the average gross wage tends to increase. If the average gross wage in food production is compared with that in the private sector, one can see that employees working in food production earn less than those employed in the entire private sector (Figure 3).

The interviews with bread producers outlined that the turnover of employees was not large at bakeries, since a baker as a profession is stable and requires specific knowledge preventing employees from quitting their job. In addition, a wage of long-term employees is higher than the average wage.

The analysis of changes in wages by year showed that the sharpest increase in wages was observed in 2007 and 2008; the same situation was observed with increases in the prices of grain and energy during this period.

Factors affecting the price of wheat bread

The correlation analysis was applied to identify the most significant factors affecting the price of wheat bread. The data shown in Table 6 indicate that the strongest correlations exist between the price of bread and the wage of employees, the price of natural gas, and the price of electricity. The prices of petrol and diesel fuel and the price of food-grade wheat affect the price of wheat bread only partially. Bread producers have stated many times that grain prices have a secondary effect on the price of bread. Bakers use flour in bread

production purchased from grain processors, the flour prices of which are affected by not only grain prices but also energy prices.

According to the result presented in Table 6, one can assert that the wage of employees affects the price of wheat bread in the most direct way in Latvia, since baking bread requires a lot of manual work. The second most significant factor affecting the price of wheat bread is the prices of electricity and natural gas, because ovens run on either natural gas or electricity are exploited in baking bread, and the consumption of energy depends on the output of bread. Regardless of the fact that the key raw material in baking wheat bread is the flour of food-grade wheat, the price of food-grade wheat has no direct effect on the price of wheat bread. Bread producers also state that raw materials account for only 10% of the price of wheat bread.

Conclusions, proposals, recommendations

1. The prices of food-grade wheat has increased 3 times in the period of 2005-2012, while the retail price of wheat bread has grown 2 times, thus,, evidencing significant price hikes during a relatively short period. The price of natural gas has also increased 2.5 times during the same period as well as the prices of electricity and fuel have increased 2 times.
2. The gross wage of employees working in the food industry has increased 2 times in the period 2005-2012.
3. The second most significant factor affecting the price of wheat bread is the prices of electricity and natural gas, as these energy resources are used in bread production.
4. Regardless of the fact that the main raw material in the production of wheat bread is the flour of food-grade wheat, the price of food-grade wheat has no direct effect on the price of wheat bread; it plays only a secondary role. The price of wheat bread changes only in relation with a significant and long-lasting increase or decrease in the price of food-grade wheat.

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PROBLEMS OF COOPERATION IN THE HUNGARIAN AGRICULTURE

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Abstract. The most researchers and economists who deal with this topic believe that the lack of the structure of agricultural sector is the cause of the market problems of domestic agriculture and they call the attention to the maintenance of cooperation. The cooperation, as an organisational form, has a big importance especially in the vegetable and fruit sector, and milk production sector. In addition, it has a tradition in the West-European countries. The cause of this is large transaction costs, which evolve from the specialisation of investments, limited alternative usage, structure of raw material production, and character of the products. In connection with the above mentioned the authors performed an empirical questionnaire examination among the producers and sales organisations of domestic vegetable and fruit sector. Nowadays, 80% of co-operatives of this sector choose an operation form among all the cooperative forms and the explanation of this is not based only on the legislation intent and the regulatory environment but – referring to the above mentioned – on the specialties of this sector. This cooperative operates like the West-European cooperative model, so they do not bear the brunt of the cooperative alteration and they can represent the domestic "new type co-operative" well.
Key words: cooperation, mutual trust, development, quality assurance, bargaining position.
JEL code: Q 130

Introduction

The fruit and vegetables sector plays an important role in the Hungarian national economy and agriculture. The ecological circumstances and producing traditions of this country provide an adequate opportunity for quality in vegetable and fruit production. The fruit and vegetables sector provides the source of living or additional income for thousands of families, and plays an important role in the utilisation of the ecological capability, land production, and local occupation of the rural population (Erdeszne, 2007).

It causes a serious problem for the Hungarian fruit and vegetables producers that they cannot produce products in adequate quantity and quality due to the atomistic production and the wide range of grown species (Popp et al., 2009). The POs with adequate membership can supply the market an effective volume of the products, which provides them better position at bargaining and through this; it means a higher income for the producers.

It can be stated that on such area where no PO functions, the marketing is much disorganised. In general, 65% of the Hungarian producers try to sell their products on their own, while 15-16% of them sell the products through a PO. Beside this, 16% prefers the marketing contract, while 4% - the production contract (Popp et al., 2009).

The POs make the procedure of selecting, assorting, grading, storing, marketing, and processing of the produced products. According to Magda (2010), beyond these functions the procurement of immaterial, intellectual, material, and service circumstances needed by the horticultural production would be also very important. These circumstances include common consulting services, postgraduate courses, professional trainings, and coordination of services of biological plant protection, growing transplants or its coordination. In total, 5-20% price allowance can be achieved by the wholesale procurement.

Based on the data collected by Dorgai (2010) in 2007, 67.5% of the sales relate with fresh-marketed products. Approximately 50% of these fresh-marketed products were sold through retail chains, 42% were sold to wholesale dealers and through wholesale markets by the POs. Only 3% were marketed through retailers. The producers themselves are very vulnerable without a marketing background, which is the main reason for being a member of a POs. As the POs dispose big product volumes, they can be a proper partner to contract with the hyper- and supermarket chains. The POs can achieve a better position at bargaining, though, this is not true in practice since the retail chains take advantage of their superiority in bargain potential and they do not pay according to schedule, buy the fruits and vegetables at a depressed price.

The aim of this article is to highlight those problems, which are the main barriers in the way of development of the cooperation and to determine the relating challenges in the Hungarian fruit and vegetable sector based on the domestic professional literature and empirical studies.

Materials and methods

This article is based on the results of two surveys and the critical proceeding of the relevant professional literature. The first survey was carried out in 2009 and the second - in the spring of 2012. The authors divided the questionnaires into four main parts. Questions on the general characteristics of the POs were asked in the first

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Table 1

Changes in the production value of the producer's organisations and the fruit and vegetables sector (2004-2010)

Characteristics	2003	2004	2005	2006	2007	2008	2009	2010
Production value of the fruit and vegetables sector (million HUF)		259 613	151 012	182 558	178 733	216 676	201 578	195 934
Total number of Producers Organisations and Producers Groups	69	101	77	64	48*	48*	48*	45*
Production value of the POs and PGs (million HUF)	22100	26 188	23 548	28 717	29 477	39 107	36 842	38 243
- *production value of the certified POs (million HUF)*		*10 489*	*9 048*	*10 518*	*11 338*	*16 386*	*32 510**	*31 487*
- *production value of the PGs and the temporarily certified POs (million HUF)*		*15 699*	*14 500*	*18 199*	*18 139*	*22 721*	*4 332*	*6 756*
Proportion of the POs and PGs of the total production value of fruit and vegetables sector (%)	**13.0**	**10.09**	**15.59**	**15.73**	**16.49**	**18.05**	**18.28**	**19.52**
Land covered by POs (ha)	25139	25 640	26 122	29 550	34 982	35 000	37 089	no data
Total membership (head)	13450	23 980	20 514	20 494	20 177	20 000	20 605	no data

* *Only the number of POs*

** The value of marketed production of the POs increased at such a high rate and in parallel the number of PGs declined so much because in Quarter 4 of 2008 the majority of the former PGs received the certification and PO status

Source: National Strategy completed with the data provided by the Department of Agricultural Market of the Ministry of Rural Development

part. This part was followed by questions in connection with the investments; the third part was related with marketing, and the fourth – with the future plans and prospects for the development. The authors changed the questions a little bit based on the experiences gained from the previous survey but essentially the questionnaire remained the same as concerned the structure and the content at the time of the second survey. The first questionnaire was sent to the POs addresses given in the list found on the current website of the Ministry of Rural Development. The second questionnaire was sent to the addresses of the POs given in a list to the attachment of the decree 97/2011 MVH. This latter list provided the authors with the data and information about 42 POs.

In the case of the first questionnaire, the authors sent questions to 48 organisations. The authors chose the traditional postal form of sending with a self-addressed envelope containing the questionnaires. The authors also interviewed the chairman of the organisation called BOTESZ. The willingness to answer was 29% in the first case, while this proportion was 28% in the second survey. These are very good indicators in the case of traditional form of posting.

In the evaluation of the results beside the above mentioned, the authors took into consideration the main statements and conclusions of the study made by FRUITVEB (the Hungarian Fruit and Vegetables Interprofessional Organisation) and the findings of a summarising report made on the basis of another empirical research.

Research results

Changes in the number of Hungarian POs and their most important characteristics

The number of the Producers' Organisations exceeds 100 in 2004, while only 65 operated in 2009 of which 48 were certified (Table 1).

Regarding the spatial distribution of the POs, it can be seen that two-thirds of them are located in the regions of the South Great Plains and North Great Plains, where 67% of the total vegetable growing area is situated on the South Great Plains and in addition 89% of the forcing lands coordinated by POs can be found in Csongrad county (Figure 1).

Main results of the empirical research

In the following paragraphs, the authors focused only on the most important, maybe the most interesting results of their surveys and the two above-mentioned empirical pieces of research.

Despite the fact that one part of the surveyed organisations are not operating in a form of cooperative, it is important to emphasise that this is the general form of operation. At the date of the first survey, 79% and at the date of the second survey, 75% of the responding organisations chose the form of cooperative as the form for operation. There are strict regulations in connection with the democratic participation of members in the governance of the organisation if the PO initially chooses the form of corporation (nobody can have more than 30% of the votes). As a consequence of this rule, the

Explanation: The grey points show the location of the preliminary certified POs and the black points show the location of the finally certified POs.

Source: Andras Molnar based on the data provided by the Ministry of Rural Development

Fig. 1. **The location of the producers' organisations (January 2010)**

organisations choosing the cooperative form are very similar to those which operate as corporation.

At the time of the first survey 83% of the operating POs worked as a cooperative and 17% of the POs chose the form of limited liability company. At the time of the latest survey, similarly to the previous survey 83% of the organisations worked as a cooperative and 12% chose a form of the limited liability company, while 5% chose a form of the private incorporated company.

The establishment of the mutual trust means a serious problem between a member and the organisation. At 80% of the responding organisations, the supplying of data caused problems in the relation between the organisation and the members. This is problematic in both ways because neither the members give true information about their production and marketing nor does the organisation feed back enough information needed by the farmers to produce and plan. The situation has not changed in 2012, because the supplying of data caused the biggest problem in the relation between the organisation and the members also in that year. No problem emerged in the field of marketing in the case of the most organisations in 2009, while in 2012, 50% of the organisations had problems in this area. The same can be said about the problems in connection with the quality, because this field caused problems to 25% of the organisations only in the time of the second survey.

The sector needs investments in the field of technology and engineering. To improve the competitiveness of the vegetable sector the rise of the forced land size would be very important. The modernisation of the orchards (plantation) is the most urgent task in the fruit sector. The surveyed organisations outlined the three most important areas from the point of the performed investments - technological improvements, modernisation, marketing, and quality assurance. The most investments connected with the field of technological improvements and modernisation are the cases of both surveys. Marketing received a bigger emphasis at time of the second survey because 50% of the organisations invested in this field, while only 21% developed this area between 2006 and 2009. There was a positive change in the area of quality assurance because in the case of the first survey this field had no importance at all. Only one organisation out of 14 had investments in this field, while more than two-thirds of the organisations invested in quality improvement in the latter years. After their establishment, the organisations used their resources to buy wrapping and refrigerating instruments and tools; thus, there is no lag in this area as compared with the more developed EU countries.

It is important to mention that the lack of capital and the inability to provide the needed self-financing were thought to be the most obstructive factors in connection with investments in the cases of both surveys. The Fruitveb (2009) also mentioned in its study that the biggest recent problem of the producers' organisations was the lack of current assets, which influenced the payments for producers very adversely. The authors of the study added that the most of the POs suffer from the lack of capital the cause of which is mainly rooted in two things. On the one hand, the members struggling with the lack of financial resources cannot bear the refilling of the organisations' funds with remarkable contributions and on the other hand, in the case of most Pos, the lack of assets or the mortgaged estates mean the most significant obstacle in the case of credit provision. From the aspect of the producers, the shorter paying deadline

and the paying security stand before everything and only after the fulfilment of these obligations there is sense to speak about the benefits and services as positive influencing factors of the membership's loyalty.

In spite of that, the specialised product scale is characteristic to one part of the organisations, they plan to introduce a wider range of products to reduce their vulnerability. Besides there are some organisations operating, which think that the possibility for growing their competitiveness lies in the specialisation and the narrowing of the range of produced products. Favourable processes started in connection with the size of the integrating organisations, specialisation, and concentration but one can still speak about relatively small POs.

In the study of the Fruitveb, the problem of trust between the POs also emerges as a barrier in the forming of the secondary organisations. The POs have a fear for their markets characteristically and the choice of the financing form and degree of the common organisation/ enterprise also creates a very hardly solvable conflict.

It turned out during an interview made with the leader of an organisation that in spite of the decreasing number of the members the circle of the producers became stable, which means a basis for long-term cooperation. The POs are an opportunity for those producers who are able to produce quality products but they have limited marketing opportunity. This statement was underpinned by the study of the Fruitveb, according to which the members regard the creating of the marketing stability and the establishing of the marketing connections as the most important tasks of the POs. Beside this, the takeover/ acceptance of the quality products is a very important factor among the marketing conditions (Fruitveb, 2009).

The most important partners of the organisations were the processing industry in the time of the survey of 2009, and this was followed by the multinational retail chains and the wholesalers. By 2012, the situation was changed in that the retail chains became the main marketing channel (58%), and it was followed by the processing industry and wholesalers.

It is underlined in the connection between the retail chains and the POs that the low prices and the acceptance as a supplier were regarded as the hardest requirements set by the chains. Beside the above mentioned, the chains require the application of some relevant standards and the performing of auditing.

The POs find the basis of the successful operation in: the stronger integration, the quality assurance, professional advising service, organising of events, starting newsletters, improving of the production technology, common procurement of the raw materials, inputs, and common insurance. Majority of the POs would put more emphasis on the professional advising in the future.

Conclusions and recommendations

The first organisations were established by fruit and vegetables merchandisers by the integration of some of their former suppliers and their own enterprises. The advantage of this type of formation was that the merchandisers had the basic market background and connections. However, there was no producer's control and the aim of the establishing of these organisations was only to get the subsidies. So, at the time of the EU accession, when the conditions of getting subsidies became stricter, their number reduced significantly as a consequences of termination of their activity or bankruptcy procedure.

After all this, only few producers could be convinced to be the members of the organisations again; however, the improvement of the market share of the POs would be favorable also for the producers. Because the modern marketing channels come into the foreground nowadays, it is interest of the producers to cooperate to get into stronger bargaining position. Without this it is hard to make a reliable prognoses among the daily changing supply-demand and price conditions. All the phases of the supply chain are risky and this risk can be hardly avoidable by the producers on their own than by a distributor.

The POs can provide an opportunity to those producers who are able to grow quality products on their own but they have limited marketing tools. This was underpinned by that, according to the study of Fruitveb, the members regard the establishment of marketing security that is building of marketing connections as the most important task of the POs. Among the marketing conditions, the acceptance of the proper quantity of the products is a key element (Fruitveb, 2009).

It can be said from the Producers' Organisations point that the malfunction of the proper information stream and the lack of mutual trust still cause the main problems. In addition, the cooperation between the producers and the POs is made harder by the fact that the producers going against the requirements do not give in all of their harvested products so the product funds of the POs would be smaller. Therefore, the POs buy products from outsider domestic and foreign producers to retain the market and to increase the supply and they do not indicate the origin of these products on the wrapping.

There are still not enough punitive sanctions against the producers violating the rules, however, this would be very important to reinforce the trust toward the POs. Because of the lack of a central database, the dismissed members can reenter easily to the system and the double membership just like the membership established to gain tender points are also very usual. The eliminating of these drawbacks would be very important in the future (Eruditio, 2012).

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"ECONOMIC SCIENCE FOR RURAL DEVELOPMENT"

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FINANCE AND TAX

COMPARISON OF THE TAXATION SYSTEMS OF THE BALTIC COUNTRIES

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Abstract. Taxation has always been a topical issue, which undergoes continuous change and improvement. Taxation impacts all the important measures of the national economy and every resident of a country, therefore the establishment of an effective and simple taxation system that would ensure the development of the national economy, the welfare of people and revenues to the central budget is very important. In the course of forming the taxation system, every country has to think not only about gaining bigger revenues from taxpayers, but also has to be able to protect its country against squandering, to think about the encouragement of the competitiveness of the country, the attraction of investment, the development of the business environment, and the promotion of people's welfare. The goal of this study is to compare the taxation system of Latvia with the taxation systems of Lithuania and Estonia, to identify the factors influencing it, to analyse the changes of the Baltic countries taxation systems implemented during recent years, and find out what experience could be taken over by Latvia.
Key words: taxes, the principles of taxation, tax discipline, tax evasion
JEL code: H20

Introduction

Globally, there are different models of taxation systems, which are different as to the principles of operation and the implementation mechanisms. However, it is impossible to recommend the copying of any of them and its application to the conditions of Latvia, where there is high unemployment, a huge state administration with disproportionate expenditure and large procurements, bad roads, low wages and high prices, enormously expensive projects, and irresponsibility of the resolutions adopted at the government level.

The hypothesis of the research: if Latvia uses the proper taxation principles and effective tax system elements of Lithuania and Estonia, then unemployment rate and illegal economy would decrease but the business environment would improve.

The **aim of research** is to explore tax systems of the Baltic States, to evaluate how taxation principles are enforced in the Baltic States, and to present proposals for improvement of Latvia tax system.

The tasks of the research were set in order to achieve the aim: 1) to analyse the directions of tax systems development in the Baltic States; 2) to explore the tax discipline in Baltic.

Generally, the national taxation (fiscal policy) has a huge role in national economy both for encouraging the economic growth and for ensuring a balanced economic growth and the national financial stability. An effective taxation system should be based on the correct taxation principles, which were initially defined by A. Smith and later systematised by the German financier A. Wagner (1835-1017) as follows: 1) financial principles; 2) the principle of the national economy (the mix of the types of taxes); 3) the principles of ethics and fairness; 4) tax management principles; 5) balanced split of taxes - taxes have to comply with taxpayer's income; 6) the certainty of taxes - clarity as regards the amounts and terms of payable taxes; 7) collection of taxes at the most convenient time; 8) the shift of the tax burden to the net income - the net profit should be subject to taxation rather than the capital; 9) cheap collection of taxes - the least possible expenditure for collecting taxes (Ketners K., Lukasina O. 2008).

Research methods used in the paper are as follows: monographic, statistical, questionnaire survey, and the logical and constructive methods.

The taxation principles that were systematised in the 19th century are valid also today. A country can use taxation for either developing or hindering its economics and business. The taxation system of each Baltic country has its own specific features, which are determined by social economic differences, mentality, and the national tradition.

Research results and discussion

1. Directions of the development of the taxation systems in the Baltic countries

In the course of building their taxation mechanisms, the Baltic countries have different approaches to the issues regarding the tax burden on legal and natural entities, the taxation policy compliant with the structure of manufacturing and households, the taxation base, tax rates, tax relieves, etc. The analysis will first focus on the ratio of taxes of the Baltic countries to the GDP and the evaluation of factors influencing these indices.

In Latvia, the highest tax burden was in 2000. The evaluation of the development over several years reveals that the lowest burden was in 2007 and started to increase again as of 2008. The total tax burden (inclusive of social insurance contributions) *in Latvia* reached the level of 29.8% in 2010, and this is considerably below the mean level of the EU (35.6%). The above figure is the

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Table 1

Ratio of taxes in the Baltic countries during the period of 2000 - 2010 (% of GDP)

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
LATVIA	30.9	29.8	29.4	29.0	3.2.	27.5	27.0	25.3	25.6	28.7	29.8
LITHUANIA	31.5	29.8	29.2	27.9	27.6	27.2	27.2	26.0	26.6	30.9	29.0
ESTONIA	31.9	31.1	31.2	30.6	30.2	29.2	27.6	27.1	29.5	38.5	36.8

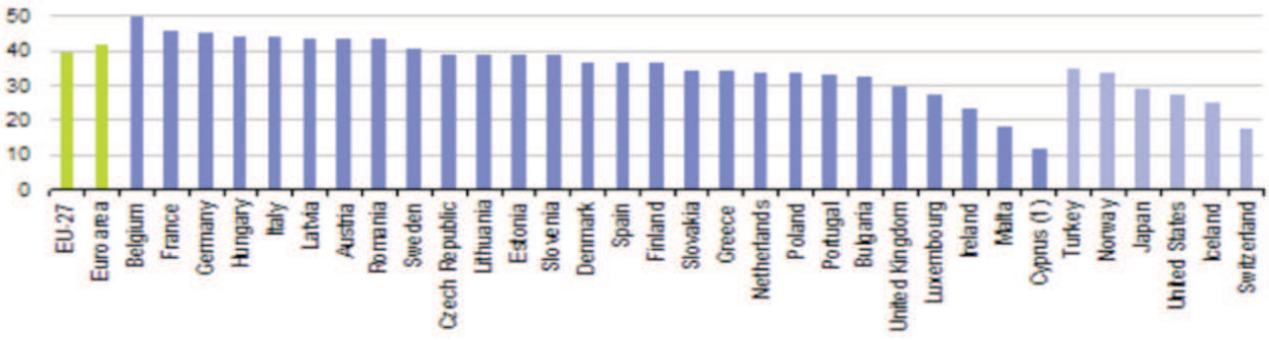
Source: Eurostat, Statistical books...,2012; Revenue Statistics...,2008; FM, Valsts budzeta paskaidrojumi,2012

Table 2

Earnings in the business economy in the Baltic countries from 2000 to 2010
(mean annual gross earnings of a full-time employee) EUR

Country	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Latvia	3247	3426	3523	3515	3806	4246	5211	6690	8676	8728	8596
Lithuania	3591	3726	4046	4195	4367	4770	5543	6745	7398	7406	7234
Estonia	3887	4343	4778	5278	5658	6417	...	...	10045	9492	9712

Source: Earnings in the business economy..., 2010



Source: Tax rate on low wage earners..., 2010

Fig. 1 **Tax rate applicable to low wage earners - the labour tax burden in 2010 (%)**

third lowest index in the European Union after Lithuania and Romania.

In Estonia, the tax burden (inclusive of social insurance contributions) in 2010 amounted to 36.8%, it was above the level of the pre-crisis years, however, below the level of 2009, and it proves the recovery of the economics to some extent. In 2009 and 2010, tax revenues were influenced by the increase of the VAT rates and the excise tax. Temporary measures, for example, postponement of contributions to the second pension tier, slightly increased the tax burden as regards year 2008. In 2010, the tax burden is Estonia was close to the mean level of the EU-27 (35.6%) (Eurostat, 2012) and it was considerably above the level of other Baltic countries.

In Lithuania, the lowest total tax burden (inclusive of social insurance contributions) was in 2010 and amounted to 29.0%. In comparison with the two other Baltic countries, the Lithuanian tax burden is close to that of Latvia (29.8%) and 7.8 percentage points below that of Estonia (36.8%).

The above-mentioned findings lead to the conclusion that Estonia has the highest tax burden among the Baltic countries. The further analysis will focus on the factors that could have most impact on these indices. Gross wages in business sector is one of these factors.

The data in the Table give evidence that the highest earnings in the Baltic countries are found in Estonia. Up to 2007, the lowest earnings were in Latvia, whereas since 2008 the lowest earnings were in Lithuania. According to the Eurostat data, the minimum wage in Lithuania is slightly lower than in other Baltic countries (Minimum wage statistics..., 2012). In addition, average hourly labour costs in the business economy do not differ a lot among the Baltic countries in 2009 (Average hourly labour costs..., 2010). The tax rate applied to persons with low wages presents another factor, which may influence the tax burden of residents.

According to the Eurostat data, Belgium has the highest tax rate applicable to low wage earners among the EU countries, whereas the tax rate of Latvia is highest and the tax rate of Estonia is lowest among the Baltic countries.

Tax revenues are influenced also by the demographic situation in Latvia. Emigration from the Baltic countries alongside with the decline of the economic conditions

Table 3

Minimum monthly wage, poverty risk threshold and the minimum consumption basket in Latvia during the period from 2005 to 2011, LVL

	2005	2006	2007	2008	2009	2010	2011
Minimum monthly wage	80	90	120	160	180	180	200
Poverty risk threshold/ average	77.1	88.7	117.25	169.10	191.6	158.78	146.8
Minimum consumption basket/ December	109.8	121.8	143.0	168.0	162.7	168.8	172.3

Source: At-risk-of-poverty..., 2012; Iedzivotaju ienemumi ...,2012

should be mentioned as an important factor. According to the official data, approximately 6.3 thousand people emigrated from Latvia in 2009, although more than 15 thousand people from Latvia have been registered in Great Britain during a year, and this is twice as many as in 2008. Usually, highly qualified employees and young people choose to search for jobs elsewhere, and this factor deteriorates the quality of human capital in the Baltic countries. The comparison of the Eurostat data during the period from 2003 to 2012 allows concluding that the population of Estonia amounted to 1.339 million in 2012, and it was 1.3% below the level of 2003, whereas the population of Lithuania was 3.007-million, which is 13.1% below the level of 2003. The population of Latvia was 2.331-million in 2003, and since 2003, the number of population has decreased by 12.4%. In 2012, it reached the level of 2.041 million (Demographic balance …, 2012). Lithuania and Latvia experienced the highest decline in the number of population during the reviewed period, whereas the negative development of the population is not so very pronounced in Estonia. Latvia is losing the people who could establish new companies and jobs. Moreover, tax revenues depend on the above processes. The taxation system influences also the welfare level.

At the accession to the EU, Latvia took over its practice as regards the assessment of the poverty risk index and other indices. In the EU, poverty is defined as insufficient income and resources due to which a person's standard of living is below the generally accepted level in the relevant community. In Latvia, the poverty risk index is defined as the proportion of people (percentage) whose equivalent available income is below 60% of the median of the national equivalent available income.

According to the provisional data of the survey "European Union statistics on income and living conditions (EU-SILC)" summarised by the Central Statistics Bureau (CSB), 425 thousand or 19% of people were subject to the relative poverty risk in this country in 2010 (Ekonomiska krize ..., 2012). The poverty risk index was 19% in 2004; 23% in 2005; 21% in 2006; 26% in 2007, and 26% in 2008 (Ekonomiska krize ..., 2012). The average EU index was 16%. Similar, although slightly better indices than the one of Latvia are reported by Lithuania, Estonia, Greece, Spain, and Italy. The thresholds of poverty risk differ across countries because the incomes of people differ. For example, in the Netherlands a person would be subject to the poverty risk if he/ she earned 685 LVL per month, whereas in Slovakia the corresponding threshold would be 168 LVL per month.

Based on the Eurostat data, it has been assessed that 16.3% of the EU-27 people were subject to the poverty risk in 2009. The above proportion, which has been calculated as the average weighted value of the results by countries, differs a lot in different countries. According to estimations, in the four EU Member States, i.e. in Latvia (25.7 %), in Romania (22.4 %), in Bulgaria (21.8 %), and in Lithuania (20.6 %) the poverty risk refers to more than one fifth of the people (Nabadzibas riska …, 2011). Gini coefficient can be used for identifying the welfare level of people. It varies from zero to 100. Gini coefficient equals zero in case of absolute equality of income (i.e. all the people have the same income), and the closer it is to 100, the higher is the inequality of income. At the global level, Gini coefficient fluctuates from approximately 0.232 in Denmark to 0.707 in Namibia. In 2010, the Gini coefficient in Latvia equalled 0.352 or 35.2% (Dzini koeficients, 2012). In 2011, the Gini coefficient in Latvia – 37.7% was above the relevant indices of Estonia (34%) and Lithuania (36%) (Baltijas valstis, 2012).

According to the survey of 2008, the Gini coefficient in Estonian was very close to the average European coefficient and maintained a relative stability in this respect, still displaying a trend towards a slight increase of the inequality. The attitude towards the manifestations of poverty in the relevant country by people of Latvia, Lithuania and Estonia differ. In Latvia, 88% of people consider that the poverty is widespread in the country, whereas in Lithuania this index is 79%, and in Estonia – 73% (Special Eurobarometer ..., 2010). The comparison of available statistical data in Latvia from the social point of view follows.

If an employee's minimum wage amounted to 200 LVL in 2011, and there were no dependants, the net pay amounted to *LVL 144.75* (200 LVL - 11%VSAOI [mandatory social insurance contribution] - 25% IIN [Personal Income Tax]), and the threshold of poverty risk amounted to LVL 146.8 according to the Eurostat data. The minimum subsistence level income in Latvia amounted to LVL 172.3 in 2011, i.e. the minimum required for a person to live.

According to the statistical data, the number of employed persons amounted to 787 017 as in January 2012, and the minimum wage was paid to 196 133 employees or 27.1% of the total number of employed persons (Darba samaksa, 2012). The number of retired persons equalled to 581 864 in the last quarter of 2011, an average monthly old age pension amounted to LVL 177.34 (Pensionaru skaits …, 2012). This means that Latvian pensioners receive the minimum consumption basket for all the years they have worked and paid taxes. According to the statistical data, 4% of pensioners receive the pension below LVL 100, whereas 18% receive from LVL 100.1 to

Table 4

Tax revenues in the central budget of Latvia from 2000 to 2012, % of GDP

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
	30.9	29.8	29.4	29.0	3.2.	27.5	27.0	25.3	25.6	28.7	29.8	28.0	28.1
Direct taxes	18.0	17.7	17.8	17.0	17.3	16.9	18.3	17.8	18.5	16.5	16.3	16.8	16.6
Indirect taxes	12.6	11.8	11.3	11.7	10.7	12.3	13.4	11.5	10.4	10.3	10.6	11.0	11.3
Other taxes	0.3	0.3	0.3	0.3	0.2	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2

Source: FM..., 2000-2012

Table 5

Tax revenues in the central budget in Lithuania from 2000 to 2010, % of GDP

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Tax revenues, including	31.5	29.8	29.2	27.9	27.6	27.2	27.2	26.0	26.6	30.9	29.0
Direct taxes	8.4	7.8	7.4	7.9	8.7	9.0	9.5	9.2	9.3	6.0	4.7
Indirect taxes	12.5	12.2	12.4.	11.7	11.2	11.3	11.4	11.9	11.8	11.8	12.1
Social contributions	9.3	8.9	8.6	8.5	8.3	8.1	8.4	8.5	8.9	11.6	10.4

Source: Eurostat ..., 2012

LVL 150, and 54% receive from LVL 150.1 to LVL 200. Accordingly, 76% of pensioners live on the minimum consumption basket. Moreover, if the pension exceeds the threshold of LVL 165, the personal income tax is applied (LM ..., 2012). A very strange situation emerges when the "fat years" return as regards the management boards of companies, although Latvian people are facing poverty.

It can be concluded from the above mentioned that poverty problems are not being solved in Latvia. Despite the high tax burden in Estonia, there is no emigration from this country; the average wage is much higher in Estonia than in Latvia, and the tax burden on Estonian people with low income is much lower than in Lithuania and Latvia. In addition, Gini coefficient in Estonia is much lower than in the other Baltic countries.

In Latvia, there is negative attitude towards the existing taxation policy and the system of taxes mainly because the distribution of taxes is not uniform, thus the principle of uniformity is not applied. When a decision on the increase of tax rates or expansion of the taxable base is taken, it is necessary to consider performed studies and figures in detail. A taxation system should encourage people to engage in economic activity and to earn a wage above the minimum subsistence level income, and the poverty risk cannot be above the minimum subsistence level income as it is revealed in the Table.

2. Analysis of particular taxes in the Baltic countries

In the Baltic countries, the taxation system consists of two types of taxes, i.e. direct and indirect taxes. Taxes can be used for exercising a direct impact upon people's income and the purchasing ability of people. Indirect taxes are defined as a percentage added on top of a price or absolute amounts. A buyer pays the tax, which is included in the price and gives it to the seller, and the seller transfers the tax to the budget. A mediated link is established: a tax is actually paid by a buyer, and it is transferred to the budget by the seller.

The total tax revenues of the central budget amounted to 3 881.1 million LVL, which is by 439.9 million LVL or 12.8% above the level of the year 2010. The actual performance in the year 2011 exceeded the plan by 167.3 million LVL or 4.5%. In 2011, the total tax revenues of the central budget accounted for 28.0% of the estimated GDP (FM ..., 2012). The assessment of tax revenues reveals that the estimated tax revenues do not correspond to the actual tax revenues. This problem applies to almost all types of taxes. The authors consider that this problem emerges because insufficient analysis is performed before increasing or decreasing of tax rates when resolutions are adopted at the government level.

The state social insurance contributions, the revenues of the personal income tax and the corporate income tax account for the majority of the revenues of direct taxes. The social insurance contributions present the biggest tax from the point of view of revenues.

In Latvia, the value added tax (VAT) and excise tax revenues account for the majority share of the revenues from indirect taxes. The VAT revenues present an important source of revenues of the basic budget, and in 2011, they accounted for 50.9% of the tax revenues of the central basic budget (FM..., 2012). In 2012, the major consolidation measures in the central budget in Latvia were as follows: a 15% increase of the tax rate for gambling, gambling machines, and gambling tables; an annual increase of the rate of the financial stability duty from 0.036% to 0.072%; and the expansion of the VAT base. Moreover, the taxable base of the property tax was expanded by including auxiliary buildings, parking lots, houses, and land plots that were owned by religious organisations, yet, not used for religion related purposes.

In 2012, the Law on Declaring the Material Status and Undeclared Income of Natural Entities adopted at

Table 6

Tax revenues in the central budget in Estonia from 2000 to 2010, % of GDP

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Tax revenues, including	31.9	31.1	31.2	30.6	30.2	29.2	27.6	27.1	29.5	38.5	36.8
Direct taxes	7.7	7.2	7.5	8.0	7.9	7.0	7.1	7.4	7.8	7.6	6.3.
Indirect taxes	12.3	12.3	12.5	12.1	12.3	13.4	13.5	13.5	12.3	15.0	14.2
Social contributions	10.9	10.7	11.0	10.6	10.3	10.3	10.1	10.5	11.6	13.1	13.1

Source: Eurostat..., 2012

the end of 2011 influenced the tax revenues, pursuant to which the declarations of the material position had to be submitted to the SRS [State Revenue Service]. In 2012, the SRS received declarations of the material position from 130 073 natural entities, and 80 persons declared income, which was subject to the personal income tax but had not been declared before, in the amount of 2 739 402.8 LVL, and the payable tax for this amount was 410 652.14 LVL (Nulles deklaracijas …, 2012). The Law provided an opportunity to declare the taxable income, which had not been declared before for improving the monitoring of a person's financial position.

Direct taxes and social contributions account for the highest share in the tax revenues of the central budget of Lithuania. In 2009, the proportion of direct taxes decreased, and the state social contributions increased. In the course of fighting the central budget deficit, Lithuania, similarly to its neighbouring country Latvia, implemented considerable changes in the taxation system, for example, as regards the tax of private vehicles (cars, motorcycles, yachts, and horses), implementation of the progressive personal income tax, the increase of the corporate income tax from 15% currently to 20%, and the tax for the interest income (Lietuvas nodoklu …, 2012). In 2010, the Lithuanian central government received 49.19% of the total tax revenues, which is considerably below the EU average level (58.8%). Municipalities received 11.8% of the total tax revenues, which is above the EU average index (10.6%) (Eurostat …, 2012). Despite all the above changes, the Lithuanian taxation system has maintained its competitiveness, and its tax burden is comparatively low.

In Estonia, similar to many other new Member States, the proportion of direct taxes jointly with social contributions within the total tax revenues is quite high. Social insurance contributions account for an important share within the total tax revenues. In 2010, the proportion of indirect taxes decreased. Local municipalities receive 13.4% of tax revenues, which is the seventh highest index among the EU-27 countries. The revenues of the central government equal to 67.9% of the total tax revenues (Eurostat ..., 2012). In Estonia, there is established a quite a simple taxation system. In order to maintain the simplicity, transparency and easiness of use of the system, just few exemptions were allowed, however, at the same time tax rates were kept quite low.

Upon facing a high central budget deficit in 2008-2010, during the recession, the Estonian government needed to raise several taxes, including the value added tax (VAT) and the excise tax. However, the Estonian taxation system can still offer various advantages to foreign investors in addition to the fact that this system is easy to understand and easy to handle.

Personal income tax

Personal income tax is among the main direct taxes in the Baltic countries.

In Latvia, the personal income tax rate equals to 25%. Whereas, 15% rate is applied to the capital increase, and 10% tax rate is applied to other income from capital (e.g. dividends, interest payments, etc.). PIT is reduced for the incurred expenses for medical treatment and education.

Estonia is among the Member States where a uniform PIT rate is applied. The uniform tax rate of 21% has been applied since 2008, and it is applied to all kinds of income from employment and personal capital (dividends, interest, capital increase, royalties, etc.). The untaxed minimum income and the income tax rate have been stable since 2008, and this has contributed to the collection of tax revenues. Mortgage interest payments and tuition fees may be deducted from the taxable income. The personal income tax is divided between the central and local government. The local government receives 11.4% of the tax revenues; the rest is transferred to the central government budget. The central government is entitled to receive the whole amount of income tax paid by non-residents and residents from their pensions and the capital increase.

In the Lithuanian budget, labour taxes present the most important source of revenues and account for approximately 50% of all the tax revenues. The PIT is applied to various kinds of income in Lithuania. Several kinds of income (various kinds of pensions, some insurance bonuses, heritages and gifts, various interest income, sailors' income, small farms, scholarships, etc.) are released from the taxation. Capital income is taxed at 15%, still there are various exceptions. Income gained by alienating a property is released from taxation if the owner has been residing in the relevant property for at least three years (or two years if the sale refers to the owner's main residence, or if the income is used for buying a property in Lithuania or another EU country within a year's time).

Corporate income tax

Under the conditions of the economic downturn, the revenues of the corporate income tax (CIT) have decreased considerably in all the Baltic countries because the profit has decreased, for example, in Latvia the revenues have decreased 4.5 times, in Lithuania

Table 7

Comparison of the corporate income tax rates in the Baltic countries in 2012

Country	Rates
Latvia	15%
Lithuania	15%
Estonia	Undistributed profit is not taxed

Source: Eurosat ..., 2012

Table 8

Rates of the state social insurance mandatory contributions in the Baltic and other EU countries in 2012

	Untaxed minimum income for the purpose of IIN [Personal Income Tax]	IIN rate, %	VSAOI [State social insurance mandatory contribution] paid by an employee, %	VSAOI [State social insurance mandatory contribution] paid by an employer, %
Latvia	64 EUR	24	11	24.09
Lithuania	Gross - LTL 800	15	9	30.98%+0.2% guarantee fund
Estonia	144 EUR	21	1.4%+2.8%	33%

Source: Eurostat ..., 2012

2.5 times, and in Estonia by 50%. It should be taken into account that in Estonia the CIT has to be paid only if the profit is distributed as dividends. In Latvia, when new technological equipment is purchased, its value is increased by 50% (coefficient 1.5 is applied) for the purpose of assessing the CIT. In Lithuania, the income subject to the CIT may be reduced by the expenditure which has been incurred because of purchasing factory buildings, equipment, etc., however, this reduction may not exceed 50% of the CIT.

The advantage of taxing the corporate income only when the profit is withdrawn from a company presents the most important advantage.

In Latvia, the CIT is among the lowest ones in the EU and amounts to 15%. During the period from 2001 to 2004, the rate was gradually lowered from 25% to 15%. As of 2011, Latvia has introduced a 9% tax rate for small micro companies with revenues not exceeding 100 000 EUR per year and employing up to five employees.

In Lithuania, the general uniform rate is 15%. As of 1 January 2012, 5% CIT rate was applied to business companies employing up to 10 persons and with the turnover below 1 million LTL (289 500 EUR) (the preceding threshold was 500 000 LTL).

State social insurance mandatory contributions

The Estonian social provisions are funded mainly by the social tax paid by employers; usually its rate equals 33% of the gross wage for each employed person. Self-employed persons also pay the social tax. Employees who have joined the second tier of pensions (it is mandatory for everybody born after 1983) have to pay additional 2%, which is transferred to the personal pension account. In this case, the split of the 20% pension insurance system is as follows: 16% from the state pension insurance system (the first pillar) and 4% from the mandatory funded pension system (the second pillar). The social tax, comparable to the employer's mandatory social insurance contributions in other countries, is an important tax in Estonia from the fiscal point of view. In 2010, these contributions accounted for 35.6% of the total tax revenue, and this has been the highest proportion in the EU until now. Whereas, the employees' social contributions accounted for mere 2.4% of the tax revenues (Eurostat ..., 2012).

In Lithuania, social insurance contributions currently amount to 30.8%, of which 27.8% are contributed by the employer and 3.0% by the employee. During the period from 1 August 2010 to 31 July 2012, in Lithuania the share of the social tax payments for the pension insurance was reduced for the employers who employed a person who had never been employed before and who received a low wage (up to 700 EUR) for a period of one year. Therefore, the employer saved 23.3%, and the employee saved 3% of the total payment of 31% and 9% accordingly and paid 7.7% and 6% social tax accordingly (Bezdarbu …, 2010). This relief was cancelled as of 1 August 2012. Social tax relieves were applied also for all the disabled persons who were employed on the basis of an employment contract provided that that their monthly gross wage was not above the triple minimum wage (i.e. LTL 2 400); these persons did not have to pay pension insurance contributions for a period of up to one year.

3. Tax discipline

The fighting against a very high proportion of shadow economy should be among the tasks to be solved by the government. Therefore, whistleblower programmes have been introduced in the USA. Within such a programme, the government institutions would offer an attractive remuneration to persons who report on fraudulent transactions. The remuneration has to be high enough for justifying the risk. In addition, confidentiality of these persons has to be provided, and they have to be protected against eventual repressions by their employer. It is interesting to note that this practice was intended to be implemented in Lithuania in 2010. A bonus, which may amount even up to 10% of the identified transaction value,

however, not exceeding 100 000 LTL (approximately 20 000 LVL) would be paid to every reporter. The resolutions on the payment of bonuses would be adopted by a special committee appointed by the Prime Minister in cooperation with the Ministries of Finance and Interior. The Lithuanian government considers that this practice helps to improve the collection of taxes to the central budget, which is very important during the crisis.

In Lithuania, the Law on the Release of the Bad Debts of VAT payments entered into force on 1 January 2012: if it has not been possible to recover a debt within 12 months and the status of the bad debt is proved, a business is entitled to correct the assessed payable VAT amount. It should be noted that this rule applies to payable VAT amounts for goods (services) sold as of the beginning of 2012.

In Estonia, the issue of tax discipline is studied by the Institute of Sectors. The Estonian Tax and Customs Board summarises the data on shadow economy, including the trends of payment of the excise tax, "envelope wages" and others based upon the individual reports received from each institution, and develops the general report on the proportion of the "grey sector" regarding each tax. Based on this analysis, it develops recommendations of what should be done for improving the collection of each tax. The latest assessment amounted to approximately 337 million LVL. This is the amount of unpaid tax, mainly on the account of the value added tax. This figure corresponds to approximately 3.6% of the gross domestic product (GDP); these are losses from tax revenues. There are no accurate assessments, we consider that the total proportion of the shadow economy amounts to somewhere between 10-20% of the GDP (Graudiņš ... 2012).

In Latvia, pursuant to Section 25 of the Law "On Taxes and Duties", debts and also related penalties and late payment penalties are cancelled for bankrupt companies, companies that have not applied for entering in the Commercial Register, individual (family) companies, also farms and fisheries in case of the death of their founder-owner, for natural entities in case of their death, and for taxpayers if the resolution on the recovery of delayed tax payments has lost its validity. During 11 months of 2011, the cancelled amounts of budget debts totally amount to 117 999.41 thousand LVL (Informacija …, 2011). The VAT accounts for the highest share therein, i.e. 76.66%.

In Estonia, the amounts of tax debts are not cancelled, their payments are deferred instead. It means that the deadline of settling the payment is extended in Estonia. The revenues service prefers to agree with a business on a deferred payment instead of seeing this business going bankrupt (Graudins U., 2011). In Estonia, this opportunity was utilised by numerous companies, which would have gone bankrupt. In 2009, the financing earmarked for the revenue service was not reduced when the Estonian government reduced the central budget expenditure. We increase the financing for the service to ensure better fighting against the shadow economy. The Estonian revenue service was among the few institutions to whom more financing was allocated, and it could employ more people. During its daily operations, this institution focuses mainly of the big debtors. The payment of taxes has been simplified thanks to the use of electronic means of communication.

Conclusions, proposals, recommendations

1. In the course of creating the taxation mechanism, the Baltic countries have different approaches to the tax burden on legal and natural entities, the taxation policy compliant with the structure of manufacturing and households. Moreover, the principles of imposing taxes are different in each country.
2. In Latvia, the estimated tax revenues do not correspond to the actual tax revenues. This problem applies to almost all types of taxes. The authors consider that this problem emerges because insufficient analysis is performed before the increasing or decreasing of tax rates.
3. Under the impact of the globalisation process, the capital is becoming much more mobile and it can outflow from the country if it does not implement the required measures in the taxation area for the attraction of the capital. The globalisation results in a risk of decreasing tax revenues because the tax competition between countries is intensifying, new and much more extensive opportunities of tax evasion emerge, and other problems appear. Therefore, countries have to be prepared to accept this new policy and to gain maximum benefit from it as well as to implement required measures for minimising the harmful impact of taxes mobilisation.
4. The Latvian taxation system does not solve poverty issues. In Latvia, the reduced VAT rate on food products should be introduced for minimising the inequality between various groups of people.
5. The Ministry of Finance of the Republic of Latvia should introduce a clear taxation policy with defined long-term goals related to the harmonisation of the EU single market and encouragement of sustainable development. Unjustified and too frequent change of tax rates causes people's distrust of the government. The proportion of indirect taxes within the tax revenues should be increased to make the taxation system more flexible and responsive to changes in the economic growth. It is necessary to provide a clear review of the utilisation of collected taxes.
6. The motivation of taxpayers is related to the manner of spending the taxpayers' money by the government. If money is wasted, taxpayers will not be motivated to pay taxes. The motivation of taxpayers is related to the size of tax rates and the taxable base.
7. Tax evasion depends on the development level of the country and the institutional environment. The high proportion of the shadow economy, which was caused mainly not by too high tax rates, but by the low morale of tax payment, has been established due to the impact of historical aspects and due to the lack of information. The tax amounts assessed by the SRS cannot be collected; therefore, it is necessary to introduce a uniform payment for each business.
8. In the course of improving the taxation system, the regulating (encouraging) function of taxes should be given a priority. It should be used for speeding up the economic development, in the result of which the

budget revenues will increase (the fiscal function). Therefore, the development of manufacturing based on innovations and new technologies in all the sectors of the national economy should be set as the strategic goal of the Latvian taxation policy for the next 5-10 years.

9. Labour taxes have to be lowered considerably. The reduction of rates will not result in the decrease of budget revenues because those who have been unofficially employed will start to pay taxes and the "envelope payments of wages" will decrease.
10. Relieves of the personal income tax and mandatory social contributions have to be applied to taxpayers who start to work in rural districts and small towns, in depressed regions, and in newly established companies.
11. Tax relieves should be used for encouraging the increase of the birth rate and lowering the emigration.
12. Relieves of the corporate income tax should be granted to newly established companies: during the first three years a company should be released of this tax payment, more frequent tax settlement terms and lower amounts of payments have to be set.
13. When taxes are low in Latvia, the environment will be favourable for foreign investors for building big production facilities and manufacturing products in Latvia, people will have jobs, and there will be money in the central budget.

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LATVIA'S ACCESSION TO THE EUROZONE DURING ITS SOVEREIGN DEBT CRISIS

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Abstract. The sovereign debt crisis has not stabilised, and it continues worsening in several euro area states. Latvia prepares to join the euro area in 2014, replacing the national currency lat with the single European currency euro. Therefore, the aim of the research is to analyse the main gains and losses from Latvia's accession to the euro area during its sovereign debt crisis. Several gains to Latvia's national economy are expected after the accession to the euro area, the main and most realistic of which is an improved financial system and, along with it, a higher credit rating for the country, which means lower borrowing rates for the country at international financial markets. It is important, given the fact that Latvia's government debt is quite high, approximately 40% of GDP, and its interest cost is essential. However, several additional expenses are expected with the introduction of the euro. The key expense relates to contributions to the European Stability Mechanism, part of which will have to be possibly written off or lost in case of crisis, incurring part of the debt of the economically weakest euro area countries having excessive government debt. For this purpose, scenarios for the eurozone debt crisis are developed and potential losses from Latvia's membership in the euro area are estimated in the present research. Under negative debt crisis scenarios, Latvia's losses from the membership in the euro area exceed its gains. Therefore, it is advised to join the euro area after the eurozone sovereign debt crisis is over.
Key words: eurozone crisis, accession to the eurozone.
JEL code: G01, F14

Introduction

The years 2012 and 2013 are important to Latvia, as during this period its national institutions have to make various decisions and pass various legal acts on joining the euro area. Therefore, this period will determine much in relation to Latvia's national economy, foreign trade, government debt, and other issues. There is certain unclearness and concern among economists and the entire society regarding Latvia's need of joining the euro area already in 2014, given the unsolved problems in the single currency area.

An economic recession has began in the euro area, as for two consecutive quarters – in quarters 2 and 3 of 2012 – the euro area GDP declined, although a slight increase in GDP was observed in the entire European Union (EU), to which the comparatively fast economic growth of the Baltic states contributed as well. The worst situation is observed in southern Member States of the euro area, where the longest and fastest recession is observed. Among these states, the worst situation exists in Greece, where the last annual economic growth was registered in 2007; as regards its quarterly economic growth, no data are available in the Eurostat database for the recent six quarters, and only provisional data exist about many earlier quarters, which indicate that there are problems to make GDP change calculations. A comparatively better situation is observed in the other southern Member States of the euro area: in Italy, its GDP declined for five consecutive recent quarters, in Spain – for four quarters, and in Portugal – for eight consecutive quarters (Eurostat, n.d.).

Given the present situation, all East European countries of the EU, including Lithuania, do not plan to join the euro area within the nearest years, presumably understanding the serious problems of the euro area. Latvia's government is the only one among seven East European countries, which firmly pursues the objective of joining the euro area and introducing the euro on 1 January 2014. Unlike the government of Latvia, according to a survey conducted by the company Latvijas Fakti in August of 2012, only a small proportion of the Latvian society (13.1%) strongly supports the introduction of euro as early as possible; 21.9% want the introduction of the euro, but not within the nearest years (Freimanis, 2012). According to the European Commission report, only 9% of the respondents in Latvia want the euro, and 37% are rather in favour of euro adoption (European Commission, 2012a). In Estonia, where the euro has been in circulation since 1 January 2011, in its turn, the society's support for the euro is high – 71% of the respondents are in favour of the European Economic and Monetary Union with one single currency, the euro (European Commission, 2012b). Yet, a certain part of Estonia's public expresses its dissatisfaction with the fact that the country has to make contributions to the European Stability Mechanism (ESM), which is intended for rescuing indebted governments of the eurozone countries that are wealthier than Estonia. Although no ESM funds have been used for writing off government debts, it is not excluded in the future, as it is not possible to precisely forecast further developments of the eurozone debt crisis.

The research aim is to analyse the main gains and losses from Latvia's accession to the euro area during its sovereign debt crisis.

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Research tasks:

1) to describe the fulfilment of the Maastricht criteria by Latvia and its contributions to the European Stability Mechanism;
2) to analyse the causes of the eurozone debt crisis and to develop scenarios for the future development of this crisis;
3) to analyse Latvia's gains from its membership in the euro area and to estimate its potential losses in the case of negative scenarios developing in the euro area.

The following research methods were employed in the present paper: analysis, synthesis, the abstract and logical methods, and the scenario method. Data and reports of the European Central Bank (ECB), the European Commission, the Bank of Latvia, the Ministry of Finance of the Republic of Latvia, Eurostat, and the World Bank as well as other information sources were used in the present paper.

Research results and discussion

1. Meeting the Maastricht criteria by Latvia and the cost of joining the ESM

Latvia joined the European Union in 2004. Its membership in the EU, which is the largest free trade bloc, determines the need for the single currency that fosters international trade within this bloc, which, in its turn, may promote economic growth and along with it an increase in welfare.

The Treaty concerning the accession of Latvia to the EU, like that for the other new EU Member States, stipulates the adoption of the euro as soon as all economic conditions (Maastricht criteria) are met. The highest level of economic integration of the Member States is implemented in the European Union in such a way (Ministry of Finance, n.d.).

Initially, it was planned that Latvia would join the euro area in 2008, yet, since the country was not able to meet all the Maastricht criteria, it was postponed to the year 2014. The inflation criterion was not met until 2008, and inflation was a double digit figure for several years (Ministry of Finance, n.d.), mainly due to fast economic growth as well as other factors (Ancans S., 2012). Over the next years – from 2008 to 2011 – Latvia was not able to meet the criterion on government budget deficit, i.e. not more than 3% of GDP (Eurostat, n.d.). As regards inflation, the inflation rate for September of 2012 corresponded to the inflation rate needed to meet this convergence criterion (Ministry of Finance, n.d.). Meeting the inflation criterion was facilitated by a value added tax reduction from 22% to 21% on 1 July 2012. The forecast and execution of the government budget for 2012 also met the relevant Maastricht criterion. Therefore, one may conclude that all the Maastricht criteria will be met both in 2012 and in 2013, which will pave the way for joining the euro area in 2014. Yet, a reasoned question arises: whether it is necessary to join the euro area if the government and also private debt crisis in several Member States continue and possibly expand as well. In all the previous times when Latvia tried to join the euro area, no problems with sovereign debts, unlike the present situation, existed.

If Latvia joins the euro area, funds have to be necessarily contributed to the ESM. Latvia's ECB capital key is equal to 0.2837 (European Central Bank, 2011), while its ESM capital key, if the country joins the euro area, will be slightly greater or approximately 0.3 (for comparison, Estonia's ECB capital key is 0.179, while its ESM capital key is 0.186). The ESM size in 2012, when it started operating, was EUR 700 billion. At such an ESM size, Latvia will have to contribute EUR 199 mln to its paid-in capital during the period of first five years, and, after the transitional period of 12 years is over, this contribution will have to reach EUR 324 mln (Rutkaste U., 2012) and provide a callable capital of approximately EUR 1.5 bln. After the transitional period, Latvia's ESM capital key will be approximately 0.4, therefore, the country's contribution to the ESM paid-in capital will reach EUR 324 mln, and at such a value of ESM capital key, the amount of callable capital will be approximately EUR 2.5 bln.

If the ESM size is increased, Latvia's contributions to the ESM's paid-in and callable capital will proportionally increase. The government debts of the southern Member States of the euro area – Greece, Portugal, Spain, and Italy – totalled more than EUR 3 trn in 2011 (Eurostat, n.d.). As of 2012, approximately EUR 400 bln were or will be lent to all these countries, except Italy, which so far needed no financial assistance; Greece's debt of almost EUR 150 bln was written off. It has to be noted, that the debts of these countries continue increasing.

In case, if these countries do not restore or lose investor confidence in financial markets and are not able to refinance their debt as well as if other euro area member countries need to be bailed out, the ESM size will probably need to be increased, and Latvia's contributions to the ESM's paid-in and callable capital will also increase. The international financial community discusses an ESM size of EUR 2 trn, and a part of it will be financed from private sources. Thus, Latvia's contributions to the ESM might reach EUR 4 bln or even more, which becomes comparable with the Latvian government's present debt.

2. Causes of the eurozone sovereign debt crisis and its further development scenarios

In 2007, a financial crisis or the so called sub-prime credit crunch began in the USA in its real estate market, which arose owing to a too large proportion of mortgage loans made to households with bad credit history. The fourth largest US bank Lehman Brothers invested too much in the US sub-prime mortgage-backed securities, therefore, this bank became insolvent in September of 2008. The bankruptcy of this large US bank soon caused a financial crisis in the largest part of the entire world, including Latvia, followed by an economic crisis a little later – both exports and economic output started declining.

To overcome the crisis, the central banks of developed countries took the following two key measures: 1) reduced their key interest rates up to a very low level, thus financial capital became very cheap, i.e. at low interest rates; 2) increased the money supply by injecting large quantities of money into their commercial banks through quantitative easing measures. As regards the central governments, they continued spending, under the circumstances of crisis,

Table 1

Macroeconomic indicators of the countries causing the eurozone crisis

	2008	2009	2010	2011	2012*
Greece:					
GDP change, %	-0.2	-3.1	-4.9	-7.1	-4.7
Government deficit, % of GDP	-9.9	-15.6	-10.8	-9.5	-6.7
Public debt, % of GDP	112.9	129.7	148.3	170.6	-
Exports, % of GDP	24	19	22	25	-
Current account, % of GDP	-14.9	-11.2	-10.1	-9.9	-
Ireland					
GDP change, %	-2.1	-5.5	-0.8	1.4	0.5
Government deficit, % of GDP	-7.4	-13.9	-30.9	-13.3	-8.6
Public debt, % of GDP	44.5	64.9	92.2	106.4	-
Exports, % of GDP	83	91	101	107	-
Current account, % of GDP	-5.7	-2.3	1.1	1.1	-
Portugal					
GDP change, %	0.0	-2.9	1.4	-1.7	-3.3
Government deficit, % of GDP	-3.7	-10.2	-9.8	-4.4	-5.0
Public debt, % of GDP	71.7	83.2	93.5	108.1	-
Exports, % of GDP	32	28	31	35	-
Current account, % of GDP	-12.6	-10.9	-10.0	-6.5	-
Spain					
GDP change, %	0.9	-3.7	-0.3	0.4	-1.8
Government deficit, % of GDP	-4.5	-11.2	-9.7	-9.4	-5.3
Public debt, % of GDP	40.2	53.9	61.5	69.3	-
Exports, % of GDP	26	24	27	30	-
Current account, % of GDP	-9.6	-4.8	-4.5	-3.5	-
Italy					
GDP change, %	-1.2	-5.5	1.8	0.4	-1.4
Government deficit, % of GDP	-2.7	-5.4	-4.3	-3.8	-1.7
Public debt, % of GDP	106.1	116.4	119.2	120.7	-
Exports, % of GDP	28	24	27	29	-
Current account, % of GDP	-2.9	-2.0	-3.5	-3.1	-

* forecast

Source: author's construction based on Eurostat, the World Bank

at a comparatively high level, although tax revenues significantly decreased.

Owing to implementing these measures of central banks and governments, the financial and economic crisis lasted in developed countries for about one and half years in the years 2008 and 2009, and already in 2010 the countries returned to economic growth. However, all these measures did not fully solve the problems that emerged in the national economies of these countries. In several relatively weak South European countries – Greece, Portugal, Spain, Italy, Cyprus as well as in Ireland, government debts rose at a fast rate, reaching debt amounts that started worrying private investors. This led to the situation that these countries were not able to refinance their debt in international financial markets or the borrowing rate reached a too high level, creating a need to apply for assistance to the International Monetary Fund and the European Commission. Thus, the measure implemented by governments – comparatively greater spending under the crisis to restore economic growth in the economy – may become a cause for a new crisis or the so called second wave of crisis.

Since Cyprus is a small country (0.9 mln inhabitants), it is not analysed in this research, as it may not significantly affect the crisis.

Unlike Ireland, all the other analysed countries, i.e. the South European countries have relatively weak economies – their value added in their tradable sector is comparatively low, as their manufacturing industry, in which high value added is created like in other developed countries, is not highly developed. Therefore, such an

indicator as the ratio of exports to GDP is comparatively low (Table 1). In Ireland, this indicator reaches 100% of its GDP, whereas it ranges around 30% in the mentioned South European countries. The lowest indicator is in Greece, ranging within 20-24% of GDP. It is a very low indicator, as a certain empirical correlation exists – the smaller is a country in terms of population and, therefore, smaller is its national economy, the higher ratio has to be. It may be explained by the fact that small countries have to import a lot, as they are not able to produce the whole assortment of goods and services that is consumed by the modern society. If a lot of goods and services have to be imported, exports have to be large as well. The other indicators of the South European countries – the current account balance, GDP growth, annual deficit/surplus of government budgets, and total public debt – are weak as well. In order that these countries can refinance their public debt, i.e. investor confidence returns as well as tackle other economic problems, they need GDP growth, a normal (balanced) current account (preferably with a surplus), and a government budget with a surplus.

The further development of the crisis in the eurozone will be determined by both the economic growth of the EU Member States and the overall situation with general government (central and local) budget deficit/surplus and debt. The main factor will be economic growth that enables a government to collect more tax revenues, thus reducing a deficit in the government budget (or even maybe having a surplus) and decreasing the public debt or at least not increasing it. If there is no growth in addition to the inability of these countries to implement austerity measures (due to public protests) and make structural reforms in the national economy, the situation will continue worsening – these countries will need more bailout funding and, possibly, a controlled bankruptcy, thus writing off a part of their debt like it was in Greece in 2011 and 2012.

To estimate the amounts of public debts that might be written off, three potential negative scenarios are developed:

Scenario 1. A relatively long crisis exists in the southern Member States of the euro area, yet, no crisis is observed in the remaining part of the euro area and other regions in the world, including the USA and China. In this case, the public debts of the South European states, which are above 100% of their GDP, are written off.

Scenario 2. A relatively long crisis is observed in almost entire euro area and the EU, yet, there is no crisis in other regions in the world, including the USA and China. The crisis is deeper compared with the previous one, and decreases in foreign trade and GDP are greater. The public debts of the problematic South European states, which are above 80% of their GDP, are written off.

Scenario 3. A relatively long crisis persists in both the euro area and the EU and other regions in the world, including the USA (owing to large public debt (more than 100% of GDP), changes in the tax policy and other factors) and China (after two decades of continuous economic growth, "bubbles" might emerge in the markets of stocks and real estate). The crisis in the world is the deepest and longest one. The public debts of these South European states, which are above 60% of their GDP, are written off.

3. Latvia's gains from its euro area membership and the potential losses in the case of negative scenarios

According to the assumptions made by the Bank of Latvia, the credit rating of Latvia after its accession to the euro area will rise by 1-2 levels, which will provide lower borrowing rates for the government by approximately 1.5%-points. It enables the country to save approximately EUR 900 mln in a ten-year period (Kauzens E., 2012). Besides, there are two other major gains: a gain of approximately EUR 8 bln from an increase in exports and a decrease in the interest rate for the private sector (from 2014 to 2020) and a gain of approximately EUR 700 mln from the partial disappearance of foreign exchange costs (within 10 years after the adoption of the euro) (Rutkaste U., 2012).

All these three main gains from the adoption of the euro are either relative, or might be possible only in case the euro area develops relatively positively, i.e. the situation existing in the middle of 2012 will not worsen. As regards the mentioned gain, estimated by the Bank of Latvia, from foreign exchange cost reduction, it is relative or it actually does not exist, as in this case, what is saved by exporters and importers, because they do not have to exchange their euros for lats and vice verse, is lost by Latvia's commercial banks, and in general nothing changes in the national economy as a system (Table 2). Since commercial banks lose this income, they will try to partially or fully regain it in different ways (by increasing the spread between deposit and loan rates, possibly, by increasing the spread between foreign exchange purchase and sale rates for businessmen making international transactions with countries outside the euro area etc).

The other two main gains estimated by the Bank of Latvia will be true, if there is no long and serious crisis in the euro area caused by the excessive public debts of several Member States. If such a long crisis exists, Latvia as a member of the euro area will have to borrow additional financial capital, the amount of which will be at least two billion euros or approximately 10% of GDP (in addition to the existing Latvian government debt of more than LVL 5 bln or EUR 7 bln (Treasury, 2012)), a part of which might be used to write off part of debts of other euro area countries. In 2012, the public debt of Latvia was equal to approximately 40% of GDP (Treasury, 2012). During a crisis, there will likely be a deficit in the government budget, therefore, the public debt will continue increasing, and contributions to the ESM's callable capital will additionally increase it. In a medium-term, Latvia's public debt will approach the level set by the Maastricht criteria, i.e. 60% of GDP, which is the size of debt that any national government can service sustainably. In this case, one could expect that the risk premium for Latvia might increase in international financial markets, as Latvia, which is not a developed country, assumes an additional burden of public debt for tackling problems of other countries (including for writing off their debts) instead of tackling its own problems. With an increase in risk, the borrowing rate rises, thus partially or fully losing the gain from the expected rate reduction after joining the euro area, which, according to the estimate of the Bank of Latvia, might be approximately

Table 2

Gains and losses to the national economy, if Latvia is or is not a member of the euro area

Indicator	Euro area member		Not a euro area member	
	crisis	no crisis	crisis	no crisis
Foreign exchange	≈ 0	≈ 0	≈ 0	≈ 0
Public debt, its refinancing	-	+	+	-
Decrease in interest rates for the private sector	+	+	-	-
Increases in exports and real investments	+/-	+	+/-	-
Foreign direct investments	-	+	+	-

Note: gain (+); loss (-)

Source: author's construction

Table 3

Amounts of general government debts of the problematic Member States and the potential amount of debt to be written off at various scenarios, bln EUR

	Greece	Portugal	Spain	Italy	Total
Public debt in 2011	355.7*	184.7	736.4	1906.7	
Debt to be written off according to:					
Scenario 1	40	12	0	316	368
Scenario 2	80	46	0	632	759
Scenario 3	120	81	86	949	1236
Latvia's loss according to:					
Scenario 1	0.025-0.050	0.007-0.015	0	0.197-0.393	0.229-0.458
Scenario 2	0.05-0.099	0.029-0.058	0	0.393-0.786	0.472-0.944
Scenario 3	0.075-0.149	0.05-0.101	0.054-0.108	0.059-1.180	0.768-1.537

* before debt restructuring and writing off a debt of EUR 107 bln

Source: author's construction based on Eurostat

1.5%-points; moreover, this increase in the borrowing rate, owing to the risk, might exceed the expected rate reduction estimated by the Bank of Latvia. In this case, the government saving gained from lower borrowing costs (owing to an increase in the public debt and an increase in refinancing rates) after joining the euro area will be negative compared with a situation that Latvia is not a member of the euro area.

The third main gain estimated by the Bank of Latvia arises from lower interest rates for the private sector and increases in real investments and exports (lower interest rates increase real investments and exports). In this case, increases in real investments and exports have to be analysed separately from the decrease in interest rates for the private sector. Only lower interest rates for the private sector, if Latvia is in the euro area, according to the author, is an undisputable gain for the entire national economy in any case (according to the estimate of the Bank of Latvia, a decrease in long-term interest rates reaches approximately 0.5%-points). Any borrower (both households and enterprises) will have lower expenses, whereas owners of financial capital or depositors will have lower incomes. Since about half of the money deposited in Latvia's commercial banks comes from abroad (FCMC, n.d.), foreign capital owners will not gain approximately half of the funds saved by domestic borrowers. Besides, in case some problems with any bank arise, like it was with the bank Parex in 2008, Latvia's commercial banks will have a possibility to borrow cheaper money at the ECB. The amount of loans lent to Latvia residents exceeds LVL 10 bln or EUR 14 bln, and a decrease in borrower expenses is estimated at LVL 50 mln or EUR 70 mln, of which about half (LVL 25 mln) will not outflow from Latvia as financial investment income of non-residents.

As regards real investments and exports, under a crisis, the amount of real investment will shrink, and a decrease in exports is also expected like it was during the first wave of crisis, yet, probably these decreases will be observed at smaller amounts compared with a situation if the euro is not adopted, although it is difficult to predict what a situation might emerge. When the first wave of crisis began in 2008, a phenomenon was observed that business partners of Latvia's exporters (foreign importers) did not want to purchase goods and services made in Latvia, as they knew that Latvia had a serious crisis and believed that it might negatively affect the quality and delivery of goods and services from Latvia.

Although the debt and problems of government are not directly related to the private sector, foreign

investors may believe that it is better not to invest capital in Latvia under conditions that its government has its own significant debt and additionally debts of other richer countries of the euro area have to be financed. Therefore, it is possible that in this case, too, Latvia's gain from an increase in foreign investment, being a member of the euro area, will not be positive, but negative compared with a situation, if Latvia is not a member of the euro area.

It is difficult to exactly predict a situation in the fields of finances, exports, and investment as well as in the entire national economy. Yet, one can conclude that Latvia will definitely benefit from being a member of the euro area in case no new serious financial and economic crisis or the second wave of crisis occurs. On the other hand, Latvia is disadvantaged if staying outside the euro area and no serious crisis in the euro area is expected within a foreseeable period (Table 2). Therefore, the need to join the euro area in Latvia depends on whether or not a serious crisis in the world or at least in the euro area occurs.

Further in the paper, potential losses of the government of Latvia are estimated, if political extraordinary decisions, forced by circumstances, are made to restructure and write off part of public debts of the economically weakest South European Member States, like it was with Greece in 2011 and 2012, owing to a long and serious crisis, however, this time losses will be suffered not by private holders of government bonds and not by the European Central Bank, but by euro area governments, i.e. by writing off funds of the European Stability Mechanism. In the future, such decisions would be eliminated by the Treaty on Stability, Coordination and Governance in the Economic and Monetary Union. Table 3 presents the potential losses of Latvia at various negative scenarios, assuming that the euro area governments write off a quarter to half of debts, while the rest is written off by private investors.

Given the fact that Latvia's ESM capital key is approximately 0.25 and assuming that 25-50% of debts are to be written off by governments of the euro area Member States, the Latvia government loss at Scenario 1, according to which debts above 100% of GDP are written off, is around EUR 0.3-0.5 bln. This might be the most probable scenario. According to Scenario 2, Latvia's loss is almost EUR 0.5-0.9 bln (by writing off a debt of above 80% of GDP). Although it is unlikely that it will be needed to write off all the debts above 60% of GDP (Maastricht criterion for euro area Member States), yet, in this case Latvia's loss would be more than EUR 0.7-1.5 bln. It is not possible to predict the future of economic life for several years ahead, therefore, it is impossible to forecast the development of a crisis in the euro area and, possibly, outside it – in the USA and/or in China. Yet, such negative developments may not be ignored. According to the estimates, the losses are significant, besides, it has to be taken into consideration that in case economic processes develop negatively in the euro area, the cost of refinancing the debt of Latvia government will not decline by an extent estimated by the Bank of Latvia, or it will even increase; besides, the gains in other areas will be smaller or even negative.

Conclusions

1. For the first time in a decade after joining the EU, Latvia is able to meet all the Maastricht criteria and join the euro area, yet, it requires to make financial contributions and provide callable capital estimated at around EUR 1.7 bln during the transitional period and around EUR 2.8 bln in 12 years after joining the euro area at the present ESM size of EUR 700 bln; its size, possibly, will be increased, thus Latvia's contributions to the ESM will increase as well.
2. The financial and economic crisis, which started in Europe in the second half of 2008 (the first wave of crisis), significantly increased the public debts in many Member States, which may be a cause for the second wave of crisis. It actually began in the economically weakest South European Member States, and it may spread further in the euro area. A crisis is possible also in the USA due to its excessive public debt and in China after fast economic growth for more than 20 years.
3. Out of the gains estimated by the Bank of Latvia, in case a serious crisis begins, only a gain from lower interest rates for the private sector is undisputable. In any case, there is almost no gain for the national economy as a systemfrom the partial disappearance of foreign exchange costs, whereas the cost of refinancing the government's debt will be greater, and the increases in real and foreign investments and in exports, under a crisis, will be smaller, besides, they might be lower compared with a situation, if Latvia stays outside the euro area.
4. In the case of the negative scenarios in the euro area and if the ESM funds are used to partially write off the debts of the economically weakest South European Member States of the euro area, Latvia's losses may reach a few or even many hundreds of millions of euros.
5. If economic and financial developments are negative in the euro area during the present sovereign debt crisis, Latvia's gains from its membership in the euro area significantly decrease, or even the losses exceed the gains during this period, therefore, in this case it is advised not to join the euro area and wait together with the remaining six East European EU Member States until the sovereign debt crisis in the euro area ends. The accession to the euro area may be advised only in the case of positive development of the euro area.

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APPLICATION OF IMMOVABLE PROPERTY TAX IN THE REGIONS OF LATVIA

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Abstract. Taxes are an instrument allowing the state to redistribute public resources, to promote the decrease of inequality and poverty, and to ensure social protection of population. Tax policy is a fundamental instrument for investment promotion affecting the economic competitiveness. The research is aimed at the analysis of basic socio-economic development indicators and the application of immovable property tax by the regions of Latvia as well as the discussion of amendments in the application of immovable property tax in Latvia effective from 2013. The research leads to a conclusion that the diverse basic indicators of socio-economic development of the statistical regions of Latvia – size of the region, number and density of population, and different economic development of regions, and prices of real estate serve as the reason for different immovable property tax revenues. Larger amount of immovable property tax is collected in cities – Riga, Jurmala, Daugavpils, Liepaja, and Jelgava as well as in individual counties of Pieriga (Marupe county, Adazi county), i.e. places with the highest population density and real estate market activities. Starting from 2013, the local governments in their administrative territories have the rights to determine the immovable property tax rates within the range of 0.2%-3% set by the central government, yet, observing the principles of equitable grouping, efficiency, responsible budget planning, predictability and stability, business support, social responsibility, and the principle of territorial development and arrangement.
Key words: regions of Latvia, socio-economic development, immovable property tax.
JEL code: H29

Introduction

Tax revenues are a factor characterising financial autonomy, stability, and legal capacity of every local government. Correctly developed tax policy is an issue of a socially responsible economy. Immovable property tax policy could impact the development of Latvia's regions, create a more favourable business environment, and promote capital inflow in business structures.

Topicality and choice of the research theme is based on the lack of scientific papers which provide the study on the application of immovable property tax in the regions of Latvia among relatively few studies aimed at immovable property tax issues.

The research is based on the **hypothesis** that the diverse level of regional socio-economic development serves as the main reason for the differences in immovable property tax revenues in the regions of Latvia.

The following research **aim** is set to verify the hypothesis: to analyse the basic socio-economic development indicators and the application of immovable property tax by the regions of Latvia as well as to discuss the amendments in the application of immovable property tax in Latvia effective from 2013.

The following **tasks** are advanced to achieve the set aim:

1) to characterise the basic GDP indicators, and the number and density of population by the statistical regions of Latvia;
2) to compare immovable property tax revenues and their burden in total revenues of the local government basic budgets by the statistical regions of Latvia;
3) to analyse the novelties in the application of immovable property tax introduced in 2013.

The monographic descriptive method, the methods of economic analysis and statistical data analysis are used as the main methods for the research purpose. The research is based on the application of statistical data on socio-economic development of regions from the Central Statistical Bureau of the Republic of Latvia, data on immovable property tax revenues from the Ministry of Finance of the Republic of Latvia, and research on regional development and immovable property tax revenues by the regions of Latvia done by the State Regional Development Agency.

Research results and discussion

Characteristics of economic development basic indicators by the regions of Latvia

After the implementation of the administrative territorial reform, there were 118 local governments in Latvia from 1 July 2009, while there have been 119 local governments (9 local governments of republican cities and 110 local governments of counties), where the local governments implement management within their sphere of competence from 3 January 2011.

There are five planning regions in Latvia – Riga, Vidzeme, Kurzeme, Zemgale, and Latgale - which are established for the sake of regional development planning, coordination, and ensuring the cooperation of local governments. Six statistical regions are established in Latvia for the purpose of information registration. Riga planning region in the statistical system of regions is divided into two statistical regions - Riga (encompassing

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Table 1

Gross Domestic Product by statistical regions of Latvia for the period of 2006 - 2010

Regions	Indicator	2006	2007	2008	2009	2010
Riga	GDP total, mln LVL	6 381.12	8 097.87	8 036.23	6 928.27	6 797.27
	GDP per capita, LVL	9055	11556	12766	10181	10201
	Share,%	57.4	55.0	54.4	53.0	53.2
Pieriga	GDP total, mln LVL	1 363.87	1 908.79	1 818.26	1 702.73	1 759.49
	GDP per capita, LVL	3709	5146	5598	4549	4719
	Share,%	12.3	13.0	12.3	13.1	13.8
Vidzeme	GDP total, mln LVL	684.80	970.66	990.39	899.18	860.22
	GDP per capita, LVL	2929	4217	4355	4065	4000
	Share,%	6.2	6.6	6.7	6.9	6.7
Kurzeme	GDP total, mln LVL	1 111.36	1 514.57	1 517.69	1 387.19	1 315.49
	GDP per capita, LVL	3754	5179	5793	4907	4781
	Share,%	10.0	10.3	10.3	10.7	10.4
Zemgale	GDP total, mln LVL	759.98	1 083.16	1 180.16	1 035.39	1 031.98
	GDP per capita, LVL	2762	3974	4442	3912	3995
	Share,%	6.8	7.4	8.1	7.9	8.1
Latgale	GDP total, mln LVL	814.23	1 128.15	1 219.61	1 092.34	999.14
	GDP per capita, LVL	2386	3370	3872	3429	3228
	Share,%	7.3	7.7	8.2	8.4	7.8

Source: Iekszemes kopprodukts…., 2012

Riga city) and Pieriga (encompassing the rest of the territory of Riga planning region) (Regionu attistiba...., 2009).

The authors will analyse the basic indicators of socio-economic development by regions separating Riga and Pieriga regions to provide an insight in the regional development of Latvia.

Gross Domestic Product (GDP) by regions is used to evaluate the total value of final products and services produced in the territory of a particular region during one year. The GDP may be considered as one of the principal indicators of territorial economic development (Skapars R., 2010).

The GDP breakdown by statistical regions (Table 1) shows the explicit dominant of Riga statistical region in Latvia's economy. In 2010, the GDP produced in Riga statistical region composed LVL 6 797.27 million or 53.2% of the total GDP in the country. The proportion of GDP produced in other regions ranged between 6.7% (Vidzeme statistical region) and 13.8% (Pieriga statistical region). According to the GDP per capita indicator, Riga statistical region supersedes the others, too. The GDP per capita indicators in the rest regions were below the average indictor of the country in 2010 (LVL 5797) (Iekszemes kopprodukts...., 2012).

The data summarised in Table 1 indicate that all statistical regions of Latvia have declared an increase in the GDP volume in 2007. However, the global financial crisis of 2008-2010 has caused the economic crisis and the GDP decline in Latvia.

The largest GDP decrease was observed in Riga statistical region in 2009, where the GDP volume declined by LVL 1 169.6 million or 14.4% compared with 2007. Yet, the smallest GDP decrease was declared by Pieriga statistical region (LVL 206.06 million or 10.8%). The economic fall-down of 2009 is also seen through the GDP per capita indicators by regions – the decrease in the GDP volume was observed in all the statistical regions of Latvia.

From 2010, the GDP increase was observed only in Pieriga statistical region; while GDP per capita by regions increased in the statistical regions of Riga, Pieriga, and Zemgale. This could be explained by better geographical location of regions, better infrastructure and concentration of companies producing goods and services with higher value added, for example, the JSC "Latvijas Dzelzcels", the JSC "Rigas Brivosta", the JSC "Latvenergo" etc. in Riga statistical region, the international airport "Riga", the JSC "Olainfarm", the JSC "Tukuma piens" and so on in Pieriga statistical region, the JSC "Dobeles dzirnavnieks", "Agrolats" Ltd and others in Zemgale statistical region.

As to the area, Vidzeme statistical region (15246 km²) covering 23.6% of total territory of the country is the largest region (Table 2).

The density of population is the smallest in Vidzeme statistical region (15.0 people/km²). Though, Riga statistical region occupies only 0.5% of total territory of the country, the density of population here reaches 2356.2 people per square metre, which exceeds the average population density indicator of Latvia more than 67 times in 2012 (34.5 people/km²). Pieriga statistical region (67.9 people/km²) almost twice exceeding the average population density indicator of Latvia is the second largest region by the density of population. Pieriga

Table 2

Territory of the statistical regions of Latvia and population density in 2012

Regions	Area, km²	Share of area in the total territory of the country, %	Density of population, people/km²
Riga	307	0.5	2356.2
Pieriga	10 130	15.7	67.9
Vidzeme	15 246	23.6	15.0
Kurzeme	13 596	21.1	21.6
Zemgale	10 733	16.6	25.5
Latgale	14 550	22.5	22.7

Source: data summarised and calculated by the authors based on Zinojums par…., 2012

Table 3

Number of population in the statistical regions of Latvia for the period of 2006-2012, thousand

Region	2006	2007	2008	2009	2010	2011	2012	Changes 2012/2006
Riga	706.6	702.6	697.3	687.4	673.4	659.4	650.5	**-56.1**
Pieriga	366.4	368.9	372.7	374.5	373.9	372.0	368.2	**1.8**
Vidzeme	235.8	231.8	228.4	224.1	218.2	211.9	208.1	**-27.7**
Kurzeme	297.9	294.0	290.6	286.0	279.3	271.1	266.3	**-31.6**
Zemgale	276.5	273.8	271.1	267.7	261.6	255.1	250.2	**-26.3**
Latgale	344.7	337.8	331.6	323.0	314.1	304.9	298.5	**-46.2**

Source: Iedzivotaju skaits …, 2012

statistical region is also the second smallest region in Latvia by the territory (15.7% of total territory of the country).

As to the number of population, Riga statistical region is also the largest region in Latvia (Table 3). Almost one third of the population of Latvia live in Riga city, i.e. 650.5 thousand people or 32% of the total population.

The number of population in Latvia has gradually deceased since the regaining independence; mainly due to migration and demographic processes. More substantial emigration wave related with the expansion of labour force mobility opportunities was evident after Latvia's accession to the European Union in 2004. The next emigration wave started with the beginning of the economic crisis in 2009.

Data of Table 3 show that in 2012 (compared with 2006) a quantitatively significant decrease in the number of population was evident in Riga statistical region where the number of population decreased by 56.1 thousand people or 7.9%. The change of place of residence for Pieriga region might explain the large decline in the population number. This is evidenced also by the fact that Pieriga region is the only region where the number of population has increased by 1.8 thousand people or 0.5%. As to the data analysis by regions, the number of population has particularly increased in the counties of Adazi, Babite, Carnikava, Garkalne, Ikskile, Kekava, Marupe, and Stopini. The most rapid decrease of population was observed in Latgale where the population has declined by 46.2 thousand people or 13.4% (2012 vs. 2006). As to the counties, the largest population decrease was evident in Baltinava, Cibla, Aglona, Vilaka, and Dagda counties. Hence, the number of population in Latvia has decreased by 186 thousand or 8.4% for the period of 2006-2012.

The analysed socio-economic indicators of the statistical regions of Latvia allow the authors to conclude that the statistical regions of Latvia are very diverse by their territory, number of population, density of population, and economic development level. Better socio-economic situation is evident in the central part of Latvia, especially in Riga and Pieriga. The situation deteriorates in the regions farther from Riga, especially in Latgale and the South-western part of Kurzeme. The development of Latvia's regions is heterogeneous. General performance of the regions is significantly affected by the size and number of cities and towns located in particular regions, for example, there is only one big city Daugavpils in Latgale which produces almost a half of total GDP in the region. If adding another big town Rezekne, these two towns already ensure more than two thirds of the GDP produced in Latgale. Liepaja and Ventspils, in turn, compose more than a half of the GDP produced in Kurzeme. The structure of sectors also play an essential role in the development of regions; here, the most important aspects being the available natural resources, geographical location, developed infrastructure, and historical traditions.

Immovable property tax by the regions of Latvia

Tax policy operates as one of the government instruments for the development of state competitiveness.

Table 4

Tax revenues in the basic budgets of local governments by the statistical regions of Latvia in 2011

Region	Total budget revenues, mln LVL	Tax revenues, total, mln LVL	Personal income tax		Immovable property tax		Other taxes, mln LVL
			amount, mln LVL	Share,%	amount, mln LVL	Share,%	
Riga	459.70	321.73	263.82	82.0	55.25	17.2	2.66
Pieriga	249.15	154.95	131.86	85.1	22.65	14.6	0.44
Vidzeme	154.71	58.64	52.05	88.8	6.36	10.8	0.23
Kurzeme	183.66	83.91	72.58	86.5	10.96	13.1	0.37
Zemgale	167.05	77.93	69.11	88.7	8.53	10.9	0.29
Latgale	201.18	66.85	60.03	89.8	6.45	9.6	0.37

Source: data summarised and calculated by the authors based on Regionu attistiba…., 2011

Table 5

Immovable property tax revenues by the statistical regions of Latvia for the period of 2009-2012, mln LVL

Region	Immovable property tax revenues per capita on average, LVL				Immovable property tax revenues, mln LVL			
	2009	2010	2011	Forecast for 2012	2009	2010	2011	Forecast for 2012
Riga	54	65	79	85	38.63	45.86	55.25	58.64
Pieriga	32	41	53	65	13.73	17.17	22.65	26.89
Vidzeme	16	23	28	32	3.92	5.35	6.36	6.76
Kurzeme	25	31	40	42	7.45	9.21	10.96	12.30
Zemgale	18	24	31	37	5.11	6.69	8.53	9.27
Latgale	13	18	22	23	4.18	5.41	6.45	6.83

Source: data summarised and calculated by the authors based on Regionu attistiba…., 2009, 2011, Zinojums par …., 2012

Regionally, taxes are used to support a certain sector or region, thus, obtaining tax advantages. Taxes should also promote social and economic development of the country (Ketners K., 2009).

Immovable property tax is a public tax which is administered by local governments and its revenues are accrued to the budgets of local governments. Immovable property tax is usually a relevant source of budget revenues for local governments thanks to a relatively simple tax administration and fixing to a certain territory.

The analysis of tax revenues by the statistical regions of Latvia (Table 4) show that tax revenues play a significant role in the revenue formation in the basic budgets of local governments.

The share of tax revenues in total basic budget revenues of 2011 of the statistical regions of Latvia was the following: 69.9% in Riga, 62.2% - Pieriga, 46.7% - Zemgale, 45.7% - Kurzeme, 37.9% - Vidzeme, and 33.2% - Latgale (Regionu attistiba...., 2011).

The analysis of tax significance in total tax revenues of local governments reveals that personal income tax revenues compose the largest share of revenues in 2011. Personal income tax revenues in the statistical regions of Latvia ranged between 89.8% (Latgale statistical region) and 82.0% (Riga statistical region) of total tax revenues.

The second largest group of revenues is made by immovable property tax revenues. The share of immovable property tax by the statistical regions of Latvia in total tax revenues ranged between 17.2% (Riga statistical region) and 9.6% (Latgale statistical region).

Table 5 depicts the analysis of immovable property tax revenues broken down by the statistical regions of Latvia for the period of 2009-2012.

According to the information summarised in Table 5, the largest immovable property tax revenues in absolute figures are collected in Riga, followed by Pieriga, Kurzeme, Zemgale, Latgale, and Vidzeme statistical regions. Riga presents also the largest average immovable property tax revenues per capita. However, analysing immovable property tax revenues by counties, it may be concluded that the largest immovable property tax revenues per capita in 2011 were characteristic to Jurmala city (LVL 113), Marupe county (LVL 110), Saulkrasti county (LVL 103), Garkalne county (LVL 95), Carnikava county (LVL 89), and Babite county (LVL 85), while Riga city ranked only in the 7th position (LVL 79). Similarly the analysis of immovable property tax revenues in absolute figures in 2011 reflects that Jurmala city (LVL 6.37 million or 28%) ensures the largest revenues in Pieriga statistical region, Valmiera town (LVL 8.99 million or 14%) in Vidzeme statistical region,

Table 6

Immovable property tax revenues and share in the statistical regions of Latvia by the type of taxable items in 2011

Region	Indicator	Land	Buildings	Engineering constructions	Residential buildings	TOTAL
Riga	amount, mln LVL	28.79	19.08	0.28	7.10	55.25
	Share,%	52.1	34.5	0.5	12.9	100
Pieriga	amount, mln LVL	15.35	3.84	0.25	3.21	22.65
	Share,%	67.8	16.9	1.1	14.2	100
Vidzeme	amount, mln LVL	4.36	1.11	0.23	0.66	6.36
	Share,%	68.6	17.5	3.6	10.3	100
Kurzeme	amount, mln LVL	7.43	2.38	0.21	0.94	10.96
	Share,%	67.8	21.7	1.9	8.6	100
Zemgale	amount, mln LVL	5.74	1.62	0.21	0.96	8.53
	Share,%	67.3	19.0	2.5	11.2	100
Latgale	amount, mln LVL	4.13	1.44	0.16	0.72	6.45
	Share,%	64.1	22.3	2.5	11.1	100

Source: data summarised and calculated by the authors based on Zinojums par...., 2012

Liepaja town (LVL 2.97 million or 27%) in Kurzeme statistical region, Jelgava city (LVL 1.95 million or 23%) in Zemgale statistical region, and Daugavpils city (LVL 2.03 million or 32%) in Latgale statistical region (Regionu attistiba...., 2011).

The data of Table 5 show that immovable property tax revenues have a tendency to increase annually in absolute figures. A significant increase in the share of immovable property tax revenues in general tax revenues of the statistical regions was experienced starting from 2010 with the increase of immovable property tax rate for land (from 1% to 1.5%) and the expansion of the set of items taxable with immovable property tax. Starting from 2010, the immovable property tax is levied upon engineering constructions (a tax rate of 1.5%) and residential buildings (a tax rate of 0.1-0.3%). In 2011, the tax rate for residential buildings was doubled to 0.2-0.6%, thus, also increasing the revenues from immovable property tax and reaching the highest indicators by the statistical regions of Latvia in 2011.

The analysis of immovable property tax rates by the statistical regions of Latvia outlined that the largest share or 50.2% of total immovable property tax revenue amount collected in 2011 was obtained in Riga statistical region followed by Pieriga statistical region with the share of collected tax revenues of 20.5%, Kurzeme statistical region – 9.9%, Zemgale statistical region – 7.7%, Latgale statistical region– 5.9%, and Vidzeme statistical region– 5.8% (Regionu attistiba...., 2011).

These data allow concluding that the immovable property tax is very significant particularly for the local government of Riga city. Immovable property tax revenues in Riga city compose more than a half of total immovable property tax revenues in Latvia.

Table 6 outlines the breakdown of immovable tax rate revenues by the type of taxable item (land, buildings, residential buildings, and engineering constructions).

According to the data analysed in Table 6, in 2011, the immovable property tax on land constituted the largest amount of revenues in the statistical regions of Latvia. As to the amount of revenues, immovable property tax revenues on land collected by the statistical regions of Latvia exceeded half of the total amount of collected immovable property tax revenues – ranging between 68.6% (Pieriga statistical region) and 52.1% (Riga statistical region). Buildings were the second taxable item in terms of revenues, the share of which was between 34.5% (Riga statistical region) and 16.9% (Pieriga statistical region). Immovable property tax on residential buildings, in turn, composed between 14.2% (Pieriga statistical region) and 8.6% (Kurzeme statistical region) of total tax revenues. As to the revenues, the smallest amount of immovable property tax was collected on engineering constructions which constituted between 3.6% (Vidzeme statistical region) and 0.5% (Riga statistical region) (Zinojums par...., 2012).

The authors conclude that immovable property tax revenues differ by the regions of Latvia. Diverse socio-economic indicators like the size of region, number and density of population as well as different economic development of the regions and real estate prices are the main reasons for the differences observed in the statistical regions of Latvia.

The cadastral value of immovable property is also very significant, besides the value is most directly affected by the type of use and location of immovable property. The value of immovable property changes depending on the property location – whether it is located in a prestige area (Riga, Jurmala etc.) or its vicinity with well-developed infrastructure, or it is located in the border area of the country – a distant place without a real demand for property on the real estate market or its practical application.

Larger amount of immovable property tax is collected in cities – Riga, Jurmala, Daugavpils, Liepaja, Jelgava, and individual counties of Pieriga (Marupe county, Adazi county) with the highest population density and real estate market activities.

Changes in the application of immovable property tax effective from 2013

Starting from 2013, considerable changes have been introduced in the sphere of immovable property tax. Hence, from 2013, local governments are eligible to issue Binding Regulations for setting and administration of immovable property tax and to determine immovable property tax rates within a government set range from 0.2% to 3% consistent with the targets and needs of each local government. A limit of 1.5% is set for the tax rate fluctuations (from 0.2% to 3%) up to which local governments may voluntarily determine tax rates. The rate exceeding 1.5% may be levied only upon immovable property which is not managed consistent with the procedure prescribed by the regulatory enactments, for example, hovels located in the territory of a local government and degrading the environment and endangering the population safety as well as unutilised agricultural area (Par nekustama ipasuma...., 2012).

Under the law "On Immovable Property Tax" the local governments shall observe single principles for setting tax rates from 2013. The Law prescribes four principles which every local government shall observe when determining the immovable property tax rate:

1) principle of equitable grouping under which taxpayers or taxable items are grouped consistent with equitable criteria, for example, taxpayers – natural entities and legal entities; taxable items – residential buildings, production units, business units etc.;
2) principle of efficiency under which a local government proportionates tax administration expenses with tax revenues. This principle means that a local government shall evaluate the application of appropriate tax administration measures to proportionate them with the forecasted tax revenues resulting from the implemented measures;
3) principle of responsible budget planning under which a local government balances its responsibilities with the resources necessary for the performance of responsibilities. As to the immovable property tax, it means that a local government prior to the decision on the applicable tax rate or rates shall evaluate the forecasted immovable property tax revenues (so a taxpayer is sure that a tax rate for the coming year will not be unexpectedly 1.5% for all flats);
4) principle of predictability and stability under which tax rates are duly set for at least a two-years period if the increase or decrease of immovable property base value is less than 20% comparing the base values in the taxation year and the pre-taxation year (so a taxpayer is sure that a tax rate for the coming year will not be unexpectedly 1.5% for all flats).

The law "On Immovable Property Tax" also prescribes three optional principles which a local government may apply or not apply on its own judgement:

1) principle of business support under which a local government applies the tax rate as means to increase the competitiveness of businesses or certain sectors of business operating in its territory by observing the state aid provisions;
2) principle of social responsibility under which a local government reckons on the impact of tax rate on the groups of socially less-protected and needy population as well as ability of population to pay taxes. The principles of business support and social responsibility are stated as optional principles, since local governments already previously had an opportunity to support both business and population through the application of tax allowances;
3) principle of the territorial development and arrangement under which a local government applies the tax rate to promote the development and arrangement of its territory. This principle is closely related with the principle of business support, since business promotion is one of the main instruments to ensure territorial development.

As to the application of tax allowances, the local governments are obliged to follow the principles of equitable grouping, efficiency, responsible budget planning, and social responsibility; while the application of the other principles is optional for local governments.

The immovable property tax is the only tax in Latvia which requires the consideration of the tax imposition principles for determining tax rates.

The analysis of Binding Regulations adopted by the largest cities and counties of Latvia (regulations adopted to the beginning of January 2013, since the Binding Regulations of many local governments are still under the process of development) allows concluding that the majority of local governments have retained the limitation for the increase of immovable property tax in 2013 for land (the amount of immovable property tax in 2013 may not exceed the amount of tax calculated for the previous taxation year by more than 25%) as well as the tax is not imposed upon auxiliary premises of residential buildings. Though, an additional rate of 1.5% is imposed upon degraded, crashed buildings (Par nekustama …, 2012; Nekustama ipasuma nodokla…, 2012; Nekustama ipasuma …, 2012; Kartiba, kada..., 2012).

Jelgava and Riga city councils are the only local governments which have used their rights to determine immovable property tax rates within the range of 0.2%-3% set by the central government.

Jelgava City Council has prescribed that the immovable property tax rate is between 0.2% and 0.6% (depending on the cadastral value of immovable property) for residential buildings which are owned by business entities or business entities have a legal possession on them, and the functional use purpose of these buildings is living, if they are rented for living and they have been a declared place of residence of a tenant in this property for at least three months. The rate of 1.5% is applied if the rental agreement is not concluded or a real estate rented by a business entity has not been a tenant's declared place of residence for at least three months from the contract conclusion date (Nekustama ipasuma..., 2012).

Though, Riga City Council does not apply the limitation for the increase of immovable property tax for land from 2013 and adjusts the tax burden through tax rates. In 2013, Riga City Council has determined an immovable property tax rate equalling 1% from the cadastral value of a land unit for legal entities and natural entities whose declared place of residence is the administrative territory of Riga city on January 1 of the taxation year. The tax rate equalling 1.5% from the cadastral value of a land unit is determined for natural entities whose declared place of residence is outside the administrative territory of Riga city on January 1 of the taxation year (Par nekustama..., 2012).

These rates are imposed in Riga city consistent with the compulsory principles prescribed by the law "On Immovable Property Tax":

1) principle of equitable grouping – taxpayers are grouped consistent with equitable criteria – a taxpayer is a natural entity or a legal entity; whether the natural entity is declared in Riga or outside Riga, i.e. a reduced rate will be applied if a natural entity – a payer of immovable property tax is a resident of Riga city;
2) principle of efficiency – application of the set rate does not require additional administrative resources, adjustment of software requires insignificant improvements;
3) principle of responsible budget planning – further abandonment of the application of limitation for the tax increase will partly compensate the reduction of tax rate for land up to 1%, thus, ceasing the unequal attitude towards taxpayers, since the law "On Immovable Property Tax" envisaged the limitation for the increase of tax only for a part of taxpayers. Besides, since the reduced rate is applicable only to legal entities and natural entities declared in Riga, such a regulation would encourage natural entities to declare in Riga, and thus, the increase of personal income tax revenues;
4) principle of predictability and stability – it is not envisaged to change the set rates also in the coming taxation year.

The determination of a reduced tax rate for land for the mentioned categories of taxpayers requires also the application of the principle of social responsibility and the principle of territorial development and arrangement prescribed by the law as an optional principle. Hence, the declaration of immovable property taxpayers – natural entities in Riga is enhanced, i.e. promoting the increase of personal income tax revenues in the budget of Riga City local government and allowing contribution of additional resources for the development of the city. Besides, business promotion is one of the main instruments to ensure territorial development.

Conclusions, proposals, recommendations

1. The statistical regions of Latvia are unequally developed and differ by size of the region, number and density of population, and economic development level. The structure of sectors also play an essential role in the development of regions; here, the most important aspects being the available natural resources, geographical location, developed infrastructure, and historical traditions.
2. The diverse basic indicators of socio-economic development of the statistical regions of Latvia – size of the region, number and density of population, and different economic development of regions and prices of real estate serve as the reason for different immovable property tax revenues.
3. Larger amount of immovable property tax is collected in cities – Riga, Jurmala, Daugavpils, Liepaja, and Jelgava as well as in individual counties of Pieriga (Marupe county, Adazi county), i.e. places with the highest population density and real estate market activitis.
4. Starting from 2013, the government of Latvia has introduced considerable changes in the application of immovable property tax - to confer the rights to local governments to determine immovable property tax rates within a range from 0.2% to 3% in their administrative territoris.
5. The immovable property tax is the only tax in Latvia, the determination of which requires the observance of the principles of equitable grouping, efficiency, responsible budget planning, predictability and stability, business support, social responsibility, and territorial development and arrangement.

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THEORY OF AUCTION ON THE EXAMPLE OF THE TENDER PROCEDURE ORGANISED BY THE ANR AGENCY

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Abstract. The paper presents the possibility for using the theory of auctions in the area of business run by the Agricultural Property Agency. This institution is organising tenders addressed to farmers, which are the subject of real estate. The reason for touching this problem was the dynamic development of the subject of game theory, including the theory of auction and making the applications, especially in economics.
The introduction gives an overview on the activities and definitions of the ANR auction as well as bidding and tender within the meaning of the law. The summary presents the principles of their organisation and the course in terms of procedure.
These auctions are discussed in the context of the theory of auctions in the first section. First, the dynamic auction is analysed, and the tree is depicted in the game. The following part discusses the static auctions in two aspects: the first one is concerned with the approximate optimal value, which, in turn, depends on the number of players and individual valuations; the second aspect is concerned with the analysis of the expected income of the seller.
The presented article is a simulation, because of the difficulty in obtaining data in this sphere. The calculations and various tools of the performed mathematical optimisation were made with the use of Mathematical software.
The main research aim is to present the possibilities of using the mathematical theory for modelling auction tenders organised by the ANR agency.
Key words: theory of auction, valuation, the Agricultural Property Agency (ANR).
JEL code: C14

Introduction

The Agricultural Property Agency has been carrying out its activities since 2003 (previously operated as the Agricultural Property Agency of the State Treasury). Its main task is to manage the assets held by the Agricultural Property Resources Treasury (WRSP). Sales of property by the ANR are governed by the Law on the Management of the State Treasury of 19 October 1991 and the Law on the State Treasury of 14 October 1999. These laws prescribe a detailed procedure for sales of the property and its components, the conditions for breaking down sales price instalments of the estimated land rates, and the methods of conducting tenders for the lease. The laws define in detail the procedure to be followed during the sales, and it can be done in two ways: a written tender and an oral auction (auction). The most important step in the auction is to report the offers of the participants or their representatives at the same time and place. Those reporting higher bid are signalled by the use of words or gestures. The result of this auction is the legal consequences. Part of an oral contract can be divided into the following additional steps:

a) the preparation, the announcement and the opening of the tender (done by the ANR or an entity authorised by it)
b) competition bidders for contracts of purchase / lease (the offer made during the auction expires, when another bidder makes a more favourable offer;
c) closing of the tender (Arrivals and announcement of a winer);
d) if it is necessary - submitting of letters of intent by the winner and the organiser (e.g. Mozdzen - Marcinkowski M., 003).

The tender is the most important step in writing an offer of purchase / lease. This form is applicable to situations that are more complex and require more sophisticated comparative analysis of all components of the offer, and the auctions are primarily used in cases where a tender is declared a certain amount ofmoney.

According to the Act, the tender may be limited or unlimited. Unlimited nature of the accession is allowed to all persons who have legal capacity to act. The ANR agency, however, has the option of requiring bidders limitations associated with the need to meet certain formal requirements or submission of pre-dposit.

Research results and discussion

1. Dynamic actions

One can distinguish several types of auctions. The first basic division separates static and dynamic auctions. The latter is nothing but the usual auction. Sets of the players can be very large, depending on their capabilities (usually these sets are called valuation) and number. A characteristic feature is that each of the possible strategies end up with one of two results: win or buying a fixed price auction item; or loss or buying at a certain price by another particpant.

Each auction of this type can be represented by the so-called game tree. An example of such a tree is shown

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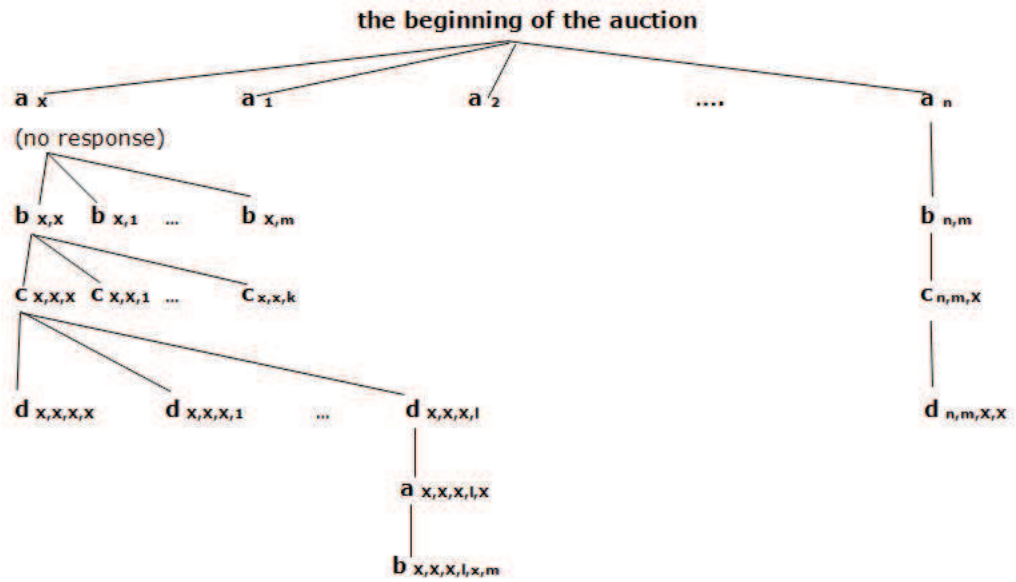
Table 1

Offer of the best players

Players (valuations)	The optimal bid $B(V_i)$ for n=4	n=10	n=40
450000	437500	445000	448750
500000	475000	490000	497500
600000	550000	580000	595000
800000	700000	760000	790000

Source: authors' construction



Source: authors' construction

Fig. 1. **Game tree**

in Figure 1 where it is assumed that four players (A, B, C, and D) have joined the auction. Each of them has a corresponding numerical value - the amount one can pay for the property, in other words, if the land is sold to the player for the price p, then p = ui, where ui - player and the payment of the remaining player is 0.

The auction is held for an agricultural land with an ea of 1 hectare. Starting price was set at 15 000 thousand units. The basic organising principle for the auction is that participants may submit bids in order from A to D, each of them being the voice, which may increase the amount or cancel the increase that is equivalent to a resignation. To sum, the game can end in two cases: in the beginning, when one turns the tone while none of the players increases the starting amount (each payment is equal to 0) or when the other three give up and one player buys a plot of land at a price $p \leq u$. Restrictions on pricing by each of the players are as follows: Ua = 20 000, Ub = 30, 000, Uc = 18, 000, and Ud = 25 000units.

The player A is the first to vote and s/he may take one of the following decisions: give up the shill bidding (a_x) or suggest one of the following amounts: a_1, a_2, ... a_n. The choice of the next player (B) is determined by the decision made by the player A, and so depending on that choice, s/he can opt out of participation in the auction at this stage (top $b_{x,x}$) or increase the amount of any of the possible amounts. There is, of course, the need to describe the problem as a whole, the figure is also limited to the presentation of the tree (it would be much larger). This type of the scheme should not be confused with the game on the grounds, where the participants always have clear preferences for each possible outcome of the game (Malawski M., 1997). However, it can be stated that using such a tool, which is the tree of the game, it is possible to represent graphically all the possible alternatives, the auction process, and the possible results.

2. Static actions

Static first-price auctions rely on the fact that the participants make bids and select the proposals with that the highest price, i.e. as it can be seen in contrast to the previously discussed model, where the participants do not even have the opportunity to respond to the actions of competitors. In organisational terms, it is the easiest way to carry out the ation.

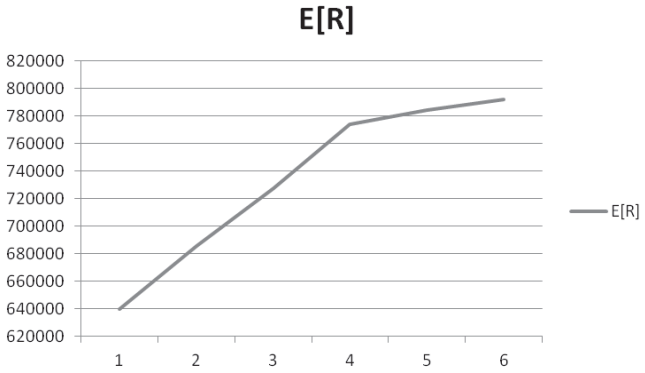
Below is an example of this type of game. It was assumed that the participants do not know the valuation of their rivals, and it is known for the probability distribution of these values. The selected uniform distribution is expressed by the equation:

Table 2

The expected income of the seller

n	E[R]
4	640000
6	685714,29
10	727272,73
30	774193,55
50	784313,73
100	792079,21

Source: authors' construction



Source: authors' construction

Fig. 3. **The expected income of the seller**

$$f(x)=\begin{cases}1/(b-a), & x \in (a,b)\\ 0, & \text{otherwise}\end{cases}$$

However, this distribution is the distribution function of the form:

$$F(x)=\begin{cases}0, & \text{dla } x \le a\\ (x-a)/(b-a), & \text{dla } a < x \le b\\ 1, & \text{dla } x>b\end{cases}$$

This type of distribution is selected on the grounds that the valuation of each set can be divided into the top and bottom. They form a set of the closed interval and Random selection of each of the values (assuming that each participant has a different valuation) is equally likely. In addition, each player knows how many there are rivals.

Taking the above assumptions, the optimal offer of the player can be defined:

$$B(v_i)=V_i-\left[\int_{p0}^{Vi}(F(x))^{n-1}dx\right] / [F(V_i)]^{n-1},\ (i=1,2,3,....,n),$$

where:

Vi - valuation the i^{th} player;

F(x) - valuation of the distribution;

F(Vi) - value of the distribution function at the point of V_i, the probability of selecting at most equal to Vi (less equal);

p_0 - the minimum price, the price at which the seller is willing to sell the item listing. If one assumes that p_0 = a, then the appropriate equation substitutions and transformations can be reduced to the form:

$$B(v_i)=V_i-[(v_i-p_0) / n]$$

It was assumed that the property is auctioned built on an area of 3 hectares, the starting price was set at PLN 400 000. The auction involved four participants whose values are as follows: V_1 = 500 000, V_2 = 450 000, V_3 = 800 000, and V_4 = 600 000 units. Table 1 shows an optimum value for each player based on the number of participants. For each of them, the following assumption is proper - the more players, the higher are the individual offers. This also follows from the equation:

$$\lim_{n\to\infty} V_i-[(v_i-p_0) / n]=v_i$$

One may also consider the changes in the expected income of the seller, depending on other parameters. For this purpose, b^* - the winning bid, where $b^* = \max_{i=\{1,2,3,\ldots,n\}} b_i$.

Here, *R* denotes the income of the seller, which is a random variable. It has been shown that the expected revenue of the seller can be expressed by the equation:

$$E(R)=n \int_{p0}^{\infty}[V F(V))^{n-1} - \int_{p0}^{v}(F(x))^{n-1}dx] f(v) dv \quad (i=1,2,3,....,n)$$

However, the substitution of uniform distribution can lead to the following equation:

$$E_n(R)=b- [2(b-a)/(n+1)] - [(p_0-a)^n / (b-a)^n] [b-(2(a+p_0 n)) / (n+1)],$$

where:

[a,b] - range in which the offer is made (uniform distribution);

p_0 - minimum price (bid);

n - number of participants in the auction.

The analysis of the figure can lead to a conclusion that the growth rate of expected revenues of the seller is definitely much better at the beginning. The number of participants in the auction outlines over twenty not as clear increases (the function becomes more horizontal).

Another interesting type of sales is a Vickrey auction (otherwise known as the second price auction). The winner is the person who offers the best price - buy it; however, the subject of the highest bid is at the price of others. The strategy, which is the most advantageous in this situation, lies in the fact that individual participants are equal to their individual valuations. If a player A offers a price lower than its valuation (guided self-confidence, understanding that his offer is still high and has a good chance of winning the auction - part of the desire to save), then this action is unwarranted and it creates unnecessary risk. The essence of such items is that the player does not have any influence on the price at which the item to buy, only whether or not to buy it. This strategy is called weakly dominant, and assuming the rationality of players, all of them reveal their true valuation (Malawski M., 1997).

Conclusions, proposals, recommendations

The auction theory can be successfully used for the analysis of tenders organised by public institutions. From the point of view of players, this technique may allow selection of the most appropriate strategies and favourable valuation estimate of an auction item. The main problem lies in the fact that the participants usually do not know the number of competitors and their planned strategy.

Institutions organising sales and using the procedure discussed in the introduction can also gain significant benefits from the knowledge of the theory. A key role is played by the right choice for the auction. It just depends on the attractiveness of the proposed offer for auction static, which is ultimately submitted to the income of the seller.

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CAPITAL RAISING IN THE BALTIC STATES: LESSONS LEARNED AND FUTURE PROSPECTS

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Abstract. The raising of capital is to a certain extent connected with the business cycle. It is rather difficult for most companies to raise external capital during the economic recession. Therefore, it is important for the company to analyse different sources of financing and decide on the best one, taking into the account also the business cycle.
The aim of the paper is to analyse the trends in capital raising and to evaluate the impact of the debt ratio on the performance of a company within the business cycle.
All correlations between the debt ratio and the financial ratios included in the study are negative regardless of the business cycle. The current ratio was the highest for Group 1LD (LD-low debt). Return on sales also shows constant results – this ratio was also the highest for Group 1LD in 7 years (out of 8). Return on equity, on the contrary, outlines different results – in 4 years the highest ratio was for Group 2MD (MD-medium debt), in 3 years for Group 1LD and in 1 year for Group 3HD (HD-high debt). Group 3HD has consistently shown the worst results of all indicators for the period of 2008-2011. The excessive (above average) debt financing leads to lower profitability, especially during the crisis.
Key words: capital, current ratio, debt, equity, profitability.
JEL code: G32

Introduction

Crises always provide opportunities for lessons to be learned. "No matter how different the latest financial frenzy or crisis always appears, there are usually remarkable similarities with past experience from other countries and from history" (Reinhart, Rogoff, 2009). This statement gives an idea that all crises are fundamentally the same, yet, every crisis comes "all of a sudden", and shortly after it the society once again forgets why the crisis occurred in the first place and makes the same mistakes again.

A company needs sufficient funds to support its investment activities. The company can employ different sources of capital – equity, debt, and hybrid securities. Financing decisions are crucial since the sources of capital have important consequences and can affect the value of the company. Using debt is less costly than equity, while the bankruptcy risk increases along with the leverage. In contrast, capital raising is to a certain extent connected with the business cycle. It is rather difficult for the most companies to raise external capital during the economic recession. Therefore, it is important for the company to analyse different sources of financing and to decide on the best one, taking into account the business cycle as well. It is easy to attract more debt capital during the economic boom, though, it is necessary to think how to repay the attracted capital in the future.

The research **hypothesis** – selected type of capital raising affects the performance of the company and this impact is different during various stages of the business cycle.

The **aim** of the paper is to analyse the trends in capital raising and to evaluate the impact of the debt ratio on the performance of the company within the business cycle.

The aim implies the following **tasks**: 1) to overview the results of previous research made in this field; 2) to analyse capital raising dynamics of the companies from the Baltic States; 3) to evaluate the impact of capital structure on profitability and liquidity; and 4) to draw the conclusions and recommendations.

The **methods** of the research include analysis and synthesis of scientific literature, a monographic method, the correlation analysis, the graphical method, and the analysis of statistical data.

The research is based on the published papers on capital raising, information provided by the Stock Exchange NASDAQ OMX Baltic (annual reports), the Central Bank of the Republic of Lithuania, Eesti Pank, Latvian Financial and Capital Market Commission, the Lursoft database. The research covers the period from 2004 to 2011.

Previous research can be divided in two groups: pre-crisis research mostly focuses on capital raising, yet recently studies explore the impact of capital structure on the performance of the company within the business cycle. A study by Mitton (2007) concludes that the average market-value debt ratio of the company in the emerging markets has increased by 15 percentage points between 1980 and 2004. Some lessons have been learnt by market participants, for example, acceptance of higher cost of capital (RBC Capital Markets, 2009). Campello, Graham, and Harvey (2010) surveyed 1 050 CFOs in the US, Europe, and Asia. Their results show that the impact of the credit crisis was severe on financially constrained companies, leading to deep cuts in R&D, employment, and capital spending. Chava and Purnanandam (2011) find that companies that primarily relied on banks for capital suffered larger valuation losses during this period and subsequently experienced a higher decline in their

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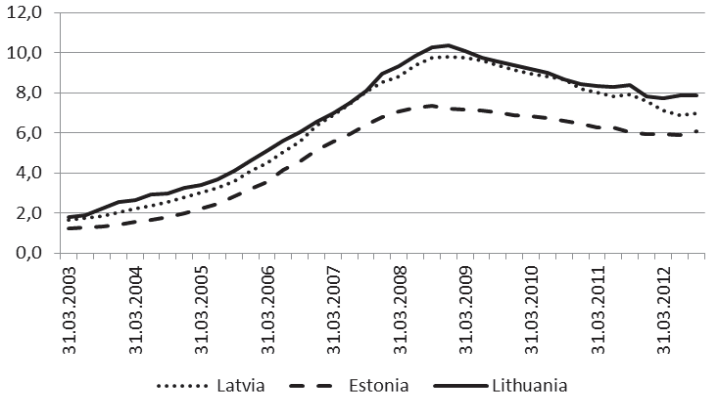


Source: authors' construction based on the Central Bank of the Republic of Lithuania, Eesti Pank and Financial and Capital Market Commission data

Fig. 1. **Stock of loans granted by MFIs to non-financial companies in the Baltic States, 2003-2012, EUR billion**

capital expenditure and profitability as compared with companies that had access to the public debt market. A study by Doukas, Guo, and Zhou (2011) looked at the motives of debt issuance during hot-debt market periods and its impact on capital structure over the period of 1970-2006. The cumulative change in book leverage of hot-debt market companies persists for more than five years after the hot-debt issue year. Hot–debt market companies do not attempt to reverse their high leverage resulting from hot-debt market issuance. A study by Mallick and Yang (2011) finds that while companies with high ratio of retained earnings-to-sales and equity-to-sales are significantly more profitable and more productive than companies with low ratio, debt financing by companies particularly in the form of bank loans leads to lower profitability and productivity, although not so in the case of debt raised through bounds. Kaya (2012) concludes that when the equity market is "hot", companies tend to choose equity financing over private placement financing and syndicated loan financing over equity financing.

Research results and discussion

1. Capital raising trends in the Baltic States

There are several sources of capital available for companies in the Baltic States. Companies can raise capital-using shares, bonds, loans from credit institutions, loans from the shareholders, convertible bonds, private equity etc. In the next paragraphs, the authors discuss the most common ways of capital raising; particular attention is paid to the sector of agriculture, forestry, and fishing.

Figure 1 represents stock of loans granted to non-financial companies in the Baltic States for the period of 2003 – 2012. All three Baltic States show a similar trend – stock of loans granted increased rapidly until the end of 2008, then it decreased; however, recently the stock of loans has levelled up (except Latvia, where this indicator is still decreasing in 2012).

Table 1 provides information on equity and bond market turnover (EUR million). The authors calculated the average monthly value of market turnover for the period of 2006-2012. In Lithuania and Estonia, the equity market was very active, if compared with the market of Latvia, where the market turnover was significantly less so. The difference was very pronounced before crisis; however, the gap has been reduced during the crisis. Activity of Lithuanian and Estonian equity markets decreased considerably during the crisis. Bond market is basically non-existent in Estonia; in Lithuania, the activity decreased during the crisis as well and Latvia also depicted some decrease in the market turnover.

After analysing the dynamics of three capital-raising markets – loans, equity, and bond markets – one can conclude that, before the crisis, Estonia had an active loan market and equity market, Latvia – loan market, and Lithuania – all three markets. On the contrary, starting with 2008, one can find a decrease in all markets; however, recently the loan market shows an upward trend.

By analysing the sector of agriculture, forestry and fishing, the authors find some differences. Figure 2 shows a proportion of loans granted by MFIs (monetary financial institutions) to agriculture, forestry, and fishing sector in Latvia. At the beginning of the period (30 June 2005), the proportion was 6.3%, the indicator decreased to 4.5% in March 2010 and 2.2% in June 2010. An increase in the indicator can be observed from June 2010.

Table 2 provides information on key indicators of agriculture, forestry, and fishing sector companies in Latvia for the period of 2005-2011. This period can be divided into two parts. Equity ratio decreased, profitability ratios were inconsistent and often close to 0 from 2005 to 2008. A medium strong correlation between the equity ratio and profitability ratios ROE and ROA (0.75 and 0.65, respectively) exists in this period. However, in the past three years all ratios – current ratio, equity ratio, return on equity and return on assets – show considerable improvement, even in the lower quartile. The current ratio is more than 1 and an increase in the equity ratio can be observed alongside with an increase in profitability ratios.

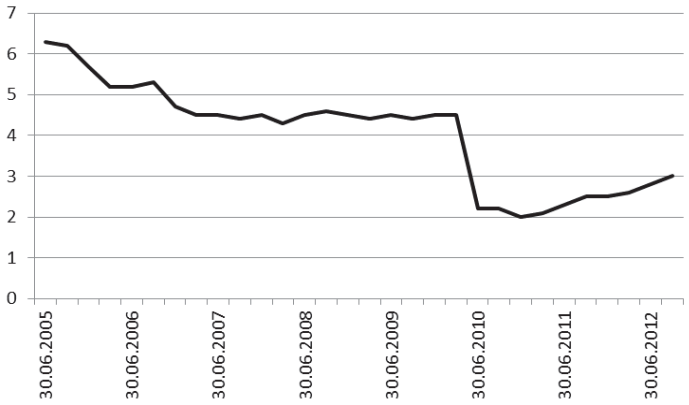
To sum up, a positive relationship between the capital structure and profitability ratios can be found in the sector of agriculture, forestry, and fishing – the profitability ratios decrease with the decrease of the equity ratio (and vice versa). Key indicators also show a conservative

Table 1

Equity and bond market turnover (EUR million) average month value in the Baltic States, 2006-2012

Year	Equity market		
	Estonia	**Latvia**	**Lithuania**
2006	63.80	7.04	133.90
2007	126.99	8.15	63.06
2008	51.49	2.37	27.67
2009	22.22	1.16	17.87
2010	20.28	1.74	18.65
2011	15.62	3.10	14.67
2012	11.21	1.26	11.14
Bond market			
	Estonia	**Latvia**	**Lithuania**
2006	0.045	0.13	37.03
2007	0.00083	3.71	21.80
2008	n/a	3.19	13.93
2009	n/a	1.99	13.16
2010	n/a	0.95	14.0
2011	n/a	0.11	7.05
2012	n/a	2.54	6.18

Source: authors' calculations based on the NASDAQ OMX Baltic data



Source: authors' construction based on the Financial and Capital Market Commission data

Fig. 2. **Proportion of loans granted by MFIs to agriculture, forestry and fishing in Latvia, 2005-2012, % of the total stock of loans**

approach in the past three years, as all profitability ratios increase with the increases of the equity ratio.

2. Empirical analysis and discussion of results

The study is based on financial data collected from the financial statements of 75 Baltic listed companies. The companies represent 9 different industries. The financial and real estate companies are excluded from the study due to their distinct balance sheet structure.

Table 3 shows the debt ratio for Baltic listed companies for the period of 1998-2011. Listed companies in Latvia can be characterised by the lowest debt ratio; however, an increase in the average debt ratio can be observed as well. Therefore, the gap has been reduced in the recent years. The average debt ratio for companies in Lithuania and Estonia was similar for the most number of periods and it fluctuated and increased less than in Latvian companies.

The data from the period of 2004-2011 were used for the correlation analysis and calculation of average ratios. Correlation measures the strength or degree of linear association between variables. The correlation coefficient measures the strength of (linear) association. The study used the following financial ratios:

— **Debt ratio** is calculated dividing liabilities by assets, this ratio indicates the proportion of company assets

Table 2

Key indicators of agriculture, forestry and fishing sector companies in Latvia, 2005-2011

Indicator		2005	2006	2007	2008	2009	2010	2011
Current ratio	Average	1.64	0.91	1.09	1.42	2.06	2.73	2.74
	Upper quartile	5.08	3.09	2.70	4.34	6.73	8.89	9.89
	Lower quartile	0.83	0.49	0.63	0.64	0.81	1.00	1.04
Equity ratio	Average	0.42	0.30	0.22	0.25	0.47	0.55	0.58
	Upper quartile	0.80	0.71	0.48	0.46	0.81	0.85	0.87
	Lower quartile	0.19	0.01	0.00	0.002	0.10	0.17	0.21
ROE, %*	Average	24.07	0.00	9.09	0.22	0.01	10.71	13.67
	Upper quartile	44.46	24.11	49.89	28.39	15.05	32.28	36.71
	Lower quartile	-3.27	-43.55	-63.76	-56.99	-22.68	-5.77	-1.40
ROA, %*	Average	7.03	0.25	3.66	0.99	0.28	6.46	8.05
	Upper quartile	20.40	10.73	12.66	7.84	8.47	18.92	20.48
	Lower quartile	-1.16	-10.78	-5.80	-13.44	-8.13	-1.43	0.00

*ROE – return on equity, ROA – return on assets
Average – median, upper quartile, lower quartile – mean

Source: Lursoft

Table 3

Debt ratio of Baltic listed companies in 2004-2011, %

Year	Latvia	Estonia	Lithuania
2004	15.71	34.55	26.75
2005	15.46	32.06	27.91
2006	18.29	26.79	26.00
2007	22.96	24.51	25.61
2008	22.66	29.29	29.76
2009	23.27	31.27	28.86
2010	23.33	28.17	26.80
2011	20.22	27.54	24.41

Source: authors' construction based on the NASDAQ OMX Baltic data

that are financed with the borrowed capital;
- **ROS** (return on sales) is calculated dividing net profits by sales;
- **ROE** (return on equity) is calculated dividing net profit by the stockholders' equity;
- **Current ratio** is measured dividing current assets by current liabilities, this ratio indicates the ability of the company to cover its current liabilities with its current assets.

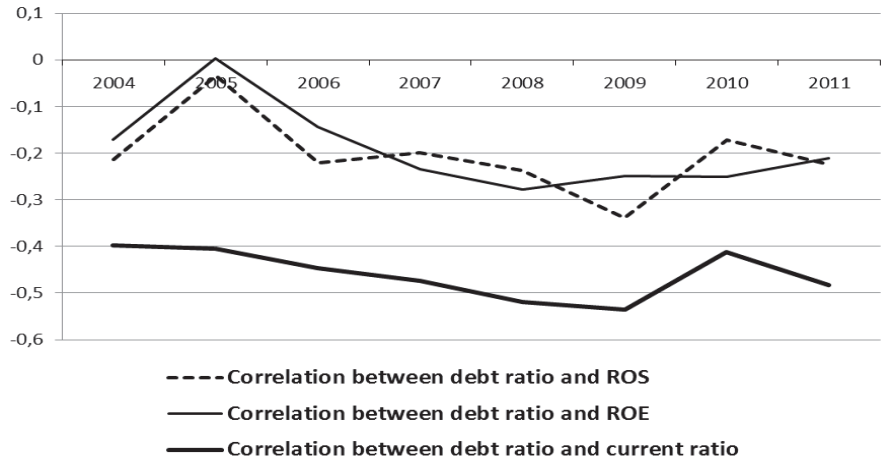
Figure 3 provides information on correlation between the debt ratio and other financial ratios included in the study for the Baltic States for the period of 2004-2011. Basically, all correlations are negative. Negative correlation between the debt ratio and current ratio can be expected; however, the Baltic listed companies have in common that the debt ratio and profitability ratios are negatively correlated regardless of the business cycle.

For further analysis, the companies for each year were divided into even three groups, depending on their debt ratio: 1LD – low debt, 2MD – medium debt, and 3HD – high debt. The average return on sales (ROS), return on equity (ROE), and the current ratio were calculated for each group (Table 4).

Before the financial crisis (2004-2007), all profitability ratios are positive and the current ratio is above 1 (if current ratio is less than 1, it indicates that a company may have difficulty to meet current obligations), regardless of the group. Logically, the average current ratio is the highest for Group 1LD. A remarkable conclusion is that most profitability ratios of period 2004-2007 are the highest for Group 1LD as well.

A prominent trend can be observed in the second period of 2008-2011 – all profitability ratios and the current ratio are the lowest for Group 3HD, for most of the time these ratios are significantly negative. Return on sales persistently is the highest for Group 1LD. However, return on equity shows mixed results – in some periods ROE is the highest for Group 1LD or Group 2MD.

To sum up, the current ratio was the highest for Group 1LD, regardless of the business cycle. Return on sales also shows constant results – in 7 years (out of 8), this ratio has been the highest also for



Source: authors' construction based on NASDAQ OMX Baltic data

Fig. 3. **Correlation between the debt ratio and other financial ratios included in the study for the Baltic States, 2004-2011**

Table 4

Average financial ratios for companies from the Baltic States, divided by the debt ratio level, 2004-2011

Year	Group	Debt ratio	Average ROS, %	Average ROE, %	Average current ratio
2004	1LD	0.0-9.9	6.6	12.9	4.3
	2MD	11.0-28.8	4.5	19.8	1.7
	3HD	30.8-88.3	1.8	8.7	1.8
2005	1LD	0.0-12.6	5.5	19.8	3.4
	2MD	13.2-26.5	6.2	18.8	2.4
	3HD	26.9-80.2	6.1	21.5	1.5
2006	1LD	0.0-9.6	9.1	20.8	3.1
	2MD	10.8-30.4	4.7	16.6	1.9
	3HD	31.2-64.8	5.2	19.8	1.2
2007	1LD	0.0-8.4	10.9	25.5	3.1
	2MD	9.0-28.9	4.4	24.5	1.7
	3HD	30.8-62.6	4.7	12.2	1.3
2008	1LD	0.00-11.6	3.0	9.0	3.3
	2MD	12.5-36.3	-0.6	9.1	1.8
	3HD	37.7-73.6	-3.1	-12.1	1.1
2009	1LD	0.0-16.4	3.5	16.6	3.7
	2MD	17.4-36.0	-4.1	8.1	1.7
	3HD	38.1-69.2	-11.5	-8.5	0.9
2010	1LD	0.0-8.9	2.3	14.6	4.5
	2MD	11.4-31.3	0.1	21.6	2.7
	3HD	33.0-64.8	-2.1	-0.2	1.0
2011	1LD	0.0-14.3	2.1	19.8	3.1
	2MD	16.0-33.9	-1.2	26.0	1.7
	3HD	34.4-68.0	-4.4	5.2	1.1

Source: authors' calculations based on the NASDAQ OMX Baltic data

Group 1LD. Return on equity, on the contrary, has different results – in 4 years the highest ratio has been for Group 2MD, in 3 years - for Group 1LD and in 1 year - for Group 3HD. An interesting conclusion it that the ROE has been the highest for Group 2MD in most cases for the second period of 2008-2011. In general, Group 3HD showed the worst results of all indicators for the period of 2008-2011. The authors conclude that the excessive (above the average) debt financing leads to lower profitability, especially during the crisis.

The authors recommend for companies to analyse their capital structure and avoid faulty decisions in any period of the business cycle. In the upward phase, a company can raise debt rather easily and cheaply; however, during the recession it is hard to raise capital. If too much debt capital is attracted in the upward phase, it can be difficult to repay it in the recession, since sales and profits usually decrease as well. In general, it is safer for the companies to stay within Groups 1LD and 2MD. Even though Group 3HD shows positive profitability ratios before the crisis, the decrease to negative ratios was very rapid.

Conclusions and recommendations

1. The sector of agriculture, forestry, and fishing in the Baltic States shows a moderate approach to capital structure and capital raising. Proportion of loans granted to this sector decreased before the crisis; however, an increase can be observed recently. Key indicators also show a conservative approach, since the equity ratio increases with the increase of all profitability ratios.
2. All correlations between the debt ratio and other financial ratios included in the study are negative. Negative correlation between the debt ratio and current ratio can be expected; however, there is a common trend for the Baltic listed companies that the debt ratio and profitability ratios are negatively correlated regardless of the business cycle.
3. The current ratio was the highest for Group 1LD, regardless of the business cycle. Return on sales also shows constant results – in 7 years (out of 8), this ratio has been the highest also for Group 1LD. Return on equity, on the contrary, has different results – in 4 years the highest ratio has been for Group 2MD, in 3 years - for Group 1LD and in 1 year - for Group 3HD. Group 3HD showed the worst results of all indicators for the period of 2008-2011. The excessive (above average) debt financing leads to lower profitability, especially during the crisis.
4. The authors recommend for companies to analyse their capital structure and avoid faulty decisions in any period of the business cycle. If too much debt capital is attracted in the upward phase, it can be difficult to repay it during the recession, since sales and profits usually decrease as well. In general, it is safer for the companies to stay within Groups 1LD and 2MD.

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APPLICATION OF FINANCIAL MARKET MULTIPLES IN STOCK MARKET DECISION-MAKING: THE CASE OF NASDAQ OMX RIGA

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Abstract. The paper investigates the use of financial market multiples in share trading decision-making on the NASDAQ OMX Riga Stock Exchange. First, the paper analyses the current research in the field of financial market multiples. It is followed by the calculation of financial market multiples in four public limited companies whose shares are traded on the Baltic Main List. The author puts forward recommendations on buying, holding, or selling shares. P/E and P/B multiples show approximately the same degree of accuracy for prediction of stock price changes one year ahead. The accuracy of predictions is greater than 50% which indicates that both multiples play a role in stock price prediction and share trading decision-making. The author concludes that, in Latvia, like in other markets, over time, the P/E ratio has a tendency to revert to a certain average.
Key words: multiples, P/E ratio, P/B ratio, NASDAQ OMX Riga, decision-making.
JEL code: G11

Introduction

The investors can use several financial market multiples to make independent decisions on the stock market: to buy, hold, or sell securities. As events during financial crises show, the reliance on predictions and recommendations of professional financial analysts does not always lead to maximisation of investor's wealth. Therefore, one may assert that at least for a part of investors it would be lucrative to conduct the fundamental analysis of shares by themselves with the aid of financial market multiples.

In the case of investments in stocks, the investor's wealth is formed by the sum of share price and dividends. To maximise wealth, one needs to use the financial market multiples skilfully. Therefore, it is topical to investigate the theoretical aspects of these ratios as well as to test empirically their usefulness in the fundamental analysis of stocks.

On the developed financial markets, the average level of the P/E ratio has changed over time (the periods of high P/E average were followed by stock market growth in the short-term and long-term that was not inspiring), and it is important to assess the changes of P/E in Latvian companies that were impacted by the economic crisis. There is a lack of research on the ability of P/E and P/B ratios to predict the return on stocks of Latvian companies.

The **object** of the paper is the financial market multiples and their role in decision-making.

The **hypothesis** of the research: P/E and P/B ratios have a role in share price forecasting and share trading decision-making.

The **aim** of the paper is, based on the investigation of theoretical aspects of financial market multiples, and the calculation and analysis of multiples of public limited companies traded on the NASDAQ OMX Riga, to provide recommendations in the field of stock trading decision-making.

Several **tasks** are advanced to reach the aim of the paper:

1) to analyse the existing research in the field of financial market multiples;
2) to calculate earnings per share, the book value per share as well as P/E and P/B ratios of companies traded on the NASDAQ OMX Riga;
3) to analyse and draw conclusions on the financial market multiples of companies traded on the NASDAQ OMX Riga;
4) to work out recommendations on buying, holding or selling of the analysed stock.

Several **methods** of economic and statistical analysis are used in the paper: content analysis, calculation of relative values, comparison and grouping of data as well as expert opinion.

The **period** of the study is the years 2006-2011. The data of this period reflect the impact of different levels of economic activity on stock market indicators and items of corporate financial reports.

The data of public companies traded on the Main List of NASDAQ OMX Riga, whose reporting year corresponds with the calendar year, were selected for the research.

1. Existing research in the field of financial market multiples

Financial market multiple is the relation of share price and an item in the financial statement. In the financial statement analysis and security valuation, the multiples are multiplied with the respective item of the financial statement – earnings, book value, sales, cash flow, thus, it means that there are such financial market multiples as the price-to-earnings (P/E) ratio, price-to-book (P/B) ratio, price-to-sales (P/S) ratio, and price-to-cash-flow (P/CF) ratio (Penman S.H., 2004). P. Fernandez, in the presentation on the most popular methods of company valuation used by the analysts, shows that the assessment by multiples occupies three places in the first

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four, while discounted cash flow valuation is only the fifth (Minjina D., 2008).

According to D. Minjina (2008), P/E and P/B are the most popular financial market multiples. A. Schreiner and K. Spremann, in their paper, conclude that the popularity of these two ratios among participants on the capital market in the United States has an impact on the market prices of US stocks (Minjina D., 2008).

Financial market multiples characterise the financial condition of the company, the value of shares, and the return. They give the information on the return on the capital invested by the shareholders and influence the price of shares. The level of financial market multiples determines the nature of corporate investment policy.

The financial market multiples can be used to evaluate not only a single company but a whole sector or sub-sector of industry as well as the entire stock market.

S. T. Lau, C. T. Lee and T. H. McInish (2002), in their paper with the data of Singaporean and Malaysian companies, have determined that there is a high correlation between modifications of P/E and P/CF ratios. In their study, there was no strong correlation among other financial market multiples.

The P/E ratio compares the stock price with earnings. In the numerator, there is the stock price determined on the stock exchange. The stock price reflects the opinion of the market on the value that a company will acquire from selling its goods and/or services in the future, i.e. future earnings. In turn, the denominator contains the relative indicator of current earnings which points out the value that the company is acquiring from current sales. Thus, one can say that the P/E ratio compares forecasts of future earnings with current earnings. If future earnings are expected to be significantly greater than current earnings, the P/E ratio will be high. If one expects future earnings to be lower than current earnings, the ratio has to be low. In other words, the P/E ratio reflects anticipated earnings growth (Penman S.H., 2004). It also reflects the current level of demand for the shares in question.

$$P/E = \frac{market\ price\ per\ share}{EPS}, \qquad (1)$$

where

P/E – price-to-earnings ratio;
EPS – earnings per share (Needles B.E., Powers M. and Crosson S.V., 2002).

The calculations use the market price per share at the end of the period (NASDAQ OMX, 2012).

By comparing the share price with earnings per share, one can analyse the valuation of the company and its shares by the market with relation to company earnings. Shares with a high and less risky earnings growth will usually have a higher P/E ratio, and vice versa. The higher is the ratio, the more speculative (riskier) is the investment (Knowledge@Wharton, 2001). The P/E ratio, which noticeably exceeds or is lower than historical confines, inevitably warns about the risk of correction in market price.

A company can have a low P/E ratio due to the fact that its earnings are unsustainably and temporarily high (the so-called Molodovsky effect; published in 1953). W. Beaver and D. Morse (1978) as well as S. H. Penman (1996) have proved that although P/E ratios have a positive correlation with future earnings growth, they have a negative correlation with current earnings growth.

In fundamental analysis of stocks, most often one believes that it is necessary to buy companies with low P/E ratios and sell companies with high P/E ratios (other conditions – especially earnings growth rate – being equal) (Penman S.H, 2004). Other conditions are rarely equal, and comparisons with other time periods and industries are problematic. Therefore, in the author's opinion, the ratio usually is useful when comparing market evaluations of companies in one sector of industry.

When drawing conclusions, one must find out whether there were one-off items during the reporting year that have artificially increased or decreased company earnings. It is necessary to investigate also whether they have influenced the share price on the stock exchange. S. H. Penman and X.-J. Zhang (2006) write that P/E ratios reflect the information on the sustainability of earnings only if the capital market is efficient.

The average P/E ratio for the US S&P 500 stock market index has ranged from 4.78 in December 1920 to 44.20 in December 1999, with the average of the ratios being approximately 15 (Knowledge@Wharton, 2001; Wikipedia, 2012b). There is an opinion that this kind of average belongs to the past because the expectation is that much of the negative events of the past will not repeat themselves (Shen P., 2000). R. A. Weigand and R. R. Irons (2005) revisit the conventional wisdom that high P/E ratios forecast negative future stock returns. Starting from P/E ratios of 21 or greater, 10-year real returns are in line with their long-term historical average, and real earnings growth is well above the average. J. Siegel believes that a P/E of 20 now would be equivalent to a P/E of 15 over the past 50 years (Knowledge@Wharton, 2001).

The market-average P/E ratio is influenced by the expected rate of earnings growth, the expected stability of earnings, the expected inflation, the return on alternative investments, the year in which it was measured, the size of the company, and the sector in which the company operates (Anderson K. and Brooks C., 2005). The results of the study by H. Ramcharran (2002) empirically show the importance of the growth rate of the economy and credit risk as the drivers in markets of developing countries that correspond with the results of studies on the capital markets in the developed countries. The variation of P/E ratios in emerging markets is determined by the economic growth rate. K. Aydogan and G. Gursoy (2000) determined the role of P/E and P/B ratios in long-term forecasting of market return in emerging equity markets. They infer that the return increases after the observation of low P/E and P/B ratios. However, the explanatory power of the return in their model in the short-term is very low which means that the potential investor cannot make excessive profits from the use of this model.

The first study that proved the relationship between P/E ratios and the return of the share market outside the US was the paper by R. Aggarwal, R. P. Rao and T. Hiraki (1990) about the securities traded on the Tokyo Stock Exchange. It compelled the financial market professionals and scholars to think for the first time about the global nature of this kind of correlation.

Table 1

Indicative approach to the analysis of P/E ratio

Ratio	Interpretation
N/A	Companies with losses (negative earnings) are usually treated as having an undefined P/E ratio
0-10	Either the stock is undervalued or the company's earnings are thought to be in decline. Alternatively, current earnings may be substantially above historic trends
10-17	For many companies a P/E ratio in this range may be considered fair value
17-25	Either the stock is overvalued or the stock may also be a growth stock with earnings expected to increase substantially in future
>25	A company may have high expected future growth in earnings or the stock may be the subject of a speculative bubble

Source: Wikipedia, 2012b

S. T. Lau, C. T. Lee and T. H. McInish (2002) have ascertained that share portfolios of companies making losses earn higher excessive profits.

When analysing the relationship of the P/E ratio with other securities, one recognizes that, for example, when the US bonds have a high yield, the investors are paying less for a fixed amount of earnings, and the P/E decreases (Wikipedia, 2012b). Wikipedia (2012b) also states that shares with high earnings growth rate have higher P/E ratios.

There are diverging interpretations of the P/E ratio. A prevalent opinion is that it is necessary to compare the current level of P/E ratio with the current interest rates. According to the Fed model, bond and stock markets are in equilibrium and represent fair values when the one year forward looking earnings yield (earnings-to-price ratio) equals the 10-year Treasury note yield (Wikipedia, 2012a). R. A. Weigand and R. R. Irons (2005) write that the use of the Fed model in investor decision-making has led to the cointegration of the P/E ratio and the 10-year Treasury note yield.

Wikipedia (2012b) offers the following simplified indicative approach to the analysis of P/E ratio reflected in Table 1.

High P/E ratio may cause the fact that the stocks are considered to be risky (Knowledge@Wharton, 2001).

Modern financial literature states that the main goal of the company owners and, thus, the whole company as well as its managers and other employees, is to maximise shareholder wealth. Shareholder wealth can be measured by the price of shares. Therefore, the management of the company will be interested in maximising the share price on the Stock Exchange. It can be increased in two ways – either with improved earnings or with an increase in P/E multiple. A higher multiple can be achieved by persuading investors that the company will have a sustainable growth in earnings. It has led to several consequences in business (to ensure gradual and stable earnings growth as well as to avoid any reductions in earnings), for example:

1) the trend to form the company as a concern with several components, each of which operates in a separate sector of industry;
2) the choice with regard to what to do with a particular component of the concern is made based on the variation of its earnings over time, not the absolute or relative level of earnings;
3) the accounting principles of the company are being modified to ensure the divertion of excessive earnings acquired during good years to cover the losses suffered during bad years.

In the author's opinion, these consequences serve to improve the P/E ratio (and consequently the share price) but at the same time they may decrease the absolute level of earnings.

As D. Minjina (2008) writes, based on the research by P. Fernandez, the P/E method takes first place in valuation of European companies – it is used by more than 50% of analysts. In this kind of valuation model, the value of equity usually is calculated by employing the P/E ratio of a similar company or the average or median of a group of similar companies. K. Skogsvik and S. Skogsvik (2008) have studied the validity of such use of the P/E ratio. They have analysed the significance of the differences between the valued company and the similar company with regard to the return on equity and the growth rate of equity. Their main conclusion is that the valuation with the help of P/E ratios is not able to take into account these differences. However, K. Skogsvik and S. Skogsvik note that earnings-based relative valuation can be improved by taking into consideration the differences of industry sectors and next year's expected return as well as by modifying the valuation model.

D. Minjina (2008) writes that the P/E ratio has a negative correlation with the cost of equity, and that the P/E ratio is mainly influenced by the growth rate of future earnings. The influence of the growth rate of future earnings on the P/E ratio is positive.

J. Siegel believes that, despite short-term price fluctuations, the shares will revert to average P/E multiples in the long-run. Therefore, when the ratio is above average, it will be reduced back to the average by earnings growth, a fall in stock prices, or by the combination of these two factors (Knowledge@Wharton, 2001). This belief is the basis of the assertion of many authors that the P/E ratio can be used in the forecasting of share prices. There are differing opinions in scientific literature on the reversion of the P/E ratio back to an average level. R. Becker, J. Lee and B. E. Gup (2010) conclude that the P/E multiple eventually reverts to an average level in the long-term. Their inference gives rise to an opinion that high P/E ratios cause slow increase in share prices and/or a rapid increase in earnings. R. A. Weigand and R. R. Irons (2005), on the contrary,

Table 2

EPS of companies listed on the NASDAQ OMX Riga Baltic Main list in 2006-2011, LVL

Company / Core business	2006	2007	2008	2009	2010	2011
Grindeks / Pharmaceuticals	0.69	0.74	0.94	0.37	0.74	0.7
Latvijas kugnieciba / Cargo shipping	-0.04	-0.01	0.14	-0.23	-0.39	-0.12
Olainfarm / Pharmaceuticals	0.07	0.03	-0.1	0.17	0.25	0.49
Ventspils nafta / Diversified concern	0.07	0.47	0.28	-0.17	-0.28	-0.07

Source: author's calculations based on the data from annual reports

Table 3

The P/E ratio of companies listed on the NASDAQ OMX Riga Baltic Main list, 2006-2011

Company	2006	2007	2008	2009	2010	2011
Grindeks	10.43	7.42	3.43	10.21	9.03	6.12
Latvijas kugnieciba	-	-	4.69	-	-	-
Olainfarm	35	78.33	-	5.6	8.64	5
Ventspils nafta	33.57	4.72	2.46	-	-	-

Source: author's calculations based on the data from annual reports

arrived at the opposite conclusion – the P/E multiples did not revert to their averages, and thus, high P/E ratios might exist in the long-run.

S. H. Penman and X.-J. Zhang (2006) defined the notion of sustainable earnings and created an approach to identify unsustainable earnings based on accounting relationships during one period or between periods as well as they put forward a model which calculates an indicator (between 0 and 1) characterising the degree of sustainability of earnings and the P/E multiple. They also stress the assertion that investors have to pay less for current earnings if the current level of earnings cannot be ensured in the future. The authors conclude that it is possible to forecast the return on shares when the actual P/E ratios differ from the ones calculated by their model. This may mean that the information contained in the financial statements reflects the risk level of the investments.

The ratio of market price to book value is the P/B ratio. If the balance sheet would reflect, according to market participants, the fair values of items, the P/B multiple would equal 1 (normal P/B ratio; Penman S.H., 2004). In this case, the forecasted return on equity would equal the required return and the predicted residual income would equal 0. The P/B ratio is greater or smaller than 1 depending on company future earnings forecasts (expected high earnings increase the market price per share).

$$P/B = \frac{market\ price\ per\ share}{book\ value\ per\ share}, \qquad (2)$$

where

P/B – price-to-book ratio (Penman S.H., 2004)

In fundamental analysis of shares, the rule used most often is that it is necessary to buy companies with low P/B ratio and sell companies with high P/B (Penman S.H., 2004). Of course, to make a correct decision on the stock market, one must compare the fair-value-to-book-value ratio with the P/B multiple (in order to do this, it is necessary to analyse the changes over time in the return on common stock equity and the investments). Therefore, there can be a situation where high P/B ratio is well-founded because the balance sheet does not take into account a considerable amount of value (a significant amount of residual income is forecast for the future). It is possible that stock with high P/B multiple is undervalued by the market, and vice versa.

J. Pontiff and L. D. Schall (1998) highlight the role of the ratio in forecasting and write that the modification of the P/B ratio (numerator and denominator swap places) can predict the return of the stock market and supplement the information provided by ratios related to the amount of dividends. The positive correlation of the return on shares with the modification of the P/B ratio is affirmed by other papers as well, including ones with data of companies from Japan, Hong Kong, South Korea, and Malaysia. In turn, J. L. Davis (1994) has detected correlation only in January but other papers have ascertained the correlation in other months, except January.

Overall one must conclude that, in the world, there are many papers on the role of P/E and P/B multiples in financial analysis and company valuation. However, there is a lack of research on the importance of these ratios in Latvian companies. Therefore, Section 2 of the paper will provide calculations of financial market multiples of companies listed on the Main list of NASDAQ OMX Riga Stock Exchange and recommendations with regard to buying or selling stocks.

Table 4

The share price of companies listed on the NASDAQ OMX Riga Baltic Main list, end of 2006 – end of 2011, LVL

Company	2006	2007	2008	2009	2010	2011
Grindeks	7.2	5.49	3.23	3.8	6.7	4.282
Latvijas kugnieciba	1.07	1.3	0.66	0.4	0.379	0.308
Olainfarm	2.45	2.35	0.38	0.94	2.17	2.455
Ventspils nafta	2.35	2.22	0.7	0.94	1.4	1.2

Source: the data of NASDAQ OMX Riga

Table 5

Book value per share of companies listed on the NASDAQ OMX Riga Baltic Main list, end of 2006 – end of 2011, LVL

Company	2006	2007	2008	2009	2010	2011
Grindeks	3.302	4.045	4.983	5.347	6.107	6.805
Latvijas kugnieciba	1.123	1.18	1.342	1.112	0.845	0.729
Olainfarm	1.017	1.15	1.047	1.215	1.466	1.932
Ventspils nafta	3.128	3.835	4.114	3.458	4.101	3.945

Source: author's calculations based on the data from annual reports

2. Calculation of financial market multiples and share trading decision-making

As stated in the Introduction, the period of study of Latvian companies covers the time from 2006 to 2011.

To estimate the price-to-earnings ratio (P/E) and the price-to-book ratio (P/B), first, it is necessary to calculate company earnings per share (EPS; Table 2).

For greater degree of confidence, the research uses the data of companies listed on the Baltic Main list of NASDAQ OMX Riga. For convenience of the overview, the analysis of the JSC "SAF Tehnika" was not carried out (its financial year does not correspond to the calendar year).

The data show that, in both pharmaceutical companies, the dynamics of earnings considerably differ from the other two companies in the study. This shows especially in 2010 and 2011 when the JSC "Grindeks" and the JSC "Olainfarm" have high EPS indicators, while the JSC "Latvijas kugnieciba" and the JSC "Ventspils nafta" suffer losses.

Table 3 presents the P/E multiple of companies traded on the Main list. The P/E ratio cannot be determined in years when the company has suffered losses. The JSC "Grindeks" has the most stable dynamics of the calculated P/E multiples. According to the general P/E standards, one can conclude that, in 2007, 2008, 2010, and 2011, the stock was undervalued by the market, and it was necessary to buy this stock (P/E < 10). In turn, at the end of 2006 and 2011, the P/E exceeds 10 but is lower than 17, which indicates a fair valuation of the shares by the investors.

In turn, the P/E multiples of the other pharmaceutical company – "Olainfarm" – are very high in 2006 and 2007 which usually points to overvaluation of shares by the investors. Therefore, one should sell these shares. The opposite situation is observed in 2009 to 2011 when the recommendation would be to buy shares.

The only year when the P/E ratio can give any recommendation on the JSC "Latvijas kugnieciba" is 2008 (stock should be bought). Losses have been observed in other years of the study. The JSC "Ventspils nafta" also had several years with losses (2009-2011). The stock of "Ventspils nafta" should be sold in 2006, and bought in 2007 and 2008.

Table 4 shows the share price of companies listed on the NASDAQ OMX Riga Baltic Main list. The table can be used to test the success of stock trading recommendations based on the P/E and P/B multiples (in this paper – one year ahead).

Table 4 splits the period of the study into three parts – 2006 and 2007 are still the "years of plenty" when the share prices are comparatively high, 2008 and 2009 are the years of the economic crisis when stock prices suffered a considerable fall, while in 2010 and 2011, the exit from the crisis has started with the rise in share prices for the majority of companies.

One can ascertain in Table 4 that the recommendations on the stock of the JSC "Grindeks" based on the P/E ratio have proved lucrative only at the end 2008, because there was a rise in the share price during 2009. The recommendation to buy shares at the end of 2007 and 2010 turned out to be detrimental because during the next 12 months the stock price declined.

The recommendation at the end of 2006 and 2007 to sell shares of the JSC "Olainfarm" proved to be correct because the stock price indeed fell during the next financial year. The recommendation at the end of 2009 and 2010 to buy the shares of "Olainfarm" also turned out to be lucrative, as during 2010 and 2011 the stock

Table 6

The P/B ratio of companies listed on the NASDAQ OMX Riga Baltic Main list, end of 2006 – end of 2011

Company	2006	2007	2008	2009	2010	2011
Grindeks	2.18	1.357	0.648	0.711	1.097	0.629
Latvijas kugnieciba	0.953	1.102	0.492	0.36	0.449	0.422
Olainfarm	2.409	2.043	0.363	0.774	1.48	1.271
Ventspils nafta	0.751	0.579	0.17	0.272	0.341	0.304

Source: author's calculations based on the data from annual reports

price increased (also, the dividends of LVL 0.025 per share were paid in 2011).

The only recommendation with regard to the JSC "Latvijas kugnieciba" that the shares should be bought at the end of 2008 proved to be incorrect because the stock price decreased during 2009. From the three recommendations on the shares of the JSC "Ventspils nafta", two turned out to be lucrative – in 2007, the price really fell but in 2009 it increased (furthermore, one-off dividends were paid – LVL 0.48 per share).

One can conclude that, out of the 11 recommendations based on the P/E multiples, 7 or 64% proved to be correct (lucrative). Also, the inference is that, like on other markets, over time, P/E ratios tend to revert to a certain average level.

Table 5 reflects the book value per share of companies in the study, which provides an overview of the valuation of company stock according to the accounting reports. Since the JSC "Grindeks" has not had losses in the period of the study, its book value has constantly increased. The opposite is true in the other companies.

The book value per share will be used further in the calculation of the price-to-book (P/B) ratio (Table 6).

The P/B ratio is considered to be high when it exceeds 1, while it is low when it is below 1 (Penman S.H., 2004).

Based on the data of Table 6, one can conclude that it was necessary to sell shares of the JSC "Grindeks" at the end of 2006, 2007 and 2010, while at the end of 2008, 2009 and 2011 it was necessary to buy shares. Such P/B-multiple-based recommendations have proved right during 2007, 2008 and 2011, when the stock price of "Grindeks" indeed declined, as well as during 2009 and 2010, when the stock price rose. The results of share trading for 2012 were not available during the preparation of this paper.

The P/B ratios of the JSC "Olainfarm" indicate that it would be lucrative to sell shares at the end of 2006, 2007, 2010, and 2011, while at the end of 2008 and 2009 the proposal would be to buy shares. Such recommendations turned out to be lucrative in all years of the study, except for 2011 when the stock price rose and, thus, the sale of shares at the end of 2010 proved not to be correct.

The P/B multiples of the JSC "Latvijas kugnieciba" show that it would be necessary to buy its stock during all the years of the study, with the exception of the end of 2007. This recommendation turned out to be correct during 2007 and 2008, while during the following years the recommendation proved to be incorrect.

As Table 6 demonstrates, the shares of the JSC "Ventspils nafta" need to be bought in all years of the study (P/B < 1). This action would have justified itself only during 2009 and 2010, while it would have brought losses during 2007, 2008 and 2011.

Overall, one can conclude that out of the 20 P/B-ratio-based forecasts 13 or 65% proved to be correct (lucrative for the investor). The P/B multiples have the ability to predict market return in the Baltic Main list of the NASDAQ OMX Riga.

The P/E and P/B ratios have approximately the same degree of forecast precision on changes in stock price one year ahead. The precision of forecasts exceeds 50%, which corroborates the hypothesis put forward in the Introduction that both multiples have a role in the forecasting of share prices and stock trading decision-making. The inferences of this section on Latvian companies to a large extent correspond with the results of research in other countries.

Conclusions

1. Financial market multiples characterise the financial condition of the company, the value of shares and the return. They provide the information on the return on the capital invested by the shareholders and influence the price of shares. The level of financial market multiples determines the nature of corporate investment policy. The financial market multiples can be used to evaluate not only a single company but a whole sector or sub-sector of industry as well as the entire stock market.
2. In the world, there are many papers on the role of P/E and P/B multiples in financial analysis and company valuation. The analysis of the bibliography suggests that they are the most frequently used financial market multiples.
3. The P/E ratio normally is useful when comparing market evaluations of companies in one sector of industry. The ambition of the company to convince investors that it would have sustainable earnings growth may lead to an increase in P/E and, thus, in the share price but, at the same time, may lower the absolute level of earnings.
4. The P/B ratio is greater or smaller than 1 depending on company future earnings forecasts (expected high earnings increase the market price per share).
5. Based on the empirical analysis of the data of NASDAQ OMX Riga, one can conclude that out of the 11 recommendations based on the P/E multiples

7 or 64% proved to be correct (lucrative). The P/E ratios have the ability to forecast market return. Also, the inference is that, in Latvia, like in other markets, over time, P/E ratios tend to revert to a certain average level.

6. Out of the 20 P/B-ratio-based forecasts 13 or 65% proved to be correct (lucrative for the investor). The P/B multiples have the ability to predict market return on the Baltic Main list of the NASDAQ OMX Riga.
7. The P/E and P/B ratios have approximately the same degree of forecast precision on changes in the stock price one year ahead. The precision of forecasts exceeds 50%, which corroborates the hypothesis put forward in the Introduction that both multiples have a role in forecasting of share prices and stock trading decision-making. The inferences on Latvian companies to a large extent correspond with the results of research in other countries.

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INSTITUTIONAL DIVISION OF CUSTOMS ADMINISTRATIONS

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Abstract. Customs authorities have been delegated to fulfil the following strictly defined functions - to collect money in the form of customs duties, to protect the internal market, to facilitate the international trade, to ensure safe flow of goods across the national borders, and to detect attempts of illegal importation of prohibited goods into the country. The way customs authorities organise their work in each country depends on such variables as national priorities, geographical location, state resources, management style etc. Customs authorities may be combined within a single institution with tax authorities and different border authorities.
The conventional quantitative and qualitative data analysis methods of economics, including various analytical methods to study problem elements and process components, and to use them afterwards to synthesise interconnections or formulate regularities as well as inductive and deductive methods were used for this research paper.
The aim of the research topic is to create an Institutional division of customs administrations.
The following tasks were established to reach the set aim of the study:
— to research the basic models of customs administrations;
— to identify characteristics of each basic models of customs administrations;
— to identify characteristics for the division of the customs administrations by their institutional affiliation.
The research resulted in the creation of the Institutional division of customs administrations according to the typology model which distinguishes the following customs administrations basic models - Customs Department, Inland Revenue Department, Revenue Department, Customs Agency, and the Border Control Agency.
Key words: institutional model, Department of Revenue, Customs Department, Revenue Service, Customs Agencies, Border Security Agencies.
JEL code: H83

Introduction

Customs, being one of the government institutions, have always been delegated to fulfil specific functions such as to collect substantial amounts of money in the form of taxes, to protect the internal market while facilitating international trade, to ensure safe flow of goods across the national borders, and to detect attempts of illegal importation of prohibited goods into the country. Other state institutions operate on national borders as well, with their own distinctive features, namely, immigration, agricultural protection, and quality control and police functions. These functions can be different in different countries, depending on variables such as national priorities, geographical location, state resources, management style etc. Besides, partly independent establishments may be founded that are completely separated from the subordinated ministry and civil service regulations, or a completely subordinated structural unit. Institutional organisation of customs authorities is one of the key issues for efficient administration.

The conventional quantitative and qualitative data analysis methods of economics, including various analytical methods to study problem elements and process components, and to use them afterwards to synthesise interconnections or formulate regularities as well as inductive and deductive methods were used for this research paper.

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The following **tasks** were established to reach the set aim of the study:
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— to identify characteristics for the division of the customs administrations by their institutional affiliation.

1. Customs administration models

There is no official terminology defined in the Customs Administration institutional breakdown. However, the WCO has divided them into four categories according to their main work priorities, taking into account the level of integration between customs and tax administrations, and the degree of reliance on the subordinated ministry (Yasui T., 2009a). Taking this typology as a basic approach, Figure 1 outlines the following basic models.

The following basic models of customs administrations may be distinguished in accordance with the model typology:

1) Customs Department (CDept) – structural unit of the relevant ministry, most often the Ministry of Finance or the Treasury, the customs functions being fulfilled on the national level, having a traditional customs organisation structure and acting as a separate unit within the ministry, usually the Ministry of Finance. In several cases, it is responsible for collecting indirect taxes such as VAT and excise duties;

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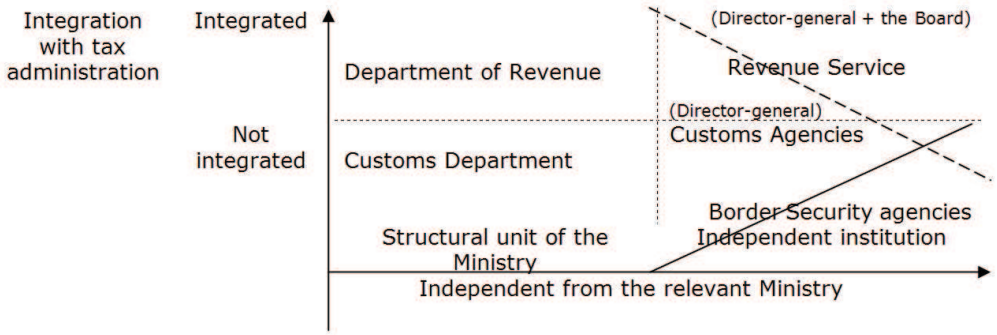

Fig.1. **Institutional division of customs administrations**

2) Inland Revenue Department (InDept) – structural unit that fulfils customs and tax functions on the national level as a single unit in the relevant ministry, usually, the Ministry of Finance;
3) Revenue Service (RS) - semi-independent organisation, where the customs and tax administrations are integrated on the national level. This could have a similar structure as the Revenue Department. However, it is partially independent of the subordinated ministry. The RS is managed by the Chief Executive Officer or the Board;
4) Customs Agency (CA) – agency which is an independent state authority with the traditional organisational structure of customs and performs customs functions on the national level. It can administer indirect taxes such as VAT and excise duties but leaves unaffected direct taxes such as income tax and does not deal with the border security functions such as immigration. The CA is not a part of the ministry but it is directly subordinated to the government;
5) Border Security Agency (BSA) - agency which is an independent public body fulfilling the customs and other border security functions, for example, it might administer indirect taxes such as VAT and excise duties but it does not administer direct taxes such as income tax.

Customs Departments (CDept) and Revenue Departments (RDept) perform the customs functions in 88 states or 50% out of the 177 WCO (World Customs Organization) member states. Revenue Services (RS) are responsible for customs functions in 39 member states (i.e. 22%). Forty-five members of the WCO (i.e. 25%) delegate customs functions to Customs Agencies (CA) and only three participants (i.e. 2%) - to Border Security Agencies (BSA). In two countries (i.e. 1%), customs authorities are under the Ministry of Interior (Polner M., 2011). After Latvia regained independence, two organisations were established for the purpose of collecting revenues – the State Financial Inspection which was in charge of tax collection and the Customs Department which was in charge of customs duties and taxes on international trade. The law "On State Revenue Service" was adopted taking into consideration the experience of Danish tax and customs administration. This law and the necessity to improve revenue collection and save on administrative expenses was the reason for merging the two above mentioned organisations into one by establishing the State Revenue Service which is directly subordinated to the Ministry of Finance. According to the above mentioned classification the State Revenue Service of the Republic of Latvia is a semi-independent organisation where the customs and tax administrations are integrated on the national level.

2. Traditional customs administration mode

In the traditional model, the primary role of customs is to increase financial revenues as stated in the state budget. Taking into consideration one of the most important functions of customs, which is the collection of revenues, traditionally, the Ministry of Finance has been the government institution with authority over the customs department that governs and supervises it. The CDept model is considered to be one of the two most traditional customs patterns. The second one is the CA model and when compared with the CDept model the only difference to be mentioned is the institutional independence of the supervising ministries, while maintaining the presence of the supervision of the Ministry. Taking into account the customs specifics, it generally maintains the decentralised organisational structure such as the Customs Board, regional administrations, and customs points. The main task of the Customs Board is to develop a short-and long-term strategy, to monitor the activities of regional bodies, including the responsibility for personnel policy. Regional Administrations monitor the operational work of customs offices and customs points that, in turn, are responsible for work with the businesses and neighbourhood customs offices as well as for taking the decisions on what level freights should be checked (Castro P., Walsh J.T., 2003a). In Greece and Poland (Ministry of the Finance of Poland, 2012), the organisational structure of customs is the CDept under the Ministry with equivalent but independent customs and tax departments. Russian and Chinese customs authorities have taken the CA as a model, thus, customs authorities would like to position themselves as one of the national symbols in these countries.

Over time, customs role in the promotion of international trade has increased compared with the fiscal role of customs, so in many countries, the Ministries of Economy and Trade are given additional justification for taking over supervision of the customs control. Inclusion of customs service into one of the ministries is the result of a rational decision, which takes into account many factors, including the state of the relevant national economy and the nature of the tasks entrusted to customs (De Wulf L., 2003a).

3. Integration with tax administration

Features of the RS and InDept model

Revenue collection from customs duties, value added tax and other taxes on sales are one of the core functions in customs of many countries of the world. The global world crisis, the global economic downturn, and the decline in international trade left a frightening effect on collecting customs revenues. However, one should recognise that taking into consideration the global international trade, the spread of regional trade agreements and expanded trade within a single company, the customs administrations endeavour to develop a long-term and effective revenue collection plan, thereby, changing their institutional structure.

The Revenue Service model (RS) evolved from the Tax Revenue Agency (TRA) model with the aim to operate like a private company, not as a state institution, where the government would develop its customs and tax policy. Instead, the Tax Revenue Agency would tackle these issues, thereby, creating the illusion that the number of public administration employees has been reduced and the task of the ruling political parties to reduce bureaucracy would be satisfied. However, this "agency" approach was modified and adapted to form different departments in the Ministry of Finance. Therefore, it transformed into the RS model.

In the future, the World Customs Organization (WCO) would recommend determining institutional arrangements between customs and tax administrations, and integrating customs and tax administrations into a single organisation. This is the way how to achieve such institutional agreement. Usually, two administrations are integrated into a semi-independent agency, namely, the SRS where the degree of independence in each case may be different. There is no uniform definition for a Revenue Service model (Kidd M., Crandall W., 2006) but it is identified as a unit that is partly independent of the relevant ministries, and then integrated on the national level the customs and tax authorities (OECD, 2010a).

Semi-independent institutions (RS), as opposed to subordinated departments (InDept), are completely separated from the subordinate ministries and the civil service regulation. In turn, the integration means that administrations, dealing with customs and revenue collection on the national level are combined in a single organisation (InDept and RS).

According to the WCO (World Customs Organization) studies, conducted so far, the RS of almost 39 countries around the world perform customs related functions. Therefore, the two services are essentially much closer to each other than it looks. The Revenue Service (RS) model is common in the South America, e.g. in Argentina (RS with the Board) and Mexico (RS with the Board), which reports to the Ministry of Finance. More than 15 countries in Africa have adopted the RS model, including Kenya, Rwanda, South Africa, Tanzania, Uganda, Zambia, and Zimbabwe. Several European countries, including Ireland, Romania, Latvia, and Great Britain (under the supervision of the Board itself) have also adopted the RS model. Customs authorities in Austria, Belgium, Denmark, the Netherlands, and Estonia (InDept model) remain under the Ministry of Finance and have become integrated with the tax administrations.

The scope and nature of RS independence can vary greatly, affecting the operational work of the service:

— budget expenditure management;
— strategic and operational planning;
— right to set their own standards of performance and control them;
— right to determine staffing, development, and remuneration standards;
— IT and database organisation;
— customs and tax law interpretation (explaining the laws to the representatives of the public and private sector and issuing binding rulings);
— right to perform operational work in investigation;
— creating their internal structure;
— collection of information (Ketners K., 2008).

In Latvia, the Sate Revenue Service (SRS) has a broad range of empowerment, except the authorisation to discuss employee salary levels which, in turn, is determined by the State and local government officials and employees compensation law (Latvijas Vestnesis, 2012), and which is common to all state and local government agencies around the country. The structure of the service should also be reconciled with the Ministry of Finance.

Motivation for RS model implementation

Each country has had its own reasons for creating the RS, while the main objective for the consolidation of the two institutions is to increase government revenues (OH Fjeldstad, M. Moore, 2009). The other two factors, why, in the world, the consolidation process of institutions was originally initiated, are also essential, namely, the assumption that the levying of VAT on import can be the sole responsibility of customs authorities, and the historical factor regarding the separation of the direct and indirect tax administrations.

Expected benefits from the establishment of a joint Revenue Service can be categorised under two headings: the first - better human resource management and corruption risk reduction, the second - containing elements such as information exchange on tax fraud and tax evasion as well as close linking of both types (Yasui T., 2009b).

From different sources of information, one can draw the following conclusions about the potential benefits of establishing the RS, such as:

Benefits to the national economy:

— state revenues increase;
— signals about political confidence to stakeholders in the relevant country and abroad;
— encouragement of other public reform programmes.

Benefits to customs administrations:

— depoliticising;
— greater flexibility to deal with the institution's budget and the right to change its internal structure;
— reduced corruption and enhanced professional ethics;
— increased work efficiency;
— greater desire to obey tax and customs laws;
— possibility to concentrate on the main objective of the authorities;
— in some cases, free from civil service constraints in human resources management.

Benefits to taxpayers:

— cost and time savings for receiving quality services provided by the joint authority;
— feeling that taxpayers' money has not been wasted.

The PLS RAMBOLL (2001) study presents the analysis of Denmark, Canada, Colombia, the Netherlands, Ireland and Latvia experience on integrating the tax and customs departments. It also points to two reasons for such reforms: to increase efficiency (the Netherlands, Latvia, and Colombia) and productivity (Denmark) in collecting the revenues, or both motives together (in Canada until 2003). It reflects the efficiency of revenue collection parameters - the amount of revenue and the potential for fraud, fairness degree of compliance with the law etc., while the productivity is characterised by public and private sector resources that are spent on each unit of income.

Unlike Denmark, where productivity is highlighted as a priority, in Latvia, it is often stressed that the integration of customs and tax administrations was implemented according to the Danish model; however, the authors believe that the main reasons for the creation of the SRS have been efficiency, potential for fraud, integrity level, the amount of revenue, and compliance with laws.

Another important reason for creating the RS is often regarded as a catalyst for other government reforms. By establishing a Revenue Service, the government creates a sense of satisfaction of taxpayers and other stakeholders, and tries to implement one of the major reforms of the country. So the RS is considered to be one of the most visible and decisive achievements of successful implementation of the government's reform programme. In order to comply with the European Union (EU) accession requirements, the RS model was selected as part of a broad government restructuring programme for a number of the EU candidate countries (World Bank Group, 2003).

The experience shows that creating a RS is a time-consuming process incurs large costs. The report of the International Monetary Fund on the cost-benefit analysis concludes that, in most cases, the Revenue Services were created intuitively and it considers that it was the best solution to solve the problem in accordance with the recommendations of international organisations as well as being inspired by the other countries in the region (Yasui T., 2009c).

RS model implementation results

It is difficult to prove a causal link between the RS creation and revenue collection in the country, and getting objective indicators over several years is virtually impossible.

There is a common argument that the RS political independence does not allow political interference in its daily activities, such as hiring brightest staff by offering them better pay and incentive systems as well as extensive training opportunities.

It is true that tax administration and customs officials are the most vulnerable to corruption, and hence, the officials work should receive higher remuneration at least compared with other public officials. It is necessary to maintain a skilled and professional staff with a high degree of integrity. Therefore, it is one of the reasons, why greater autonomy in human resources management might reduce the risk of corruption and improve professional ethics of the employees (Castro M., Walsh J.T., 2003 b).

However, one may note that most part of the Revenue Services is still under political influence of the ministry which reduces the expected results (Kidd M., Crandall W., 2006). The authors believe that in this case some ministries may complain that the Revenue Services get more privileges than they do.

Financial independence of the Revenue Service means a certain independence of the use of financial resources without having to refer to the supervisory body which may result in an adverse effect, i.e. negative effect. The same effect can also lead to arbitrary public procurement. Every year the funds of the Revenue Service are determined as a fixed or variable amount of the earned income rate. However, this RS financing model may result in an opposite situation, where the employee is paid less than the national average, and this can further increase the risk of corruption.

One expects that the benefits gained by integrating the two institutions will result in the increase of the quality of work, more effective exchange of information, and improved service to taxpayers (Yasui T., 2009d).

In this respect, one may reach an advantage by organising the revenue administration by function rather than by tax type. Therefore, the potential administrative costs of tax-based revenue collection are higher due to doubling the support service costs (OECD, 2010b). Customs officials can use tax-related information to identify high-risk transactions or to verify the non-compliance of the information. Therefore, it is easier to find the necessary information on taxpayers if it is stored in an integrated IT system. For example, both administrations should consider the coordination of activities relating to transfer pricing transactions between related companies, realising that they account for a significant share of global trade. In addition, customs officials badly need an in-depth knowledge of the domestic tax system in order to identify trafficking and undeclared goods.

The expected benefits are dependent on the extent to which the two institutions would be integrated into the central, regional, and local levels. In order to fully integrate into the organisation, one needs to overcome a lot of difficulties that may arise stemming from different historical, cultural, and functional considerations. Therefore, in most countries where a single RS was created, it was found that the customs and tax functions remained separated from each other. For example, both administrations, independently of each other, engage in non-tax functions such as national security. Replacement of the outdated RS systems designed to meet the needs for each administration, with an integrated IT system for the two boards, takes a lot of time and cost much. Therefore, one may conclude that, despite the integration of many national customs and tax administrations, the information about taxpayers is still fragmented, depending on the tax type. According to the principle of confidentiality and without legal justification, the customs administration cannot use the information of the tax administration. The authors believe that information obtained in such a way is unlawful. The question that arouses the authors' interest is whether the administration may disclose the information obtained from a foreign administration and

based on the international agreements, e.g. customs mutual assistance agreements and tax treaties, provided that the relevant information may only be used by one of the services.

Starting the customs and tax administration merger, there should be complete understanding of the fact that there are significant differences between the principles of the customs and tax authorities, which generate asymmetry and which the newly formed administration, will have to adapt. Therefore, the basis for taxation is the taxpayer's assessment and follow-up control allowing the grouping of the tax rates. The customs clearance requires ensuring accurate calculation and collection of customs payments and customs control at the same time, and the customs valuation in combination with customs control when releasing cargoes. Besides, clearance of goods envisages the necessity to make quick cargo clearance.

It could be argued that an effective revenue collectors' work does not always provide a high level of tax and customs administration integration. Case studies show that a complete merger of the two administrations may even be an obstacle to improve the efficiency. Hence, equal attention should be paid to the customs and tax issues, the regulatory coordination issues as well as planning with the aim to improve the efficiency and productivity of the administration. In turn, the combination of physical bodies (joint staff, organisational culture, infrastructure, and IT systems) requires political and administrative management and much effort on the side of staff and stakeholders (businesses) that may ultimately prove to be counterproductive, e.g. Colombia's experience. Latvia decided to retreat from such a complete model of merger (De Wulf L., 2003b). Therefore, one may conclude that in Latvia customs administration is not directly subjected to the Ministry of Finance but the State Revenue Service (SRS). Latvia has not integrated the core functions but only the supporting ones. The structure of the SRS supports this assertion. The SRS Director General has two deputies, one of them dealing with customs and the other - with tax matters (Latvian State Revenue Service, 2012).

Management contracts

The contracting method with individuals or entities that facilitate the collection of taxes is not new. Historically, there are many "rental tax" examples, when in accordance with the contract, the charging function was transferred to an individual or a group of individuals. Usually, such a contract was limited at the time, it was sold to the one who offered the highest quality, performance and purchase price, and so received the right to retain all income above the agreed amount.

Current management contracts in customs and tax administration are significantly different from historical contracts. Management contracts in customs services mean a radically new approach to customs control, that is, only the tax collection management process has been privatised.

The main contractor is responsible for:

1) managing the work of the customs service and ensuring that the customs authorities perform their duties efficiently. In general, the priority of such agreements is the increase of national revenue, while trade facilitation is not less essential;
2) training employees for some time in order the national customs service is able to take over all management responsibilities.

For such services, the contractor receives a fixed fee which can be supplemented with a compensation for effective performance. In the authors' opinion, the government should consider the customs service management costs of such an agreement over the period and compare them with the costs of a less radical customs service management model.

So far, the customs services of Angola and Mozambique have introduced this management model (Crown Agents, 2012a). It was implemented by the Crown Agents who worked for many years as a British national authority and in 1997 it was transferred to the private sector as a limited company. Now, it is called The Crown Agents Foundation (Crown Agents, 2012b). From 1996 to 1998, this organisation in cooperation with the Latvian State Revenue Service rendered its services in the framework of the project "Technical Assistance Programme for a Management Unit". The aim of the programme was to establish the structures and systems necessary for the customs change management.

4. BSA model

One can argue that, in the 21st century, there are, at least, three different significant factors that have affected the border management type. First of all, the very concept of borders has undergone a qualitative change. The physical border is still where it is, while the concept of a virtual border has come up and has become more essential because the risks at the border do not imply their existence in one state or jurisdiction. Therefore, these risks should be identified before the goods or passengers cross the border. Secondly, the concept of travel and marketing as well as manufacturing and marketing concept converge, which means that the border management authorities should review their tasks. Hence, as a number of government departments perform duties related with border crossings, the greater is the risk that the border management authorities may exercise their functions alone. Lack of communication and coordination between border control authorities may lead to a situation, when different state authorities do not have access to the vital information needed to make substantiated decisions about the potential threats, which, in turn, can lead to inefficient services. Although the risk may be understood as intended risk, be aware that there are unconscious risks, which also need to be managed. Thirdly, worries about the consumption of resources and the environment exacerbate too.

Changes in the border control nature require a structured approach, how by streamlining the resources, to synchronise the business strategy between the border control authorities. If the border control work is not properly managed, the result is long clearance time, obstacles to travellers, increased investments in services and infrastructure and, finally, increased costs for trade and the end user.

The mid-1990s have seen a growing demand for co-ordination of the efforts of various institutions of the state border. Therefore, a situation arises where different organisations define the same term differently. The World Customs Organization (WCO) uses the term

"coordinated border management" (CBM), while the EU - "integrated border management" (EC, 2012). The World Bank uses the term "cooperation in border management" (Doyle T., 2010) and the Organization for Security and Cooperation in Europe (OSCE) - "comprehensive border management" (OSCE, 2012). All the terms mentioned above are essentially similar to each other.

The Coordinated Border Management (CBM) concept represents the border management approach, when the national authorities located on the borders, work in a harmonised manner in order to achieve a common goal, thus, ensuring unified government's response to border management issues. The CBM is a logical way to manage effectively all public authorities, located on the borders and involved in border security building measures. The aim of the coordinated border management system is to facilitate trade and clearance of goods of people crossing the border, at the same time providing secure borders. Though, the authors believe that the concept of the CBM rather focuses on the fact that by providing secure borders, one may facilitate trade and promote border crossings by people. The coordinated border management concept consists of two components. The first is the national border management system, which includes measures for both single institutions and all authorities of a country involved in the border management process. The second component is the international border management system of cooperation between the neighbouring Member States of the customs union and trading partners. In the framework of the international border management system, the co-operation can be initiated through a memorandum of understanding or bilateral / multilateral arrangements. Effective cooperation and coordination between the various border agencies can occur on three different levels:

— local cooperation between officials on both sides of the border;
— bilateral cooperation between neighbouring countries;
— the international cooperation.

The CBM is based on communication which is not "one-size-fits-all". There are many different models of the CBM around the world. The reason for creating their own CBM model for some countries is better border security, whereas other countries seek to promote the trade or improve the quality of services on the border. The CBM model usually reflects the differences in the needs of different countries and hence, in order to exploit the potential benefits of the CBM fully, all public authorities, whose activities include providing the border management functions, need to work together as equal partners. Customs, police, Immigration service, and the veterinary and phytosanitary inspection are usually the main public bodies, operating at the border. However, there are also many other government institutions which play an essential role in the border management process and operate in such areas as agriculture, health care, bio- security, economy, energy, environment, finance, foreign affairs, transport, statistics, port management, law, and investment.

A number of countries have chosen to build their institutional integration by focusing on security issues, including anti-terrorism and border protection, where one government institution tackles the border management functions. The Canadian and the UK Governments decided to eliminate the RS, and combine customs administration with other institutions involved in dealing with border security issues. In December 2003, Canada Customs and Revenue Agency (CCRA) no longer dealt with the customs functions, which were delegated to the newly created Canada Border Services Agency (CBSA). This Agency includes all the main parties involved in border management: in customs programme - the Canada Customs and Revenue Agency, in the intelligence and crime prevention programme - Canada Citizenship and Immigration Agency, and in the import inspection programme in ports - Canadian Food Inspection Agency. To ensure coordination among all federal departments and agencies responsible for national security, emergency, law enforcement, crime prevention, and customer service at the border, the CBSA was subject to Public Safety and Emergency Ministry (Aniszewski S., 2009). In turn, in 2008, the UK Border Agency started to operate and it was formally subject to HMRC (Her Majesty's Revenue and Customs). Together with the UK Visa and Border Control and Immigration Agencies, it forms the UK Border Agency. The HMRC retains ownership of the customs policy.

The traditional role of customs has been prohibitions and restrictions, and collection of revenues from exports and imports. In the 1980s, the customs authorities mostly concentrated on revenue collection and control of each transaction made, whereas in the 1990s - mostly on the integration of customs and tax revenues authorities. Over time, the role of customs authorities evolved, including issues of trade promotion and public protection. Therefore, customs functions changed from economic protection to public protection. Since 11 September 2011, the customs needed to balance the new security measures introduced with the movement of freight and passengers, providing quick movement of goods and persons across the borders. The role of customs in supply chain security highlighted the first half of the 21st century, whereas the process of integration of customs with other border services was characteristic for the second decade of the 21st century. In the near future, probably the third decade of the 21st century, customs together with other border authorities will coordinate their actions on virtual frontiers.

Conclusions, proposals, recommendations

The following basic models of customs administrations may be distinguished in accordance with the model typology, namely, Customs Department, Inland Revenue Department, Revenue Department, Customs Agency, and the Border Control Agency. In the traditional model, the primary role of customs is to increase financial revenues as stipulated by the state budget. Customs Department and Customs Agency models are considered to be the most traditional models of customs organisations. The integration of customs administrations with tax authorities, resulting in Revenue Departments and Revenue Agencies are characteristic for the end of the twentieth century. A trend that integrates customs and border control into a single institution characterises the twenty-first century. Organisational structure involves a change in tasks, which increases the need

for development in management and competences to meet the new requirements. Organisational model is a basis for developing operational strategy and tasks, competence strategy and education policy in order to secure the competences relevant to new challenges. Merging related bodies into a single authority is reducing staff requirements and the total expense levels in comparison with separated bodies, and allows integration of all revenue collection systems. Merged approach provides rationalisation measures such as focus on core activities and reduction of support activities, and a massive focus on value-based management.

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APPLICATION OF GOVERNMENT DEBT MODELS FOR THE SITUATION OF LATVIA

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Abstract. The problem of successful government debt management that takes into account economic crises could not be solved without finding of an optimal strategy by means of mathematic simulation. The goal of the present paper is to analyse accumulation of Latvia government debt in the period 1995-2011 and to make prognosis of the debt accumulation in the framework of the borrowing policy that persisted in Latvia during the last decade. For the analysis, three models of government debt accumulation were considered: the two of Domar and the originally proposed crisis model that takes into account periodical changes in the growth rate of national income. The results showed that the crisis model provides the most adequate description of Latvia government debt growth during 1995 – 2011 and predicts a higher government debt to national income ratio and tax burden, required to pay interest on debt, than the alternative Domar's models. For Latvia, given the state borrowing policy will not change in comparison with 2008 – 2010, the tax burden might grow up to nearly 5% in 30 years, which might become intolerable for the economics.
Key words: government debt, Domar's model, economic cycles.
JEL code: H680

Introduction

In the modern world, the developed and the developing countries intensively use government borrowing policy both in internal and external financial markets. In practice, nearly every country either is a lender on the financial market, or receives loans from the international financial bodies. These credits, in fact, provide resources for the developed, developing, or transient economics.

Under the circumstances of the world economic crisis, the problem of the state debt management has grown to the extreme importance. As the economic situation worsens, the debates on the government debt become more acute. The effective debt management is crucial, especially during the crisis. The high government debt leads to the increase of the tax burden, to the growth of the state budget deficit, to the dropping of the state consumption level, and to the reduction of public sector salaries and social security payments. The above-mentioned effects have a negative influence on the state economy, which is already weakened by the crisis, and, thus, is forcing the government to borrow more.

The problem of successful government debt management could not be solved without finding an optimal strategy by means of mathematic simulation. The simulation allows analysing financial flows, making prognosis, and selecting the most rational model of debt management.

A sound number of models, that describe government debt, have been developed (Avramovic, 1964; Keunsuk, 2010; Arai, 2011). Those models take into account both accumulation of the debt itself and the debt influence on the state economic growth. Evsey Domar proposed one of the first models of government debt accumulation. In his pioneer work (Domar, 1944), Domar described several scenarios of national income growth and accumulation of the government debt. Although proposed 70 years ago, the Domar's approach is still the preferred one by a number of authors (Sardoni, 2008).

The goal of the present paper is to analyse the accumulation of Latvia government debt during 1995-2011 and to make prognosis of the debt accumulation in the framework of the borrowing policy that persisted in Latvia during the last decade. The Domar's model is especially suitable for the analysis, because it concentrates exactly on the effect of the borrowing policy on the state debt.

To achieve the goal, the following tasks are defined: first, the parameters of the original Domar's model have to be found to fit one to the retrospective data on Latvia economics, concerning both national income and government debt growth; second, one has to evaluate, whether the original model describes real data adequately and proposes necessary adjustment, in particular, to account for the crisis drop in the national income; third, to forecast dynamics of the government debt growth in the nearest future using the obtained parameters. The comparison of the forecasts made by both original and adjusted models is also the scope of the present study.

Data and methodology

1. Data pool

For analysis, the author used the data on Latvia gross national income and the government debt in the period from 1995 until 2011. The data on the gross national income (referred further as national income) were retrieved from the official web page of the Central Statistical Bureau of Latvia (CSB, 2012). The national income was used in actual prices in million of LVL. The

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data on the government debt and on the paid interest on government debt were retrieved from the official web site of the Treasury of Latvia (Treasury, 2012). Figures on both debt and debt interest payments were taken in actual costs in million of LVL.

2. Domar's models

The models considered in the present paper are the Domar's model of the constant national income growth rate, referred further in this paper as a "classic Domar's model" and the so-called "War" Domar's model, referred further as a "war model". In both models, the national income increases at a constant percentage rate *r*. In such a case, the national income *Y* in the year *t* is given by

$$Y(t) = Y_0 e^{rt}, \quad (1)$$

where Y_0 is the national income at the beginning of the period under consideration.

In the classic Domar's model, the newly accumulated government debt is formed by a borrowing α percent of the national income each year. Thus, the total amount of debt *D* accumulated by the year *t* is:

$$D(t) = D_0 + \int_0^t \alpha Y_0 e^{rt} dt = D_0 + \frac{\alpha Y_0}{r}\left(e^{rt} - 1\right), \quad (2)$$

where D_0 is the "initial" government debt at the beginning of the period of interest. The main outcome of the classic Domar's model is the conclusion that if the national income increases at the constant rate, the ratio of the debt to the national income in a long term run tends to a finite constant:

$$\lim_{t\to\infty} \frac{D}{Y}(t) = \frac{\alpha}{r}. \quad (3)$$

The same is true for the tax burden, required to pay interest on the debt. Given *i* is the interest ratio, paid on the debt, the percent of the taxes to be collected to pay the interest *U/T* tends to

$$\lim_{t\to\infty} \frac{U}{T}(t) = \lim_{t\to\infty} \frac{U}{Y+U} = \lim_{t\to\infty} \frac{iD}{Y+iD} = \frac{i}{\frac{r}{\alpha}+i}. \quad (4)$$

Here $U = iD$ is an interest charge on the debt, and $T = Y+U$ is a taxable income. Thus, the tax burden required to keep up with the debt is a limited value, too, entirely defined by the national income growth rate r, the percentage of the national income yearly borrowed by the government α, and the interest rate on the debt *i*. Although limited, the tax burden may reach levels intolerable for economy at certain values of *r*, α and *i*, especially for $i >> r$. In his work, Domar considered the period of 300 years, and the convergence of *D/Y* and *U/T* to the limit values was observed after approximately 150 years.

The Domar's "war model" differs from the "classic" one by consideration of two alternating periods: the "peace" period, when the government borrows a low percent of the national income α, and the "war" period, when the borrowing ratio increases to a higher level β. In the war model, the national income remains growing in accord with eq.1. Equation (2), in turn, has to be rewritten to be adapted to the two periods of different borrowing policies. For calculation, it is more convenient to rewrite both eq.1 and eq.2 in the form

$$Y_n(t) = Y_{n-1} e^{rt}, \quad (5)$$

$$D_n(t) = D_{n-1} + \frac{\alpha_n Y_{n-1}}{r}\left(e^{rt} - 1\right), \quad (6)$$

where Y_{n-1} and D_{n-1} is the national income and the government debt at the end of the previous period, and α_n is the percentage of the national income, borrowed yearly in the current period, i.e. α in the peace period and β in the war period. The outcome of the Domar's war model is similar to one of the classic model: both average ratio *D/Y* and the tax burden converge to the limited values, although yearly values of *D/Y* and *U/T* oscillate between the limited minimal (in the peace period) and maximal (at "war") values. In the original work, Domar analysed the 30-year period, divided into 25 years of peace and 5 years of war. In the present paper, a ten-year period is analysed.

3. Crisis model

The assumption of the Domar's model of constant growth rate of the national income seems unrealistic for a real economy, where the periods of growth are replaced by the periods of recession. Thus, for analysis of the situation in Latvia in 1995 – 2011, the author modifies the Domar's model to account for the crisis. By analogy with the Domar's war model, two periods are considered in scope of analysis. In the "growth period", the national income increases with the rate r_A, and the government borrows a percent of the national income each year. During the "recession period", the national income increases with the rate r_B (that may, actually, be negative), but the government borrows at a higher rate β to compensate the decrement of the national income. To match the model with the actual situation, the lag between the beginning of the crisis and the drop in the national income may be introduced. The model equations for the growth period are:

$$Y_n(t) = Y_{n-1} e^{r_A t}, \quad (7)$$

$$D_n(t) = D_{n-1} + \frac{\alpha Y_{n-1}}{r_A}\left(e^{r_A t} - 1\right), \quad (8)$$

where Y_{n-1} and D_{n-1} is the national income and the government debt at the end of the previous recession period. For the recession period, the form of the equation is one of the eq.7, where r_A is replaced with r_B, α with β, and Y_{n-1} and D_{n-1} is the national income and the government debt at the end of the previous growth period.

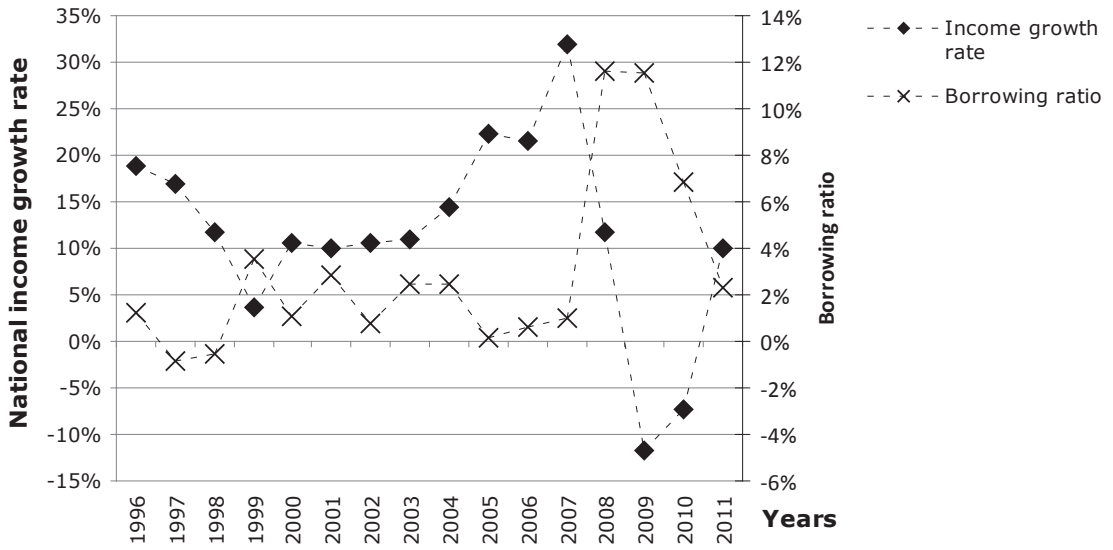

Fig. 1. **The national income growth rate and the government borrowing ratio in Latvia during the period 1996 – 2011**

The government debt of Latvia during 1996 - 2011

The analysis of the national income growth rate over the 15 years period (Figure 1) demonstrates that the national income growth ratio dropped two times, during 1998 – 1999 and during 2008 – 2010, and r reached the smallest value in 1999 and 2009, respectively. Such behaviour is in a good agreement with the economic cycle model, proposed by Juglar (Lee, 1955). The Juglar cycles appear with periodicity of 8 – 11 years with some fluctuations in the cycles' duration. In the present paper, the 10-year period was used for calculation. One has to note that the crisis of 1998 – 1999 for Latvia was attributed only by a slight drop in the national income growth rate. There was neither drop in the national income itself, nor government borrowing. This may be explained by the low level of national income in Latvia at that time (4104 mln LVL in 1998 as compared to 15925 mln LVL in 2008) and a moderate severity of the crisis. Besides, during 2008 – 2009, the national income growth rate dropped to a negative value, and the government sharply increased the borrowing rate from nearly 1% in 2007 to almost 12% in 2008.

The course, both the national income and the government debt growth in 1995 – 2011 was approximated using the classic Domar's model (eqs.1 and 2), the Domar's war model (eqs.5 and 6), and the proposed crisis model (eqs.7 and 8). The approximation was made by adjusting the models' parameters (r, r_A, r_B, α, β) to minimize the root mean square deviation of the simulated values of the national income and the government debt from the actual ones. For instance, for the national income, it is calculated over n years as

$$\sigma = \frac{\sum_t (Y(t) - Y_{model}(t))^2}{n}. \quad (8)$$

For the crisis model, to approximate the national income growth, the period of 10 years was split into 8-year period of growth with positive r_A and 2-year period of recession with negative r_B. Such division takes into account a one-year lag between the beginning of the crisis and the observable decrease of the national income, so the crisis itself begins at the last year of the 8-year growth period. The result of the national income growth approximation is demonstrated in Figure 2. For the classic Domar's model, the rate of national income growth r was equal to 11.7%, but s = 1597 mln LVL (for the Domar's war model, the national income growth regularity was the same). For the crisis model, at the growth period r_A = 18.5%, for recession r_B = -11.7% and s is only 508 mln LVL, which means that the crisis model is more adequate for the description of Latvia national income in the considered period.

To approximate the government debt growth in Domar's war model and crisis model, the 10-year period was split into 7 years of "moderate" borrowing at the rate α and 3 years of "extreme" borrowing at the rate β. Such approach corresponds to the government policy to take into account the lag between the beginning of the crisis and the drop in national income, and to start intensive borrowing one year in advance at the first signs of the crisis. Yet, since Latvia government didn't borrow intensively during the 1998 – 1999 years crisis, for this period, the borrowing rate was assumed to be the same as in the growth period (i.e. when approximating the government debt growth, the crisis of 1998 – 1999 was not taken into account). The results of national income growth approximation are demonstrated in Figure 3.

For the classic Domar's model, the borrowing rate α was equal to 3.7% for the all period, yet σ = 845 mln LVL is high, and the model is too far from the actual situation. The war model gives α = 1.6%, β = 11.4%, and σ = 218 mln LVL, so the Domar's war model generally performs better. For the crisis model, α = 0.9%, β = 12.9%, which is close to the Domar's war model, but

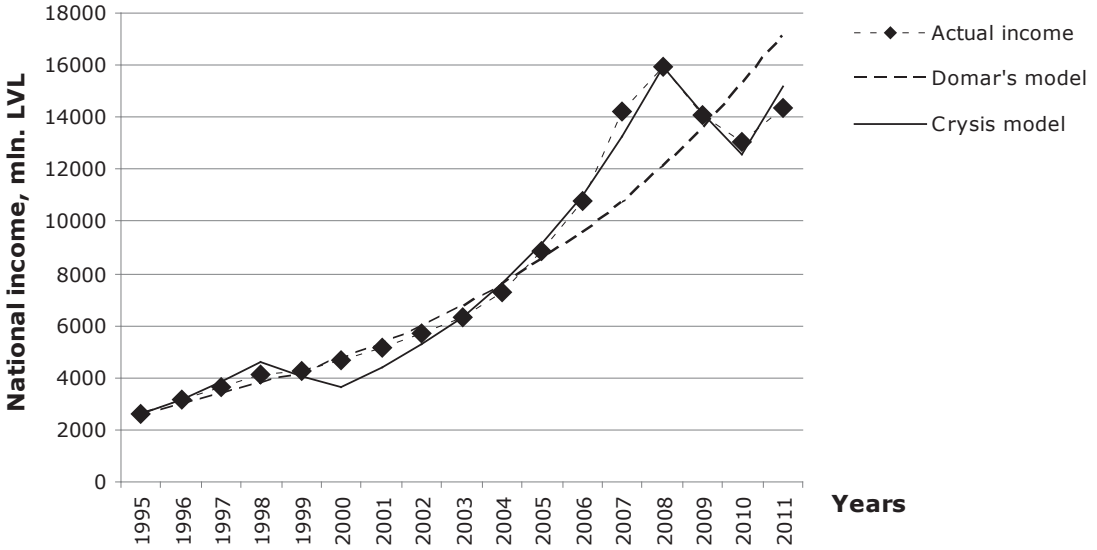

Fig. 2. **National income growth in Latvia during the period 1995 – 2011**

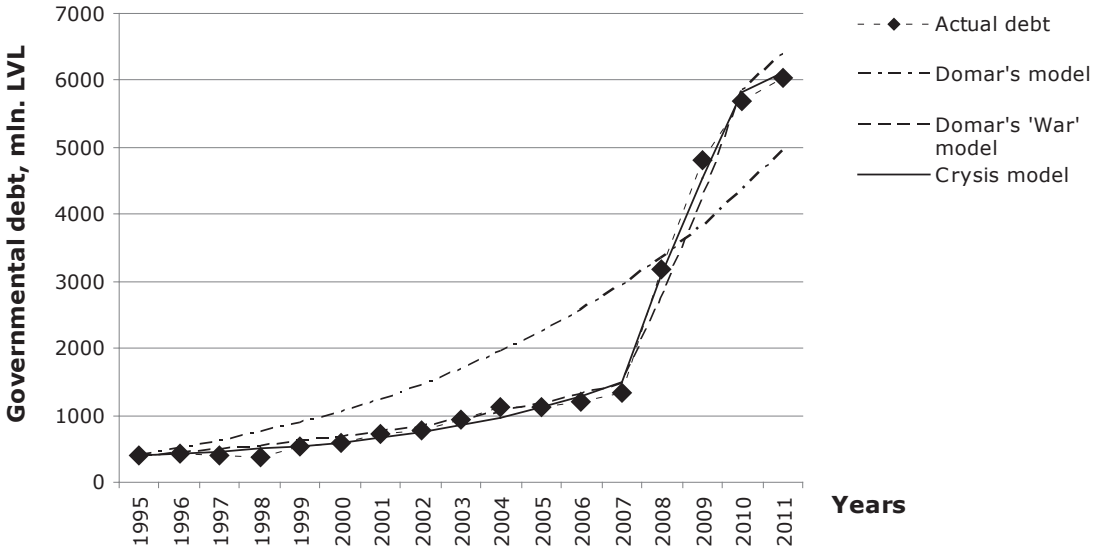

Fig. 3. **The government debt growth in Latvia during the period 1995 – 2011**

Table 1

The parameters of the national income and the models of government debt growth in Latvia economy during the period 1995 - 2011

	"Classic" Domar's model	"War" Domar's model	Crisis model
National income growth rate, %			
"growth" period	11.7	11.7	18.5
"recession" period	-	-	-11.7
σ for national income approximation, mln LVL	1597	1597	508
Borrowing ratio, %			
"growth" period	3.7	1.6	0.9
"recession" period		11.4	12.9
σ for government debt approximation, mln LVL	845	218	109

σ = 109 mln LVL, which is twice less than s for Domar's war model.

Thus, one may conclude that the proposed crisis model provides a better approximation of Latvia national income and the government debt growth during the period from 1995 until 2011. The parameters of all considered models are summarized in Table 1.

One should note that, even with significant drop in the national income in 2009 – 2010, Latvia economy grew up at a very high rate of at least 11.7%. Such a high growth rate indicates that Latvia is characteristic of developing economy. It is unlikely that such a high rate will persist in the future, thus, for the prognosis, one has to use the data that are more realistic.

Prognosis of the government debt of Latvia

In this section, the short–term prognosis of the growth of the national income and government debt is made based on all the considered models. The prognosis made up to the year 2031 includes two full 10–year Juglar cycles. For the prognosis, in the framework of Domar's model, the rate of the national income growth was assumed equal to 2.5%. This rate was taken from the prognosis made by the International Monetary Fund for European countries (IMF, 2012). For the crisis model, the national income growth rate at the growth period was assumed to be equal to the same 2.5%, however, in the recession period, the national income drops at the rate of –5%. This "crisis" rate was obtained assuming the drop of r from the growth period level to be equal to the one during the "moderate" 1998 – 1999 crisis (that comprises 7.5%). Under such assumptions, the dynamics of the national income growth is shown in the Figure 4. Moreover, even under influence of the regular crisis, in general, the national income still increases.

The accumulation of the government debt was predicted using parameters α and β of the government borrowing policy that was obtained from approximation of 1995 – 2011 years' data and summarized in Table 1. The predicted values of the government debt are shown in the Figure 5.

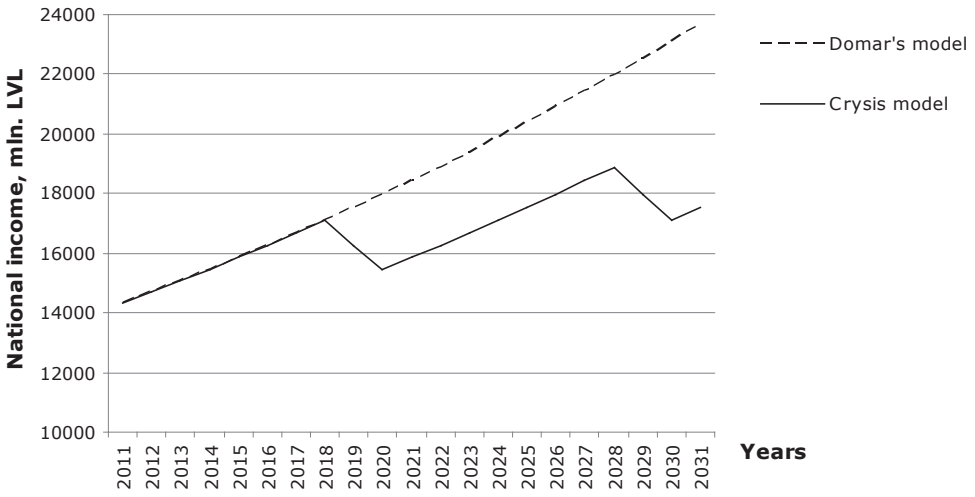

Fig. 4. **Prognosis of the national income of Latvia**

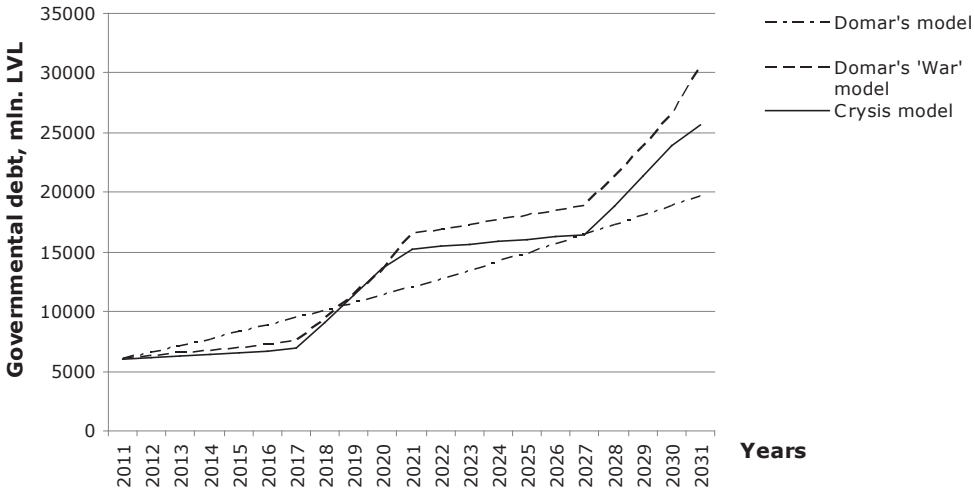

Fig 5. **Prognosis of the government debt of Latvia**

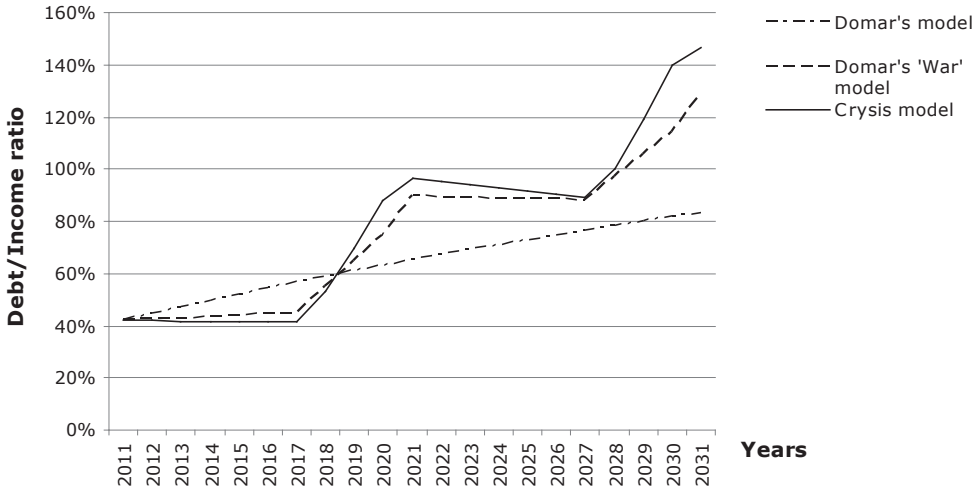

Fig. 6. **Prognosis of the ratio of government debt to the national income**

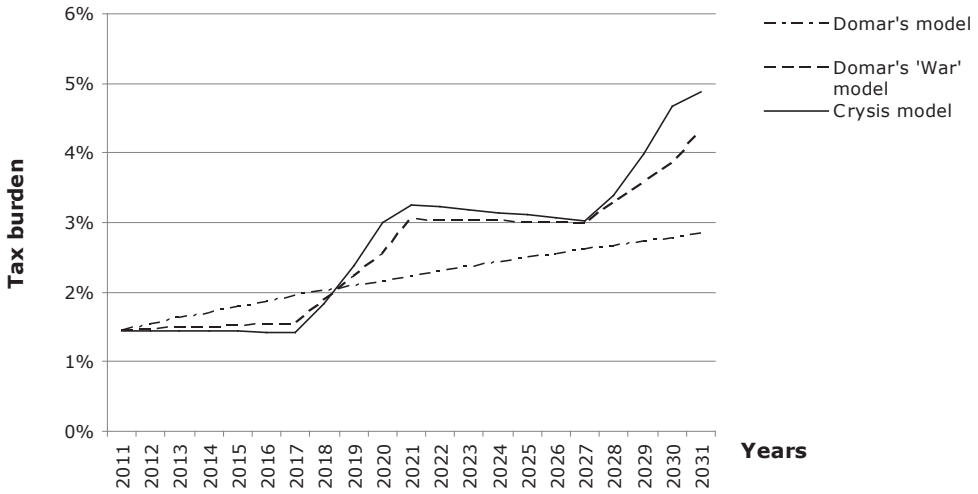

Fig. 7. **Prognosis of the tax burden to pay off interest on government debt**

Although the absolute value of the debt accumulated under the crisis model is smaller than the one under assumption of the Domar's war model, the ratio of the government debt to the national income for the crisis model is the highest (Figure 6).

The same might be said for the tax burden, required to pay off the interest on the government debt. The tax calculations were made assuming the public debt interest to be equal to 3.5%, which is the actual interest, paid by Latvia government in 2011. The results demonstrated in Figure 7 show that, in the case if the government implements the same borrowing policy as implemented during 2008 – 2010, the burden of the debt will be required at about 5% of the national income to be paid as an interest in 2030s. This value is twice as higher as the one predicted by the classic Domar's model.

The analysis of the D/Y curve and of the tax burden curves (Figures 6 and 7) shows that the fast burden growth takes place during the recession period when the government increases borrowing. In the growth periods, the tax burden tends to decrease, even when the interest rate on the debt is higher than the rate of the national income growth.

Thus, one may conclude, that the government may use intensive borrowing time-to-time in crisis to cope with the drop in the national income, yet it should not become a regular practice as the growth in the tax burden will be intolerable. In order to keep it under 2% within next 30 years, one has to recommend to do all the best to avoid intensive 2008 – style borrowing during next crisis' waves in 2018 – 2020 and 2028 – 2030.

Conclusions

1. The proposed crisis model provides an adequate description of the accumulation of Latvia government debt during 1995 – 2011 better than the "war" model of Domar does.
2. In the short run, the crisis model predicts a slightly higher government debt to the national income

ratio and the tax burden required to pay interest on the debt than the Domar's "war" model does. Besides, both models predict the tax burden growth to nearly 5% in 30 years, given the state borrowing policy doesn't change in comparison with 2008 – 2010.

3. To keep the tax burden low, the state has to forecast crisis to avoid intensive borrowing at the crisis time.

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SYNERGY OF OLD AGE PENSIONS, BENEFITS AND ECONOMIC ACTIVITY IN LATVIA

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Abstract. The paper examined the legal aspects of old age pension and state social insurance benefits, analysed the economic activity of Latvia's municipalities and cities in 2011 by using cluster analysis as well as examined the interaction between the economic activity of a territory and the average amount of pension and benefits. The research hypothesis: a synergy exists in Latvia between the average amount of old age pension and state social insurance benefits and the economic activity in Latvia.
The analysis of Latvia legal acts showed that the basic factor determining the average amount of social insurance benefits and pension was the average wage subject to insurance contributions. According to the cluster analysis results, a monocentric development trend is specific to Latvia, which leads to significant differences between Latvia's capital city Riga and other municipalities and cities. Latvia's territory may be classified by economic activity into three categories: (1) the country's capital city Riga; (2) cities, except Riga, and large, in terms of territory, municipalities; (3) small, in terms of territory, municipalities. The analysis of interaction showed that a synergy existed between economic activity as well as the proximity of a municipality to the capital city and the average amount of old age pension, unemployment benefit, sickness benefit, maternity, paternity, and parental benefits.
Key words: old age pension, state social insurance benefits, economic activity, synergy.
JEL code: G22, G29, I39, A12, R11

Introduction

In avoiding social tension and increasing the welfare of society, an essential role is played by the capacity and sustainable development of social insurance system, which supports individuals in the case of social risk and provides the disabled with funds for existence.

The authors of the paper (2011; 2011a; 2011b) have previously conducted a research on synergy between economic activity and the average amount old age pension and social insurance benefits. The research on synergy between the average amount of state social insurance benefits and economic activity was performed for a territorial division into 26 districts (Latvia's administrative and territorial division until the middle of 2009). It showed that there was a synergy among the average amount of unemployment, maternity, paternity, and parental benefits as well as the average amount of sickness benefit, the proximity of a district to the capital city as well as the economic activity in districts. The authors identified a synergy also in a research on the average amount of old age pension and economic activity in Latvia's municipalities. Yet, the previous research presented the situation that existed in Latvia in 2008 and 2009 when there was an economic crisis, which decreased economic activities and increased expenses of the social insurance special budget. Besides, significant amendments were made in 2009 in Latvia legal acts regulating its social policy, which affected the average amount of pension and social insurance benefits.

The change in Latvia's administrative and territorial division in the middle of 2009 (the transition from districts to amalgamated municipalities) as well as a gradual improvement in the economic situation in the country motivated the authors to carry out repeated research. "Report on the Economic Development of Latvia" of the Ministry of Economics (2012) states that Latvia's GDP continued stable growth in 2011 and exceeded the level of 2010 by 5.5% as well as the situation in the labour market improved – employment increased, unemployment gradually decreased, and the number of vacant jobs increased (the number of employed individuals rose 2.5% in 2011 compared with 2010). Within a year, the unemployment rate significantly fell. On average, it was, 16.2% in 2011, i.e. 3.3 percentage points less than in 2010.

The year 2010 was the first year after the administrative and territorial reform when Latvia changed its administrative division from more than 500 two-level municipalities to one-level municipalities; initially, there were 118 municipalities, but since 2011 – 119 (9 cities: Riga Daugavpils, Jekabpils, Jelgava, Jurmala, Liepaja, Rezekne, Valmiera, and Ventspils and 110 municipalities) (State Regional Development..., 2012).

The report „State Regional Development 2011" (2012) states that Latvia's 110 municipalities "**are very diverse in terms of** area, number of residents, population density, economic specifics, and **development level**".

Owing to the limitations set for the paper, the authors will examine synergy between economic activity and the average amount of old age pension and state social insurance benefits.

Hypothesis: a synergy exists in Latvia between the average amount of old age pension and state social insurance benefits and the economic activity in Latvia.

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The **research aim** is to identify synergy between the average amount of old age pension and state social insurance benefits and the economic activity in Latvia.

Toa achieve the research aim, the following research **tasks** were set:

1. to examine the legal aspects of old age pension and social insurance;
2. to analyse the economic activity of Latvia's municipalities by using cluster analysis;
3. to compare the average amount of old age pension and social insurance benefits with the cluster analysis results.

The present research is based on the monographic method, analysis and synthesis, deduction and induction, multifactor statistical analysis, and economic statistics analysis.

Legal acts of the Republic of Latvia, the data of the Central Statistical Bureau (CSB), the State Social Insurance Agency (SSIA), and the State Regional Development Agency as well as the findings of the research carried out in Latvia that is related to the field researched by the authors.

Research novelty – the authors have researched synergy between the economic activity of a territory and the average amount of pension and benefits in a long-term.

Research results and discussion

1. Legal aspects of state pensions and social insurance benefits

A social security system is established in any country, which, to a great extent, depends on the social and economic situation as well as on the social policy implemented in it. In Latvia, its social security system includes state social insurance, social benefits, social assistance, and social services.

In **Latvian Strategic Development Plan 2010-2013 (2010)**, long-term challenges are set (until 2020), and one of the key challenges is to make the government's social budget sustainable, given the problem of the population aging. The key priorities of government policy regarding social security are employment and social assistance, the implementation, improvement, and control of an active labour market policy, and the reduction of regional differences.

In accordance with the "Law on State Social Insurance" (1997), the goal of the social insurance system is to insure individuals and their dependent individuals against the risk of losing their earned income due to sickness, disability, maternity, unemployment, old age, accidents at work or occupational disease as well as against additional expenses related to child care and the death of insured persons or their dependents.

Latvia's social insurance includes state pensions and state social security benefits. State pensions are classified as follows: old age pension, survivor's pension, disability pension, and service pension. State social insurance benefits, in their turn, are classified as follows: unemployment benefit, maternity benefit, paternity benefit, parental benefit, sickness benefit, and funeral allowance.

Old age pensions are granted in accordance with the Law "On State Pensions" (1995). State social security benefits are granted in accordance with the laws "On Insurance in Case of Unemployment" (1999), "On Maternity and Sickness Insurance" (1995), and "On Compulsory Social Insurance in Respect of Accidents at Work and Occupational Diseases" (1995).

In accordance with the "Law on State Social Insurance", a person is socially insured for occupational accident insurance, insurance against unemployment, invalidity insurance, maternity and sickness insurance and parents' insurance, and he or she must make mandatory contributions (regarding thereof) from the day when such person has acquired the status, except for the status of a self-employed person. A person is socially insured for pension insurance if mandatory contributions have been actually made.

The right to a **state social insurance pension** in accordance with the "Law on State Social Insurance" is held by persons living in the territory of Latvia who were subject to the State mandatory pension insurance scheme.

The amount of a state pension is dependent upon the length of period of insurance, which includes counting of months in which insurance contributions were made.

Women and men who have reached the age of 62 years and whose length of period of insurance is not less than 10 years have a right to an old-age pension in Latvia for the period 2008-2012. To maintain the social security system in a long-term, the age upon which a person has a right to a pension will be gradually increased from 2014 in accordance with the amendments to the Law "On State Pensions". From 1 January 2014, it will be 62 years and three months, while from 1 January 2025 – 65 years. The length of insurance period needed to receive a pension will be significantly increased – it will be 15 years in the period 2014-2024 and 20 years in 2025.

To maintain the social security system sustainable in situations of economic crisis in Latvia, limits were set for the amount of unemployment, sickness, maternity, paternity, and parental benefits for the period 2010-2014 – LVL 11.51 per calendar day and a 50% deduction was imposed on the amount exceeding this rate. From 2013, the limit on the amount of maternity, paternity, and parental benefits was increased to LVL 23.02 per day (Law on the ..., 2009).

In accordance with the law "On Unemployment Insurance" (1999), an **unemployment benefit** is granted to a person whose length of insurance period is not less than one year, if the mandatory state social insurance payments for unemployment have been made or had to be made for such person for not less than nine months during the time period of the last 12 months prior to the day when the status of an unemployed person was obtained.

From 2013, the length of the period for receiving an unemployment benefit does not depend on the length of service of an unemployed person. For all unemployed persons, the length of period for paying an unemployment benefit is nine months, and the amount of benefit depends on the length of unemployment: 100% of the granted amount of unemployment benefit for the first three months, 75% of that amount for the following three months, and 50% for the last three months.

In accordance with the law "On Maternity and Sickness Insurance" (1995), a **maternity benefit** is granted and paid for the entire pregnancy leave (56 days) and the entire childbirth leave (56 days) if a woman is absent from work and thereby loses income to be gained from paid work or if a self-employed woman loses income.

A woman whose pregnancy-related medical care was commenced at a medical prophylactic institution up to the 12th week of pregnancy and was continued during the entire period of pregnancy is granted a benefit for a 14-day-long additional leave, which is added to the maternity leave.

A woman is granted a benefit for a 14-day-long additional leave due to pregnancy or childbirth complications, or complications during the period following childbirth as well as in cases where two or more children were born; such leave is added to maternity leave.

A **paternity benefit** is granted and disbursed to the child's father for *ten calendar days* of the leave granted owing to the birth of the child.

From 2010, a maternity and paternity benefit is granted in an 80 per cent amount of the average wage of the benefit recipient that is subject to insurance contributions. Before 2010, a maternity benefit was granted in a 100 per cent amount of the average wage of the benefit recipient that is subject to insurance contributions. A paternity benefit, in its turn, was granted in a 100 per cent amount only in 2009, thus stimulating the engagement of fathers in caring for their newborn children (On Maternity and..., 1995).

A **parental benefit** is granted and paid to a socially insured person that *nurses his/her child aged less than one year* if this person is employed on the day of granting the benefit and is on leave for child care, or does not gain income from self-employment owing to child care.

A **sickness benefit** is granted if a person is absent from work and thereby loses paid labour income, or if a self-employed person loses income owing to the following reasons: loss of capacity for work due to sickness or injury; a need to receive medical assistance of therapeutic or prophylactic nature; isolation is necessary due to quarantine; treatment in a medical treatment institution during the period of recuperation after a sickness or injury, if such treatment is required in order to restore capacity for work; and nursing of a sick child aged up to 14 years and/or prosthetics or orthotics in a hospital.

From 2009, a sickness benefit is granted and disbursed for the time period from the 11th day of incapacity for work until the day the capacity for work is restored, but not longer than for 26 weeks, counting from the first day of incapacity for work if incapacity is continuous, or not longer than for 52 weeks in a period of three years if incapacity for work recurs with intervals. A sickness benefit in the event of taking care of a sick child under 14 years of age is granted and paid for a period from the first day of incapacity for work until the 21st day of incapacity for work. A sickness benefit is granted in an 80 per cent amount of the average wage of the benefit recipient that is subject to insurance contributions. (On Maternity and ..., 1995).

A **funeral allowance** is granted to a socially insured person in case of death of this person or a dependant family member of this person.

2. Assessment of the economic activity of Latvia

To assess economic activity in the cities and municipalities, the authors, based on various indicators, performed a cluster analysis. For the cluster analysis, 15 statistical indicators were selected based on the report „Development of Regions in Latvia 2011" and studies by J. Paiders (2007):

1. number of residents (thou.);
2. change in the number of residents (%);
3. population density (people per 1km^2);
4. number of employees at the main job (thou.);
5. average net monthly wage in the public sector (LVL);
6. number of businessmen per 1000 residents;
7. personal income tax (hereinafter – PIT) revenues (mln. LVL);
8. PIT revenues in local government budgets per capita (LVL);
9. revenues of the government basic budget (mln. LVL);
10. total revenues of the government basic and special budgets (mln. LVL);
11. demographic burden;
12. rate of unemployment (%);
13. number of economically active market-sector statistical units per 1000 residents;
14. revenues of the government basic budget per capita (LVL);
15. revenues of the government special budget per capita (LVL).

For comparison of national and regional economic development in Latvia, the following indicators were also used: gross domestic product (GDP), gross value added, and non-financial investment. Since GDP data, broken down by regions, are published with a large time delay, J. Paiders (2007) recommends municipal tax revenues per capita as a "measure of regional development level" that could replace GDP per capita, as this indicator may be obtained earlier than the other one for all Latvia's administrative units. Therefore, the authors replaced the GDP indicator with PIT revenues in municipal budgets in their research. Data on the net monthly wage in the private sector by municipality are not available due to confidentiality; thus, these data are not included in the present research. Updated data (for 2011) on gross value added and non-financial investment by city and municipality were also unavailable.

Statistical indicators regarding Latvia's all 110 municipalities and 9 cities were analysed, and they reflected the situation of 2011.

The analysis of variance (ANOVA), which is integrated in the statistical data processing module "Cluster Analysis" of SPSS for Windows, showed that all the selected indicators, except five – demographic burden, unemployment rate, number of economically active market-sector statistical units per 1000 residents, revenues of the government basic budget per capita, and revenues of the government special budget per capita – were statistically significant for grouping the municipalities and cities into clusters. Their significance level did not exceed 0.05. The authors omitted the statistically insignificant indicators for further analysis.

The cluster-to-cluster distances obtained in the analysis indicate that there is a relationship among the

Table 1

Average values and ranks of clusters in the cluster analysis of economic development in Latvia in 2011

Indicators	Clusters								
	1.	**2.**	**3.**	**4.**	**5.**	**6.**	**7.**	**8.**	**9.**
Number of residents, thou.	699.2	82.4	59.9	101.1	40.2	19.8	28.6	9.4	4.2
Rank	**1**	**3**	**4**	**2**	**5**	**7**	**6**	**8**	**9**
Change in the number of residents, %	-3.4	-3.7	-1.2	-5.6	-2.7	2	-4.1	0.2	-5.9
Rank	**5**	**6**	**3**	**8**	**4**	**1**	**7**	**2**	**9**
Population density, people per 1km^2	2300.0	1351.0	805.5	1395.8	382.7	54.7	463.5	35.0	12.6
Rank	**1**	**3**	**4**	**2**	**6**	**7**	**5**	**8**	**9**
Number of employees at the main job, thou.	313.9	26.7	14.3	32.3	11.2	4.5	7.5	1.8	0.7
Rank	**1**	**3**	**4**	**2**	**5**	**7**	**6**	**8**	**9**
Average net monthly wage in the public sector, LVL	407	300	288	269	299	292	276	283	258
Rank	**1**	**2**	**5**	**8**	**3**	**4**	**7**	**6**	**9**
Number of businessmen per 1000 residents	57.0	25.8	25.4	21.5	25.3	23.4	24.5	20.7	13.9
Rank	**1**	**2**	**3**	**7**	**4**	**6**	**5**	**8**	**9**
PIT revenues in local government budgets per capita, LVL	377.31	250.80	343.61	219.99	354.06	272.29	237.76	264.03	188.97
Rank	**1**	**6**	**3**	**8**	**2**	**4**	**7**	**5**	**9**
Revenues of the government basic budget, mln. LVL	460.0	48.9	38.6	59.8	29.5	12.1	19.5	5.8	2.5
Rank	**1**	**3**	**4**	**2**	**5**	**7**	**6**	**8**	**9**
Total PIT revenues, mln. LVL	264.0	20.7	20.5	22.2	14.3	5.3	6.7	2.4	0.8
Rank	**1**	**3**	**4**	**2**	**5**	**7**	**6**	**8**	**9**
Total revenues of the government basic and special budgets, mln. LVL	500.0	50.0	40.0	60.0	30.0	10.0	20.0	6.0	3.0
Rank	**1**	**3**	**4**	**2**	**5**	**7**	**6**	**8**	**9**
Total rank	**14**	**34**	**38**	**43**	**44**	**57**	**61**	**69**	**90**

Source: authors' construction based on the CSB and State Regional Development Agency data, 2012

clusters. The clusters being closer to each other can move to another level if a new distribution of them is performed, and they can create new clusters or cluster groups.

In clustering the statistical data, several numbers of clusters were considered by the authors. Latvia's territorial division by economic development into nine clusters was the most appropriate option, as the number of Latvia's municipalities and cities was steadier with such a distribution into clusters.

In addition to the clustering results, the clusters were ranked based on all the statistically significant indicators to determine the overall development level of each cluster in relation to the other clusters (Table 1).

The ranking showed that the highest economic activity in Latvia was observed for **Cluster 1** that included only the capital city **Riga**. All the analysed indicators were ranked in the highest first position, except one indicator – change in the number of residents (5th position).

The number of residents changes owing to both vital statistics and international and domestic migration. According to the Population Censuses of 2000 and 2011, in 2011, compared with 2010, the largest decrease in the number of residents was observed for Latgale region (21.0%), a slightly smaller decrease was observed in Vidzeme region (17.4%) and Kurzeme region (16.0%), a smaller decrease was in Zemgale region (13.2%), while the smallest decrease was observed in Riga planning

region (8.4%) (State Regional Development..., 2012). Among the cities, the fastest decrease in the population occurred in Daugavpils (19.1%) and Rezekne (17.7%). The smallest decrease was observed for Jelgava city (6.6%). A smaller decrease, compared with the average indicator in the country (13.0%), except Jelgava, was in Jurmala (9.0%), Valmiera (9.5%), Jekabpils (11.7%), and Ventspils (12.0%), followed by Riga city (14.0%). A positive change in the number of residents was observed only for municipalities located near Riga. In the period 2007-2011, the greatest increase in the number of residents was in Marupe municipality (40.1%) and Garkalne municipality (31.2%) (State Regional Development..., 2012). The researche carried out by A. Baula, Z. Krisjane (2011) and M. Berzina (2011) also confirmed that a very intensive migration existed towards Pieriga region.

Cluster 2 included the city of Liepaja. The majority of the indicators specifying economic activity were ranked in the third position. Two indicators – "net average monthly wage in the public sector" and "number of businessmen per 1000 capita" – were ranked in the second position. The average values of the statistically significant indicators – "change in the number of residents" and "PIT revenues per capita" were ranked in the sixth position.

Liepaja is the third largest city, in terms of population, with 82413 residents in the beginning of 2012, which reduces the statistically significant indicator "PIT revenues per capita". According to the Population Censuses of 2000 and 2011, Liepaja is ranked in the third position among the cities with the fastest decreasing population. The change in the number of residents in Liepaja (14.4%) was higher than on average in the country (State Regional Development..., 2012). Cluster 2 has the third highest population density.

After comparing the economic activity indicators and the total ranks of Clusters 1 and 2, one can conclude that a significant difference exists between them, which points to the fact that economic activity in the capital city is significantly higher than in Liepaja and other cities and municipalities of Latvia.

Cluster 3 included two cities – Jelgava and Jurmala. The majority of the economic activity indicators were ranked in the fourth position. The average values of three indicators – "change in the number of residents", "number of businessmen per 1000 capita" and "PIT revenues per capita" – were ranked in the third position. The average value of one statistically significant indicator – "net average monthly wage in the public sector" – was ranked in the fifth position.

As it was stated before, the change in the number of residents in the cities included in this cluster was lower among the cities.

Cluster 4 included only one city – Daugavpils. The majority of the economic activity indicators were ranked in the second position. In the lowest positions, the following indicators were ranked: "number of businessmen per 1000 capita" (7^{th}), "change in the number of residents" (8^{th}), "net average monthly wage in the public sector" (8^{th}), and "PIT revenues per capita" (8^{th}). The large number of residents living in Daugavpils city reduced the indicator "PIT revenues per capita". Daugavpils is the second largest city in terms of population with 101057 residents in the beginning of 2012. Among the cities in 2011, the lowest PIT revenues per capita were in Daugavpils. In 2011, the PIT revenues per capita in the municipal budget of Daugavpils amounted to LVL 219.99, which comprised 64% of the average indicator for the cities and 75% of the average indicator for the country (State Regional Development..., 2012). On the contrary, the indicator "total PIT revenues" was ranked in the high second position. The low net monthly wage may be explained by the fact that the city is located in Latgale region where the lowest wage level is observed in the country (State Regional Development..., 2012).

According to Table 1, in general, the large population of Daugavpils city determined its inclusion in Cluster 4. If the indicators per capita or per 1000 capita were not examined in the cluster analysis, Daugavpils city would be ranked in the second position.

Cluster 5 included Ventspils city and Ogre municipality. The majority of the indicators were ranked in the fifth position. Since the number of residents is small in Ventspils city and Ogre municipality, compared with the previously analysed administrative units, the indicator "PIT revenues per capita" was ranked in the second position. Among the cities in 2011, the highest personal income tax revenues per capita, on average, were collected in the municipal budget in Ventspils city (LVL 394.4 or 115% of the average indicator for municipalities and 135% of the average for the country) (State Regional Development..., 2012). Given the location of the territories of the cluster – Ogre municipality is in Pieriga region and Ventspils is a seaport like Liepaja, the net average monthly wage in the pubic sector was ranked in the third position. It was only LVL 1 lower than the respective indicator in Cluster 2. The advantageous location of the territories contributed to a quite small change in the number of their residents.

Cluster 6 included part of the neighbouring municipalities of Riga (municipalities of Kekava, Marupe, Olaine, Sigulda, Salaspils, Jelgava, Stopini, Bauska, and Dobele) and ones of the largest municipalities in terms of territory (Ventspils, Limbazi, Valka, Aluksne, Gulbene, Balvi, Daugavpils, and Kraslava).

In Cluster 6, six of ten indicators were ranked in the seventh position. The indicator "change in the number of residents" was ranked in the first position; its average value was 2%. The average value of the indicator "net average monthly wage in the public sector" was ranked in the fourth position, and the authors explain it by many municipalities located next to Riga, as a part of the population of these municipalities have jobs in Riga, which increases the average wage level. The indicator "number of businessmen per 1000 capita" showed that business activity was not high there.

Cluster 7 included three cities – Rezekne, Valmiera, and Jekabpils, and, in terms of territory, large municipalities: Kuldiga, Madona, Rezekne, Saldus, Talsi, Tukums as well as Cesis. The majority of the indicators were ranked in the sixth and seventh position. Business activity was medium in the territories of the cluster.

The smallest municipalities, in terms of territory, were included in Clusters 8 and 9.

Cluster 8 included 29 municipalities of Latvia. The cluster included 11 municipalities of Pieriga region: Adazi, Babite, Carnikava, Engure, Garkalne, Ikskile, Incukalns,

Kandava, Lielvarde, Salacgriva, and Saulkrasti, six municipalities of Zemgale region: Aizkraukle, Auce, Iecava, Krustpils, Ozolnieki, and Vecumnieki, five municipalities of Latgale region: Dagda, Ilukste, Livani, Ludza, and Preili, four municipalities of Vidzeme region: Amata, Koceni, and Priekuli, and three municipalities of Kurzeme region: Aizpute, Grobina, and Priekule.

In Cluster 8, the majority of the indicators were ranked in the eighth position. A positive change in the number of residents was specific to Cluster 8.

Cluster 9 included 56 municipalities of Latvia from all its regions – 16 municipalities of Vidzeme: Ape, Beverina, Burtnieki, Cesvaine, Ergli, Jaunpiebalga, Ligatne, Lubana, Mazsalaca, Naukseni, Pargauja, Rauna, Rujiena, Strenci, Varaklani, and Vecpiebalga, 11 municipalities of Kurzeme: Alsunga, Broceni, Dundaga, Durbe, Mersrags, Nica, Pavilosta, Roja, Rucava, Skrunda, and Vainode, 11 municipalities of Zemgale: Akniste, Jaunjelgava, Jekabpils, Koknese, Nereta, Plavinas, Rundale, Sala, Skriveri, Tervete, and Viesite, 10 municipalities of Latgale: Aglona, Baltinava, Cibla, Karsava, Riebini, Rugaji, Varkava, Vilaka, Vilani, and Zilupe, and eight municipalities of Pieriga: Aloja, Baldone, Jaunpils, Krimulda, Kegums, Malpils, Ropazi, and Seja.

All the indicators were ranked in the ninth position, which convincingly indicates weak economic development in these municipalities.

3. Analysis of the research results

To identify the existence a synergy between the economic activity and the average amount of old age pension and social insurance benefits in Latvia, the results of the cluster analysis (the situation of 2012) were compared with the average amount of old age pension and social insurance benefits in the cities and municipalities (data of 2011).

The average amount of old age pension in Latvia's municipalities and cities, in 2011, ranged within LVL 155.00-219.00, while in the entire country it was equal to LVL 184.72 (SSIA data).

An average old age pension, which was above the average in the country, i.e. the highest in the country, was reported in economically the most advanced cities (Ventspils (Cluster 5), Jurmala (Cluster 3), Riga (Cluster 1), Valmiera (Cluster 7), Jelgava (Cluster 3)) as well as in the municipalities located close to the country's capital city in Pieriga region (Garkalne, Kekava, Carnikava, Stopini, Ikskile, Babite, Marupe, Adazi, Saulkrasti, Salaspils, Incukalns, and Sigulda), which were included in Clusters 6 and 8. An average pension, which was above the average in the country, was reported also in Aizkraukle municipality (Zemgale) included in Cluster 8 and in Cesis municipality (Vidzeme) included in Cluster 6. In Ogre municipality (Cluster 5), too, an average old age pension was above the average pension in the country (SSIA data).

Regardless of the fact, that many municipalities of Pieriga region as well as Aizkraukle municipality belonged to Cluster 8, i.e. a cluster of low economic activity, an average old age pension there was above the average pension in Latvia. The authors explain it by the fact that these municipalities are located close to the country's capital city, therefore, part of the population living there have their jobs in Riga or its vicinity where the unemployment rate is one of the lowest in the country and the level of business activities is higher. According to statistics, the average monthly wage was higher in Riga region (gross wage LVL 512 and net wage LVL 363) in 2011, while in other regions this indicator was lower by 23% and even more (State Regional Development..., 2012).

The lowest average old age pension (less than LVL 160) was mainly in small, in terms of territory, Latgale region's municipalities of Cluster 9 (Cibla, Rugaji, Vilaka, Baltinava, and Aglona) and in one small Zemgale region's border area municipality – Rundale (Cluster 9) (SSIA data).

The average pension ranged within LVL 160.01-165.00 mainly in Latgale region's municipalities (Karsava, Dagda, Zilupe, Riebini, Varkava, Vilani, and Livani) and Zemgale region's municipalities (Nereta, Krustpils, Jekabpils, Viesite, Tervete, Vecumnieki, and Jaunjelgava) of Clusters 8 and 9 as well as in large, in terms of territory, Latgale region's municipalities included in Clusters 6 and 7 (Daugavpils, Rezekne, Kraslava) (SSIA data).

In general, one can conclude that a synergy exists between the economic activity as well as the proximity of a municipality to the country's capital city and the average old age pension.

The average amount of unemployment benefit in Latvia's municipalities and cities in 2011 ranged within LVL 62.00-162.00, while in the country it was LVL 104.00 (SSIA data).

An average unemployment benefit of more than LVL 120.01, which was greater than the average in the country, was mainly reported in the municipalities of Pieriga region located close to the capital city (Stopini, Marupe, Kekava, Ikskile, Carnikava, Garkalne, Babite, Adazi, and Salaspils), which were included in Clusters 6 and 8 (SSIA data).

The average unemployment benefit within a range of LVL 105.01-120.00, which was greater than the average in the country, was reported in economically the most developed cities (Riga (Cluster 1), Jurmala (Cluster 3), Ventspils (Cluster 5), Valmiera (Cluster 7)) as well as in the municipalities in the vicinity of the capital city (Sigulda, Malpils, Incukalns, Lielvarde, Ogre, Krimulda, Engure, Ropazi, Seja, and Saulkrasti), which mainly belonged to Cluster 8 and 9, except Sigulda municipality (Cluster 6) and Ogre municipality (Cluster 5). An average unemployment benefit within a range of LVL 105.01-120.00 was also reported in three Zemgale region's municipalities (Tervete, Iecava, and Aizkraukle), one Kurzeme region's municipality (Dundaga), and one Vidzeme region's municipality – Beverina of Clusters 8 and 9 (SSIA data).

The lowest average unemployment benefit (less than LVL 75.00) was mainly reported in small, in terms of territory, Latgale region's municipalities of Clusters 8 and 9 (Aglona, Karsava, Varkava, and Livani) and Rezekne municipality (Cluster 7) as well as in two Zemgale region's municipalities of Cluster 9 – Nereta and Jekabpils (SSIA data).

In the cities – Jelgava (Cluster 3), Daugavpils (Cluster 4), Rezekne (Cluster 7) – where economic activity was high and medium, the average unemployment benefit was within a range of LVL 90.01-

105.00, in Jelgava – LVL 98.72, Daugavpils – LVL 98.24, and Rezekne – LVL 92.42 (SSIA data).

In general, one can conclude that a synergy exists between the economic activity as well as the proximity of a municipality to the country's capital city and the average unemployment benefit.

The average amount of sickness benefit in Latvia's municipalities and cities in 2011 ranged within LVL 178.20-340.21. The average sickness benefit in the country was LVL 248.41 (SSIA data).

The highest average sickness benefit (more than LVL 300.01) was in small, in terms of territory, Vidzeme region's municipalities (Ergli, Vecpiebalga, Beverina, and Lubana) which were included in Cluster 9 and in two Latgale region's municipalities – Rugaji (Cluster 9) and Balvi (Cluster 6) (SSIA data).

An average sickness benefit within a range of LVL 275.01-300.00 was reported in economically most developed cities: Riga (cluster 1), Ventspils (Cluster 5), Jurmala (Cluster 3) as well as in Pieriga region's municipalities, included in Cluster 8, located close to the capital city (Garkalne, Babite, and Carnikava) and in two Vidzeme region's municipalities: Ligatne (Cluster 9) and Koceni (Cluster 8). A high average sickness benefit was reported in small, in terms of territory, Latgale region's municipalities of Cluster 9: Vilaka, Cibla, and Baltinava (SSIA data).

The lowest average sickness benefit (less than LVL 200.00) was reported in two cities: Daugavpils (Cluster 4) and Jekabpils (Cluster 7) as well as in Latgale region's municipalities (Varkava, Livani, Daugavpils, and Kraslava), Zemgale region's municipalities (Krustpils, Sala, Auce, and Jekabpils), and small, in terms of territory, Kurzeme region's municipalities (Nica, Rucava, Alsunga, and Pavilosta) of Clusters 8 and 9 (SSIA data).

In general, one can conclude that a synergy exists between the economic activity as well as the proximity of a municipality to the country's capital city and the average sickness benefit.

The average maternity benefit in Latvia's municipalities and cities in 2011 ranged within LVL 658.97-1677.09. The average maternity benefit in the country was LVL 1171.53 (SSIA data).

The highest average maternity benefit (more than LVL 1300.00) was reported in the capital city of Riga (Cluster 1) and Pieriga region's municipalities (Marupe, Ikskile, Ropazi, Kekava, Carnikava, Stopini, Adazi, Malpils, and Babite) which were included in Clusters 6, 8, and 9. It was determined by the mobility of the population of these municipalities, which contributed to a higher wage level (SSIA data).

The lowest average maternity benefit (less than LVL 800.00) was mainly reported in Latvia's border area municipalities of Cluster 9 – four in Kurzeme region (Rucava, Pavilosta, Priekule, and Vainode), three in Zemgale region (Akniste, Nereta, and Jekabpils), one in Vidzeme region (Mazsalaca), and two in Latgale region (Zilupe, Riebini) as well as in two Pieriga region's municipalities, included in Cluster 9, located most distantly from the capital city – Jaunpils and Aloja (SSIA data).

The average paternity benefit in Latvia's municipalities and cities in 2011 ranged within LVL 65.17-190.12. The average paternity benefit in the country was LVL 123.31 (SSIA data).

The highest average paternity benefit (more than LVL 135.00) was reported in the capital city of Riga (Cluster 1) and Jurmala (Cluster 3) as well as in 11 Pieriga region's municipalities (Marupe, Kekava, Stopini, Sigulda, Babite, Ikskiles, Carnikava, Garkalne, Adazi, Malpils, and Kegums) of Clusters 6, 8, and 9, in one Vidzeme region's municipality – Pargauja (Cluster 9), and in one Latgale region's municipality – Baltinava (Cluster 9) (SSIA data).

The lowest average paternity benefit (less than LVL 85.00) was reported in seven Vidzeme region's municipalities (Lubana, Vecpiebalga, Strenci, Cesvaine, Rauna, Ape, and Varaklani), three small, in terms of territory, Kurzeme region's municipalities (Rucava, Pavilosta, and Mersrags), one Latgale region's municipality (Cibla), one Zemgale region's municipality (Sala), and one Pieriga region's municipality (Aloja) of Cluster 9 (SSIA data).

After analysing the average amount of maternity and paternity benefits in the cities, one can conclude that a high average amount of these benefits was also reported in Ventspils (Cluster 5), Jelgava (Cluster 3), and Valmiera (Cluster 7) (SSIA data).

The average parental benefit in Latvia's cities and municipalities in 2011 ranged within LVL 160.62 - 342.63. The average parental benefit in the country was LVL 294.98 (SSIA data).

The highest average parental benefit (more than LVL 300.00) was reported in the capital city of Riga (Cluster 1), Jurmala (Cluster 3), two Pieriga region's municipalities: Malpils (Cluster 9) and Marupe (Cluster 6) as well as in small, in terms of territory, Vidzeme region's municipalities (Naukseni, Cesvaine, Varaklani, Rauna, and Ergli), Kurzeme region's municipalities (Priekule, Pavilosta, Vainode, Roja, and Dundaga), one Zemgale region's municipality (Sala), and one Latgale region's municipality (Vilaka) of Cluster 9 (SSIA data).

A high average parental benefit was also reported in the city of Liepaja (LVL 299.00) included in Cluster 2, i.e. a cluster with high economic activity (SSIA data).

The lowest average parental benefit (less than LVL 195.00) was mainly reported in Latgale region's municipalities (Ludza, Preili, Baltinava, Aglona, Kraslava, and Daugavpils), small, in terms of territory, Zemgale region's municipalities (Iecava, Plavinas, and Tervete), Vidzeme region's municipalities (Koceni, Vecpiebalga, and Lubana), and Kurzeme region's municipalities (Grobina, Talsi) of Clusters 6, 8, and 9 as well as in Pieriga region's municipalities – Olaine (Cluster 6), Salacgriva (Cluster 8), and Seja (Cluster 9) (SSIA data).

In general, one can conclude that a synergy exists between the economic activity as well as the proximity of a municipality to the country's capital city and the average maternity, paternity, and parental benefit.

Conclusions, recommendations

1. The examination of Latvia legal acts showed that the basic factor determining the average amount of social insurance benefits and pension is the average wage subject to insurance contributions; thus, to ensure

and increase social security for Latvia's population, it is necessary to raise labour productivity and economic activity in the country.

2. A monocentric development trend is specific to Latvia, which leads to significant differences among Latvia's capital city Riga and other municipalities and cities. The territory of Latvia may be classified by economic activity into three categories: (1) the country's capital city Riga; (2) cities, except Riga, and large, in terms of territory, municipalities; and (3) small, in terms of territory, municipalities.
3. A synergy exists in Latvia between the economic activity as well as the proximity of a municipality to the country's capital city and the average old age pension and social security benefits.
4. The authors of the paper believe that even development of all the regions of Latvia is impossible, thus, the country's population have to migrate from economically weak or underdeveloped municipalities to economically active centres of Latvia, i.e. the cities and municipalities included in Clusters 1, 2, 3, 4, and 5 in order to raise their social security level.
5. The population of the weakly developed municipalities have to engage more in economic activities themselves, thus raising their social security level.

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AGE AND EDUCATION BACKGROUND OF HEAD OF FAMILY FARM AND ACHIEVING ECONOMIC PROFIT

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Abstract. The aim of this paper is to assess the influence of the age and education background of the head of an agricultural holding on the ability to make an economic profit.
The research was carried out on family farms, which were continuously used in compiling data for the needs of the FADN for the years 2004-2008. Three age groups and four groups based on education level were devised for the research purpose. A model with the use of logistic regression was built thereof. The results of the analysis show that the age of the manager of a family farm has a negative influence on the level of economic profit achieved. The level of education however, had no significant meaning. Other factors, apart those mentioned above, also played a decisive role in the success of a farm.
Key words: economic profit, age of farmer, education level, family farm.
JEL code: Q12

Introduction

Human capital is playing an increasingly greater role on contemporary farming conditions. One of its elements is a formal education as well as experience (Davidsson, Honig 2003). The research conducted in units functioning outside of agriculture showed correlations between education and success in the running of one's own enterprise (Bellu et al., 1990; Evans Leighton, 1989; Honig, 1996; Reynolds, 1997). However, there was no unequivocal dependency shown between experience and running of business (Davidsson, 1989). Polish farming is characterised by quite a low level of education; although, an improvement has been observed during the past ten years. This is confirmed by an increase in the number of people with higher education, from 2% in 1988 to 4% in 2002, and the decrease in the number of people with a primary education, from 11% to 5.9% in the same period (Development Programme, 2005). Unfortunately, unfavourable changes in the age structure have been observed. The percentage of people aged over 65 amounted to 13.3% in 2007. There were also areas in which this proportion reached 16%. This is the effect of migration of young people to towns (Henkel, 1999) and labour related migration. Unfortunately, these changes do not say much about the potential of work in agriculture. According to Zietara (2008), education and age are those elements, which decide about this potential. The quality of labour resources may have an influence on the achieved economic results of the family farm and the possibility of generating equity, and in effect the possibility of the growth of the farm.

The aim of the paper was to find the answer to whether family farms run by young and well-educated farmers function better and show a greater level of generated capital or farms run by elder and more experienced farmers achieve better results in this field. The following research tasks were set in the study: to recognise the size of factor of production farm equipment and the level of income according to the age group and to establish the role of age and education in generating the economic profit.

Research methodology

The research involved 7612 family farms, which were included in the gathering of the FADN accounting data for the years 2004-2008. An analysis was conducted on account of the possibility of the farms making an economic profit (ZE) according to the age criterion and education of the owner of the family farm. Economic profit (ZE) was established according to the following equation:

$$ZE = DRGR - Ka, \quad (1)$$

where:

DRGR - family farm income,

Ka - alternative cost of own factors of production.

Three age groups were distinguished: Group I – farmers up to 40 years of age, Group II – 40-55 years old, and Group III - over 55 years of age. Four levels of education were established: basic, vocational, secondary, and higher.

The present study applied a standard form regression model (Equation 2) thanks to the appearance of qualitative variables alongside quantitative variables developing the model. This helped establish if the variables of interest influence the level of economic profit.

$$\text{logit}(p) = \log\left(\frac{p}{1-p}\right) = x'\beta = \beta_0 + \beta_1 x_1 + \ldots + \beta_k x_k \text{ , } (2)$$

where:

$x=(1, x_1, x_2 \ldots x_k)'$ - vector of exogenous variables;

$\beta = (\beta_0, \beta_1, \ldots \beta_k)'$ - vector of parameters.

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Table 1

Proportion of farms according to the level of education and age of farmers in 2008

Age group (% of total)	Level of education			
	Basic	Vocational	Secondary	Higher
< 40 years (34.5)	7.3	43.2	39.6	9.8
41-55 years (58.8)	8.1	48.1	39.8	4.8
> 55 years (6.6)	16.4	40.7	30.0	13.0
Average	8.4	46.0	39.2	7.2

Source: author's calculations based on the FADN PL data

Table 2

Land, labour and capital as a means of production in farms according to the age groups

Age group	2004	2005	2006	2007	2008
Land (ha)					
Below 40	28.0	29.1	29.8	31.1	32.0
Aged 40-55	29.0	29.9	30.1	30.8	31.4
Over 55	25.8	26.2	26.2	26.8	27.0
Number of family work units FWU[2] (FWU/100 ha)					
Below 40	10.7	10.4	10.1	9.7	9.5
Aged 40-55	11.1	10.9	10.9	10.7	10.6
Over 55	13.5	13.3	13.0	12.2	12.0
Equity (thousand PLN/farm)					
Below 40	341	341	361	381	402
Aged 40-55	348	346	361	375	392
Over 55	308	300	310	321	321
Borrowed capital (thousand PLN/farm)					
Below 40	78	81	94	112	118
Aged 40-55	55	56	64	69	71
Over 55	29	27	29	33	36

Source: author's calculations based on the FADN PL data

McFaddens R-square was used to verify the model. A VIF variable co linearity test was also performed in the research.

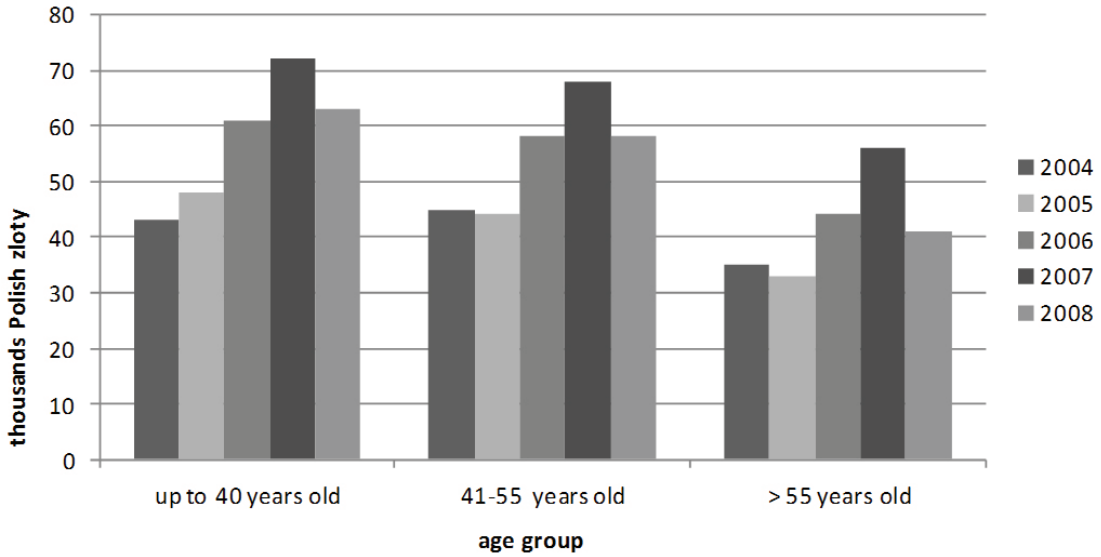
Results of research

Polish farms are run by poorly educated farmers. Table 1 presents a comparison of the proportion of farmers of various levels of education according to the age.

The most numerous group consisted of farmers aged between 41-55 years. Their proportion was almost 59%. The smallest group included farmers aged over 55 years – almost 7%. As far as the level of education is concerned, the highest percentage was observed amongst managers possessing a vocational education (almost every second farmer) and a secondary education (39%). The least frequent were family farms run by farmers with a basic level of education (ca. 8%) and higher education (ca. 7%). Each separate age group was of similar size to the average. It is worth noting, however, that the group of over 55 years old farmers was of a size, which was significantly different from the average. It is worth noting that the highest percentage of farmers from this group showed the highest percentage of higher education in comparison with the other groups; however, at the same time, it comprised the highest percentage of farmers with the lowest level of education. The group with the youngest farmers presents itself somewhat differently. In this group, the majority of farmers possess a vocational and secondary education. It is worth noting though that almost 9% comprised farmers with a higher education. About 7% of young farmers possess a basic education. This picture confirms that in the country children who did not obtain a better education and did not have the possibility of finding a job away from the agricultural holding were left with the role of running the family farm. This concerned over half of the farmers who participated in the compiling of data.

Table 2 presents the means of production of family farms by age groups.

[2] FWU express a number of converted units of own labour force, which constitutes the resources of the farmer and his family. 1 FWU equals 2200 hours of work annually



Source: author's construction

Fig. 1. **The level of income from family farms by the researched groups**

The area of land as a means of production was similar in all groups. However, farmers aged to 55 years old possessed slightly less (around 4 ha) land and the average area increased in the next years. This may indicate that the size of the analysed farms has increased regardless of age; however, the pace of change was minimal. This process was fastest in farms belonging to the youngest farmers, which was the effect of the implementation of the Common Agricultural Policy instruments and the Rural Development Programme – Structural pensions. Young farmers took over the whole farms of their parents, which resulted in the greatest changes in the area. It is worth noticing, however, that the average area of investigated farms was almost 4 times greater than the national average of family farms in Poland. This indicates that the data compiled within the framework of the FADN concerned family farms in a better position than the average Polish farm. It is commonly acknowledged that family farming is excessively equipped in labour, which has an unfavourable influence on efficiency (Gadomski, 2011; Golas, Kozera, 2003, 2008). The greatest resources per 100 ha of agricultural land (UR) were seen in farms run by the oldest managers and the least by those run by the youngest ones. The reason for this is obvious. According to the organisation life cycle theory, the youngest farmers did not possess adult children who would work on the farm as opposed to the oldest farmers. It is worth noticing that though the level of employment on farms run by farmers up to 40 years of age was stable, a decrease in labour force was observed in the group of farmers aged over 55. This may indicate the withdrawal of labour force from the farm to areas outside of agriculture.

Young farmers possessed significantly more capital in comparison with the other groups. This concerned both equity and borrowed capital. This may be proof of more decisive action in the scope of investment after taking over the family farm. It is claimed that farmers from this age group possessed a greater propensity for the risk associated with debt. This is proved by their use of the financial leverage phenomenon to finance agricultural activity and the possibilities which appeared during the period of membership in the structures of the European Union. It is also worth noticing that the highest increase of equity was observed in this group. Farmers from the oldest group had a cautious approach to obtaining external capital. Despite this, one can observe an increase in debt alongside a stabilised level of equity (especially in 2007-2008). This may indicate the obtaining of financial means from loans to make up for shortages in financial means. However, this activity did not increase equity. The resources possessed should have a reflection in the results achieved.

Figure 1 presents the level of income from family farms in the researched groups (thousand of Polish zloty (PLN)).

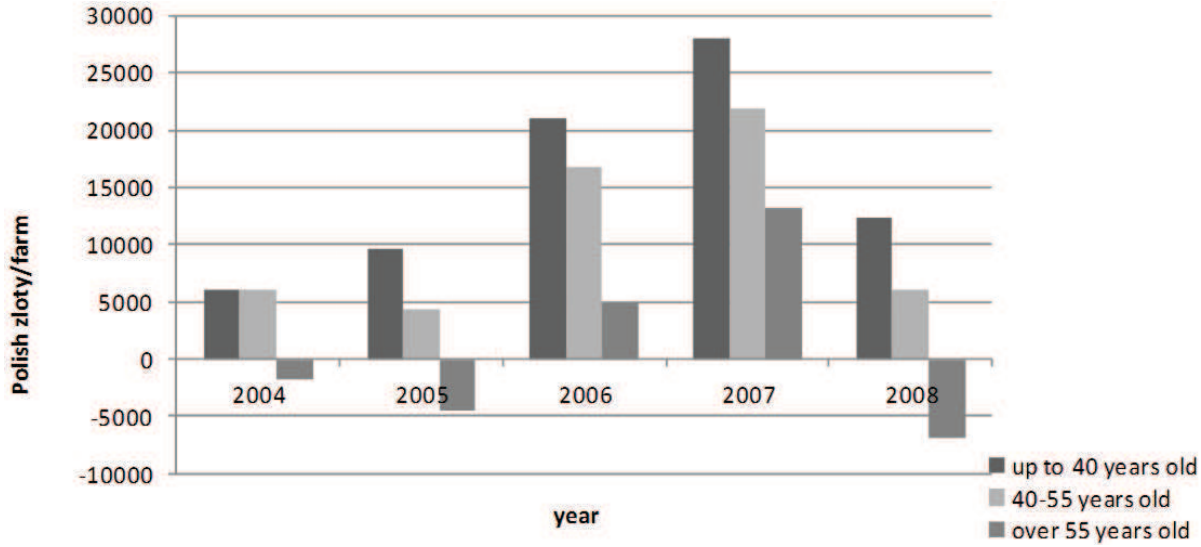
The value of income from the agricultural holding increased in the group of farms run by farmers up to 40 years of age. This was a result of the favourable condition on the market of agricultural products. However, it decreased in 2008. This was caused by unfavourable relations between the cost of production and the price of means of production. The price scissors phenomenon could be observed during this time. Farms from the remaining groups only observed a decrease in income in 2005 compared with 2004. It is worth noting that farms run by the oldest farmers achieved the lowest level of income and in 2007, they showed the relatively highest increase, whereas, the greatest decrease was observed in 2008. This would indicate that these farms belonged to those production types, which reacted very strongly to the changes and unfavourable price relations. It is worth drawing attention to the fact that in the last analysed year the greatest declines were observed on the farms run by the oldest farmers. This was due to the fact that the income achieved by them lowered the value of that achieved in 2006. This was caused by the price scissors phenomenon (Kowalski, 2009), which was most noticeably felt by

Table 3

The value of family income of the farm by age groups and level of education (thousand PLN) in 2004 and 2008

Age group (% of total)	Level of education			
	Basic	Vocational	Secondary	Higher
YEAR 2004				
< 40	34.0	39.2	46.1	64.3
Aged 41-55	34.1	40.3	52.1	60.2
> 55 years	24.1	38.0	35.2	44.0
YEAR 2008				
< 40 years	50.3	55.2	68.6	77.9
41-55 years	55.1	51.6	65.0	80.2
> 55 years	33.9	40.9	44.2	42.5

Source: author's calculations



Source: author's construction

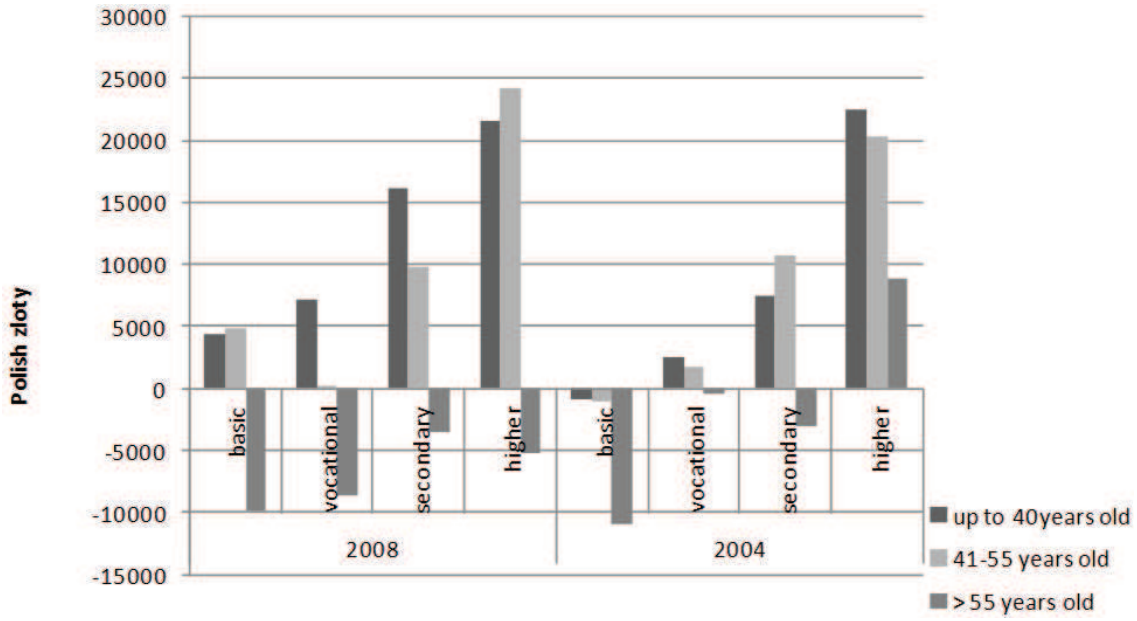
Fig. 2. **Economic profit by groups of farms in the period of 2004-2008**

farms of a lower production potential. It is worth noting that the changes, which occurred in the level of income, did not have any reflection in the change of size of equity. This is especially visible in the final analysed year in which an increase in the value of equity was observed despite a decrease in the income used from family farms. This indicates a problem in establishing the level of profit left on Polish family farms in which there still is a strong bond between the family farm (place of work) and the household (family). A differentiation in the level of income in the age groups occurred if education is also taken into consideration. The results are presented in Table 3[3].

A higher level of education in a particular age group resulted in the achievement of a higher value of income. The exception was ''middle-aged'' farmers with a vocational education and ''the oldest'' with the highest level of education in 2008. It is worth drawing attention to the fact that farmers from the age group of 41-55 years who thus, possess experience in running of the farm, and those with the best education achieved the highest income in the final analysed year. This may indicate that both these features of the quality of human capital are necessary for the achievement of success in the difficult situation, which took place in 2008. Unfortunately, this was not confirmed in the case of farmers from the age group over 55 years with just as good an education. This group's income was twice as low as in the remaining groups. It is worth noticing that oldest farmers with higher education in 2008 did not achieve the income of 2004, which may confirm that the conditions of farming (after the favourable years of 2006 and 2007) changed so much that these farmers failed to fully prepare and adjust to the unfavourable conditions.

It seems though that the differences in the level of income are a consequence of the size of resources and other factors such as the lack of a successor and not the level of education. Moreover, other features of farmers may also play a role such as the ability to analyse

[3] Results for the first and last year of analysis are presented because of limitations of the figure. However, similar tendencies were observed in the other years



Source: author's construction

Fig. 3. **Variation of the level of economic profit by age groups taking into consideration education in the years 2004 and 2008**

Table 4

Estimation – logistics regression model for dependent variable: economic profit 0-1

The explanatory variables	Coefficient	p-value	Significance
const	-1.81248	<0.00001	***
WIEK_K	-0.008001	0.03355	**
WYK_K	0.010995	0.57570	
SUCCESSOR	0.145813	0.00031	***
Breeding stock	0.00001	<0.00001	***
Circulating cattle heard	0.000007	0.00024	***
Reserves	0.000005	0.00690	***
Labour resources	-0.49394	<0.00001	***
Arable land	0.012941	<0.00001	***
Przek_sr_pien_do_gosp_dom	0.000001	<0.00001	***
Agriculture type (TF8)	-0.054407	0.00001	***
PR_do_kap	2.73272	<0.00001	***
Percentage of correct predictions	76,7%		
McFadden R-square = 0,23983	Corrected R-square = 0.23716		
Likelihood ratio test: Chi-square (11) = 2158.57 (0.0000)			

Source: author's calculations

surroundings or decision of the production direction (to specialise or not).

During the whole period of research only those farms run by farmers aged to 55 were able to make an economic profit. Older owners were only able to achieve full pay from the involvement of their own factors of production in those years in which the market was favourable for agricultural products. The achievement of worse results was most probably caused by less means of land and other factors. It is worth adding that labour, capital, and land efficiency measured in terms of production value for the appropriate factor of production showed lower values in the case of the oldest group of farmers.

In the groups distinguished on account of education level, one can observe differences between young and older farmers. The figures are presented in Figures 3[4].

[4] Data from the years 2004 and 2008 are presented to maintain the figure legibility

In 2004, farmers with higher education coped the best as far as achieving an economic profit is concerned. This may indicate that the real level of education regardless of age has significance in the generation of capital. This was not back up in 2008 in which the oldest farmers regardless of the level of education were unable to make enough income from the family farm to enable the covering of costs of the involvement of their own factors of production. It is worth noticing that farmers with secondary education coped best. It was also observed that in 2008 (which was a difficult year for agriculture) the best educated farmers and those possessing some experience in work on farms coped well (the age group of 41-55 years achieved a profit of almost PLN 25 thousand). This may indicate that such farmers learned how to cope in difficult situations. However, the research really shows that education does not play a decisive role in the success of a family farm and age has a negative influence on the results achieved.

It can be stated with certainty that neither feature guarantees success in the shape of economic profit. To indicate those factors, which decided about the possibility to achieve a positive level of economic profit, a model was built using logistic regression for this purpose. Table 4 presents the results of regression. The following served as exogenous variables: labour resources (expressed as FWU), land and capital understood as the value of fixed and current assets, age of manager (variable WIEK_K) and education (WYK_K), and also successor. It was established that the direction of production, the value of financial means transferred to the household (Przek._sr_pien_do_gosp_dom), and efficiency may also decide on the achievement of success by the farm.

Capital resources and land were the variables, which increased the probability of achieving success in terms of family farms making an economic profit. What turned out to be significant were those parts of the estate, which could directly decide about achieving results such as breeding stock, circulating cattle herd, and product reserves as well as financial means transferred to the household and the surface area of arable land. An important variable turned out to be having a successor. Those farmers who had a successor were more likely to make higher income. Amongst variables lessening the chance of achieving success were labour resources. This may indicate that a further increase of employment size is unfavourable. The agricultural type and the age of the owner turned out to be detrimental. The education of the manager was an insignificant variable.

Conclusions

The research showed that the managers of agricultural holdings who participated in the compiling of date within the framework of the FADN were mainly farmers to 55 years of age and those who possessed vocational and secondary education. It was also observed that the oldest farmers possessed less land and capital resources, which most probably were the main reason why this group obtained much lower income level from the family farm regardless of their education. The group of the oldest farmers was not able to fully pay for their own factors of production or achieve economic profit in times, which were unfavourable for agriculture. This means that experience (measured by age) is not conducive to obtaining better results. It may also be proof that the running of an agricultural holding is an especially difficult business accompanied by many changes of management conditions and the necessity to react quickly to those changes. Young farmers were better at this. An obviously important element, which one should not forget about, was being equipped with land (a stimulant) and capital (a stimulant). These were most probably the factors, which were of greatest importance. Education, however, did not play a significant role in the achievement of economic profit, which was confirmed by the developed model.

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VERTICAL COORDINATION IN THE PORK PRODUCTION – THEORETICAL AND PRACTICAL APPROACH

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Abstract. Constant supply and price fluctuations in the pork market essentially raise the risk of production. This risk can be reduced through various strategies, and coordinated systems of production became one of effective ways that mitigate the negative impact of price and supply volatility. The benefits achieved by this method of production are associated with the reduction of costs, meat quality improvement, widening of market access, achieving of economies of scale, ensuring wider access to new information etc. These elements help to achieve value added (which normally would be received by the wholesalers) and guarantee stable and long-time development. The aim of this paper is to identify the nature and effects of vertical integration on pork production. The authors argue that the properly coordinated production process can reduce the risk of price and production volatility and helps to stabilize farms' income. The paper is divided into theoretical and practical parts. The first one is related to the concept of transaction costs. The empirical part presents the examples of vertical integration in the pork market based on selected countries.
Key words: pork market, price fluctuations, transactions costs, vertical integration
JEL code: D23, Q12, Q13

Introduction

Constant supply and price fluctuations in the pork market essentially raise the risk of production. It is associated with natural conditions; however, it may be mitigated using more advanced technologies (e.g. frost and drought resistant varieties of plants). However, the risk of sales, which destabilizes the pork production, is more difficult to regulate. There are two important aspects to consider: a variable price level and sales possibilities. The problem is that the farmer's decision to start the production brings the results after the time, which is related to the breeding cycle, and the consequences of wrong decisions are difficult to withdraw and can only by mitigated (Szulce H., 2001). Therefore, the farmers should aim to reduce the impact of the above-mentioned factors on the duration of fluctuations and risk level.

Traditional farms were used to breed pig independently, which means that they delivered part of services themselves. Most of the resources (machinery, equipment, land, and labour) were owned by the farms, and they could decide about nutrition, animal health, reproduction, and marketing programmes. Meanwhile, there has been a rapid development of technology. The transfer of the new technologies was quite difficult for the traditional farms, which reduced the possibilities to improve the effectiveness. Producers had to try to somehow takeover the benefits by gathering information, getting an access to the technologies, and to implement new methods of production. Coordinated systems of production became an alternative. In such production system farms, a kind of "coalition" for better breeding system forms, which reduces the costs, improves the meat quality, widens the market access, helps to achieve the economies of scale, reduces and distributes the price and production risk, and ensures wider access to new information and technologies. These elements help to achieve value added (which normally would be received by the wholesalers) and guarantee stable and long-time development. The aim of this paper is to identify the nature and effects of vertical integration on pork production. The authors argue that the properly coordinated production process can reduce the risk of price and production volatility and helps to stabilize farms' income. The paper is divided into theoretical and practical parts. The first one is related to the concept of transaction costs. The empirical part presents the examples of vertical integration in the pork market based on selected countries. The presented information allows drawing some conclusions. It is a review paper with the elements of deductive reasoning, and it is based on literature resources in Polish and English languages.

The nature of vertical coordination

Vertical coordination was developed in the second half of the twentieth century in the well-developed countries, and it has its source in the deepening the gap between the scattered, mostly small farms and the integrated food-industry and trading companies. It can be defined as a continuous transfer of product from the farmer to the consumer, or as a coordination of the following stages of production in terms of quantity, quality, and time (Martinez S., 2002). There are two the most popular solutions in the pork production. In many European countries, such as Germany[3], the Netherlands, and

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[3] It can be illustrated by one of the slogans on the pig producer in Germany: "free entrepreneur does not need a contract."

France, the level of integration is small, and the market is dominated by the *spot* transactions, which sometimes are being supplemented by informal agreements and long-term marketing contracts defining the terms of sale and purchase of raw materials (Spiller B. at al., 2005). In other countries, such as the United States[4], Denmark and Spain; vertical coordination is widely developed and replaces a large part of the free market[5]. In these countries, production contracts reduce the farm elasticity and make them dependent on the processors' centralized decisions (Schulze B. et al., 2006). Agricultural producers must obey the guidelines on housing systems, use of feed, veterinary treatments, etc., so that the final product is the same in terms of quality, which makes it easier for the processors to gain the chosen market segments (for example, the Danish slaughterhouses offer specially selected merchandise for the British and Japanese markets). It is worth to mention that such kind of food production system gives benefits to export . Without doubt, this can be proved by the expansion of Denmark and the United States in the international market.

The theory of transaction costs provides a useful framework for the analysis of vertical coordination of the food supply chains, especially in the field of animal production. According to O. E. Williamson (1998), one can distinguish four types of transaction costs due to the phase of the transaction: preparation costs, negotiation costs, control costs, and adaptation costs. These categories include the costs of searching for information (about prices and properties of goods, about potential buyers, sellers, and their aims), costs of negotiations with buyers or sellers, costs of preparing contracts, costs of monitoring contract partners as well contract enforcement and compensations costs, and costs of the protection of property rights (Iwanek M., Wilkin J., 1997). On the other hand, transaction costs can be interpreted as the opportunity cost in a situation, where a single entity (e.g. farmer) does not have adequate information about market conditions in which he works and due to this fact suffers losses (e.g. by obtaining lower sales prices of agricultural commodities). Assuming that proper assessment of the economic effectiveness of business entities should include the ability to reduce production costs as well as transaction costs, the new institutional economy gives the opportunity to look at the issue of cooperation in agricultural sector from a different perspective (Czyzewski B., 2010). In this context, the development of a coordinated production system can be seen as an attempt to optimize transaction costs.

Key variables in this theory, which define the conditions under which transactions are carried out, are the ownership (property) characteristics and the level of market uncertainty (Klein B. et al., 1978). In the comparative analysis of integration degree choice, one emphasizes the organization's ability to adapt to the market and level of administrative control, which affects the autonomy of the subject. Transaction costs (e.g. associated with the supply uncertainty or non-productive assets) are a prerequisite for developing contracts between the parties, which results in the risk reduction and change in the specificity of the owned property. One of the first papers, which used the theory of transaction costs to explain some phenomena on the meat sector is the one published by M. den Ouden (1996), in which the authors see the increasing consumer requirements for the meat quality as a premise of development of coordinated production systems. In particular, these requirements concern animal welfare, food safety, traceability of the production chain, and care for the environment. It is assumed that from the transaction costs point of view, coordinated systems, which include contracts and vertical integration, are more efficient. Lawrence claims that the synchronized pork production, which ensure the quality and safety of food, provides incentives non-market coordination (Lawrence J. D. et al., 1997). He argues that ordinary market transactions are not able to provide producers with adequate information on the consumer requirements. Cooperation between farms and receivers (slaughterhouses, meat-processing companies) can thus "save" transaction costs. Farmer benefits because he gets premiums for the proper quality (that is the one, which is required on the market), whereas for the processor the key issue is that he can obtain animals of the similar quality and in the desired time and place. Vertical coordination is also important in reducing uncertainty about the quality of goods in critical situations, which are quite common in the meat industry (e.g. BSE, FMD, avian influenza). One stresses also the positive effects of integration, which involve reducing the number of agents and allows taking over part of their margin (Lawrence J. D. et al., 2001).

To sum up, the standard approach to the theory of transaction costs in the pork production stresses the importance of continuous changes in consumer expectations, and large uncertainties inherent in this type of activity as the main arguments in favour of extending the coordination in the processing of meat. Contracts can be seen as a factor, which reduces the production risk through centralized (at the slaughterhouse or processing plant level) decisions regarding the production factors and breeding standards. They reduce the problem of negative selection through the system of continuous monitoring of the supply chain ("from farm to table").

Practical forms of vertical coordination

There are two main forms of co-operation between the farmer and the processor, which have a character of vertical coordination: contract and full vertical integration (Stepien S., Smigla M., 2012). Two basic types of contracts are production and marketing contracts. Production contracts are signed before the production process and describe in details the responsibility of the farmer and the contractor with regard to production inputs, production methods and the form of payment. In the case of contracts for the supply of the animals, the farmer provides equipment, buildings and work, while the contractor provides feed, livestock, medicines and veterinary services as well as ensures the transport of animals. These contracts often define specific requirements for the production, including the use of

[4] In the early 90s, pork transactions on the open market accounted for almost 90% of all transactions. In 2005, these accounted for just over 10%, 68% of the sales took place in the framework of contracts and 21% in the vertical integration (see: Hayenga M.L. et al., 1996 and Grimes G., Plain R., 2005).

[5] In Denmark, more than 90% of the pigs is produced, slaughtered, and processed in the cooperative system; and in the United States – more than 70%.

the technology, compliance with certain requirements etc. The contractor has the right to control the farmer, and, in the case of violations of arrangements, he can withdraw. The payment for the delivered product is generally based on the costs incurred by the farmer (including cost of work and machines) and the amount of the delivered product. Another way is to distribute sales profits between the farmer and the contractor[6]. In most cases, contractor is the animals' owner during the entire duration of a contract. These kinds of agreements are most adequate for young farmers starting their business, without a suitable amount of capital to purchase herd or farm with unused assets, or for those who do not want to invest too much money in breeding pigs.

Marketing contracts (called also forward sale contracts) define a sales price and the amount and conditions of delivery. Agreement details shall be specified before the end of production, i.e. before harvest or before the end of animal breeding. The mechanism of price setting generally reduces farmer's risk by reducing the impact of price fluctuations on the price of the contract. In contrast to the production contracts, in marketing contracts the farmer owns the good throughout the time of production and has a major impact on production process.

Another way is to divide contracts into: full risk contracts, contracts with limited risk, and secure contracts (Janusz P., 2008). Full risk contracts oblige a farmer to supply a certain number of pigs to the contractor without any warranty price[7]. They are characterized by the fact that in a situation of *"pig bottom"* farmer can earn higher prices for his products, while he may lose in the *"pig peak"*. Contracts with limited risk cover at least a part of the production costs (e.g. feed or piglets), but the farmer must meet certain production criteria defined by the buyer (feed consumption, daily weight gains, meat content, the number of falls etc.). In the third type of contract, the buyer provides the farmer with live pigs or piglets, animal feed, and other resources needed for production as well as veterinary services, and farmer provides his work for previously defined income. Therefore, it is similar to a production contract described above.

So-called contracts insuring against the risk of price fluctuations are example of contracts stabilizing agricultural production in the United States. These may take the form of two types of contracts: cost-plus and price window. Cost-plus are contracts in which the livestock producer receives a price equal to the cost of production, calculated on the basis of agreed feed costs and possibly other ingredients, plus a premium for the quality of the raw product[8]. This kind of pricing is good for the farmer in case of low livestock prices, while during high prices a purchaser gains. The price window contracts determine the range, in which market prices should probably be set. When this happens, the producer receives an agreed price. If the market price exceeds below or above the agreed level, gain or loss shall be shared equally between producers and purchasers (Zawadzka D., 2006). This form of cooperation has another advantage - it allows reducing costs by avoiding the so-called transaction costs associated with partner search. The guaranteed price level and lower transaction costs protect farms against cyclical changes and mitigate the fluctuation. This applies to particular farms from developing countries, where the market system does not work as well as in developed countries, and where farmers slower adapt to the market mechanism (e.g. due to the structural differences in agricultural sector in these two types of economies). As the result, a part of the value added runs from the farmer to agents, and the only way to keep it, is to create a coordinated production system.

In Poland, a relatively small number of farmers use the contracting system, however, as in the case of horizontal integration, one can notice that interest in this form of sales increases with the rise of farm area[9]. Farmers are reluctant to strengthen this kind of cooperation because the contracts are often beneficial for the processor, and that is why farmer's involvement is low[10] (Czternasty W., Smedzik K., 2009). Farmers also raise

[6] A specific form of the production contract is an agreement between a farm (which offers work, space, and machinery), feed suppliers, herd suppliers and a consulting company (and others), which divides livestock sales income proportionally to the costs incurred. The most important issue in this type of contracts is the proper settlement of income share with regard to the actual expenditure incurred and risks.

[7] In many European countries (e.g. Germany, France, Denmark, Austria, Spain, and Italy) pigs' prices are, however, defined by the some organizations using special pricing system. These prices are respected by both parties - farmers and processors – hence, there is no need to apply agreements with many rigorous requirements, including the pricing of delivery. In Poland in 2007, one attempted to introduce such a system. As a result of an agreement signed by the few organizations - the Polish Association of Pigs Breeders and Producers "POLSUS", the National Council of Agricultural Chambers, Chamber of Commerce Polish Meat, Butchers and Meat Processors Association and the Polish Institute of Agricultural and Food Economics – the Pricing Commission was established and its task was to analyse the pork price in the largest meat processing plants in Poland and in the European markets, and then to calculate the average price, which was supposed to be used as an initial base price for contracts (see: Blicharski T., 2007). In January 2011, the Commission's price quotations have been suspended due to irregular information and some members' delays in analyzing the prices.

[8] This type of contract is used for example by Animex with regard to regular partners. The agreement defines so-called guaranteed amount, taking into account the cost of feed and piglets purchase. If the farmer has to pay more, then Animex pays the difference. The maximum feed consumption has been set as 2.8 kg per 1 kg of growth.

[9] According to M. Smiglak and A. Zielinska research, in an area group of 15-20 acres just 3% of the surveyed farms were selling their products under the contracts, in the area group of 20-50 ha this ratio was 13%, while in a group of the largest farms (50 - 100 ha) up to 80% of producers were using this form of marketing. However it should be noted that this group represents only a few percent of the farms' population in Poland (see: Smiglak M., Zielinska A., 2006).

[10] Large companies, in exchange for guaranteed sales, offer usually a minimum price for the supplied product. Lowering the purchase price by bigger companies leads to a situation in which smaller slaughterhouses also adjust their rates. Such situation may force family farms to withdraw from the market, because by smaller production scale they are not effective.

an argument against the long-term cooperation, because they are afraid of losing autonomy, which results from the fact that the provisions of the agreements define specific actions that producer must take (e.g. the use of the technology, methods of feeding animals, limited use of fertilizers and plant protection products, etc.). Some of these farms value their autonomy so high that the risk of income lost is not an incentive to sign a contract (Gillespie J. M., Eidman V. R., 1998).

The situation, in which farmers are strongly dependent on large corporations, may also not be beneficial for the market, because it implies the formation of oligopoly, in which large companies decide on the price of product, quality requirements, production conditions etc.[11] One has to remembered that signing the contract does not eliminate the price risk for farmer. If a producer is obligated to sell products at a predetermined price, in a situation of price increase caused by inflation or improvement of economic conditions, he does not have a possibility to achieve additional income. Entrepreneurs who buy the product also bear a risk because they can not be sure that the future price will be higher then the one agreed in the contract (Rembisz W., 2003).

Full vertical integration is regarded as the most advanced form of coordination. It is a combination of different stages of the production process in the same company. A characteristic feature of this form of cooperation is the possibility to control each phase of marketing chain. In this situation, farmer's losses resulting from the poor bargaining position are minimized, and the surplus, which in market economy leaks to the processors, can be taken over[12]. In the absence of capital required to develop own slaughterhouse and processing plant, membership in the cooperatives can be an alternative. Distribution of profit might be then a kind of compensation for lower livestock prices. This type of cooperation system is common in Denmark. Pig production in almost 90% is slaughtered, processed and sold by the cooperatives, which are owned and managed by the pig producers. This allows the sector to respond quickly to changes (Stadejek T., 2007). This does not mean, however, that the pig market in Denmark is free from cyclical fluctuations, though the variability of supply is relatively low and the pig producers' income more stable.

Summary and conclusions

The presented information allows drawing the following conclusions:

— Vertical coordination is a form of mitigating the negative effects of hog cycle, associated with price and supply fluctuations on the pig market and aims to stabilize farm incomes. It can take the form of contracts or full vertical integration, however the level of farmer's commitment results from the estimated production risk and ability to fulfil agreement's provisions;

— Farmers participate in the coordinated system, if they do not see any other opportunity for development, or if they recognize the potential benefits of cooperation. Contracts are a preferred option for the meat sales, especially when they reduce the risk (supply and price) and increase the feasibility of specific agricultural investment. For the processors, the cooperation is a way to improve the quality of the raw product when the system of meat classification is not efficient, and also when they implement a food safety strategy (Boger S., 2001);

— The criteria taken into account while organizing the pig market are freedom and flexibility to choose alternative sources of distribution on the one hand, and fear of losing the autonomy (in decision-making) on the other. Reluctance to enter into contracts may result from the fact that using contracts on a large scale can lead to a conversion of price risk into the risk associated with the contract. Under certain conditions, these agreements may lead to a situation in which larger processors use their market advantage and try to exclude smaller companies from the sector, which may result in excessive loss of competition and to high concentration. Then there is the possibility that the farmers' situation might be less favourable[13].

Finally, it is worth noting that the vertical coordination, which is developing for decades at the national level, for several years moves also at the global level in the form of transnational corporations. This is a result of globalization, which gives an incentive to the concentration of agribusiness entities (Czyzewski A., Grzelak A., 2012). Corporations, which lead competitive struggle – fighting for the economic gains – strive to consolidation and even to a global oligopoly. Increasing subordination of agribusiness to retail chains is a new

[11] During the meeting of EU Council Agriculture and Fisheries, which took place on 14th April 2011, representatives of the Belgian pig sector proposed an introduction of a European mechanism to mitigate fluctuations in the pork market. The project involves cooperation between single entities of the pork production chain: from feed providers, by pig producers, processors, to the food distributors. It foresees homogenous method of financial compensation payments for each elements of the chain. In a situation, when raise of the production profitability is required, each element of the chain increases the so-called compensation, up to the consumer level. For example, if the price of feed rises, compensation (in the form of higher purchase prices) is received by the livestock producers, then the processors obtain higher prices from distributors, and the latter raise the prices of the final product. Such action would have an intervention character and would be implemented, if the difference between the pig price and the cost of feed per unit exceeds the established margin. Processors and pork distributors are however against such solutions, because they are afraid of losing consumers in case of increased retail prices, so this project is a theoretical concept (see: Blicharski T., 2011).

[12] Repurchase of Salus Meat Plant in Golince (Wielkopolska region) by the pig producers (over 750 people) affiliated in 27 producer groups can be an example of this kind of action. In 2011, they took over 75% of company's stakes for the amount of 16 million zl. This was the first case in Poland, when pork producers bought the processing plant.

[13] Such a situation occurred in the case of Tyson Foods, in relation to which the Alabama State Court in 2004 stated the practice of undercutting the purchase of raw products.

phenomenon. Super- and hypermarkets take over even a bigger share of the food market, and decisions regarding the production and distribution have shifted from farmers to these corporations.

Farmers are the ones who lose in this situation. They are subjected to immense pressure to concentrate the production, increasing specialization to monoculture, they lose the flexibility to decide, or are forced to end the business, mainly the small farmers (Czyzewski A., Stepien S., 2011). One of the cures for this problem may be the development of local food production systems and promotion of traditional and regional food. This creates some opportunities for smaller farms displaced from the market by corporations. It may also be beneficial to the environment and local community, strengthening the vitality of rural communities. It seems that this solution may become a dynamic trend in modern food system in developed countries.

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TAXES AND SOCIAL INSURANCE CONTRIBUTIONS CHARGES OF FARMS IN POLAND IN THE YEARS 2004-2008

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Abstract. The article presents a system of taxation and social insurance for farmers on a background of ongoing discussion on the tax reform in Poland. Research tasks were to determine the size of the tax burden and social security burden for a farm in Poland in the years 2004-2008, and to determine the size of these burdens depending on the type of farm, according to the Farm Accountancy Data Network (FADN) classification. The first section of the article presents legal and organisational solutions. The second section shows the effect of these charges on the economic situation of farms based on data from 12 thousand households coming from the FADN. The average farm charge has increased from PLN 2781 per year in 2004 to PLN 3669 in 2008 due to taxes and social security contributions during the considered period. The author has noticed that charges depend on the type of production during the entire period; the highest charge of taxes and social insurance contributions were for type AB farms – PLN 5180 per year in 2008, while the lowest - for type I – PLN 2870 per year in 2008.
Key words: agricultural holdings, taxes, social security.
JEL code: Q14

Introduction

Currently in Poland, the system of taxation of agricultural activities and the functioning of the agricultural system of social insurance originates from the 1980s. These systems have a highly preferential character as agricultural activity is not subject to income tax (except for special sectors of agricultural production). However, when it comes to social security, there are special regulations for this system, which make the farmers pay much lower contributions than the rest of the society. This is a problem that can be perceived both by public opinion, as a manifestation of social injustice and government. Discussion on the reform of these systems has increased, in particular, in the period of global economic crisis when additional measures are needed for the public sector. Donald Tusk, the Prime Minister of Poland has announced the introduction of income tax for farmers in 2014. However, such changes should be preceded by wide research. The article poses a research problem: is it real that the Polish farmers do not pay taxes and social insurance contributions at the extent to which these costs are charged to the income of households.

The article has two research tasks:

— to determine the size of the tax burden and social security burden for a farm in Poland in the years 2004-2008;
— to determine the size of these burden in Poland in the years 2004-2008 depending on the type of farm, according to the FADN classification.

This article is divided into a theoretical part, which sets out the legal and macroeconomic conditions relating with taxation and social security in agriculture. It applies the study of literature, in particular, legislation and statistics data storage. The empirical part provides the analysis on the data for individual farms acquired by the Institute of Agricultural and Food Economics - National Research Institute under the FADN for the period of 2004-2008 from 12 000 households. The observation of the FADN concerns commercial farms included in the production group of a certain region or country and generating at least 90% of the standard gross margin. Lower threshold limit economic size is determined based on the summation of Standard Gross Margin (SGM) for holdings in the national registry of households, starting from the largest to the last; a comprehensive 90% of the SGM. For this reason, the economic thresholds for defining the minimum size of farms included in the FADN field of observation are different in each country. In Poland, the limit is two European Size Units (ESU)[1].

The FADN methodology distinguishes seven types of farms:

— AB (field crops) - mainly grain farms;
— C (pomological crops) - the lowest average agricultural area, the highest economic size;
— E (permanent crops) is a production-oriented farm pomological, the area is below the average;
— F dairy cows - farm milk production-oriented, agricultural area close to the average;

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[1] ESU is established on the basis of standard gross margin (SGM) farm (all activities on the farm). One ESU corresponds to the value of EUR 1200. Formally regulated by the European Commission Regulation No 730/2004 of 19 April 2004, SGM is the average of the three years, the value of production of certain agricultural activities below the average (over three years), and the value of direct costs incurred to produce it. More about types of farms, and the basic economic sizes characterizing them in : The standard results obtained by individual farms participating in the Polish FADN, Part II, Analysis of the standard. 2004, 2005, 2006, 2007, 2008

Table 1

Tax farming - conversion factors

Quality classes of soil	Types of land							
	Arable land				Meadows and pastures			
	Tax districts							
	I	II	III	IV	I	II	III	IV
I	1.95	1.8	1.65	1.45	1.75	1.6	1.45	1.35
II	1.8	1.65	1.5	1.35	1.45	1.35	1.25	1.1
III a	1.65	1.5	1.4	1.25				
III					1.25	1.15	1.05	0.95
III b	1.35	1.25	1.15	1				
IVa	1.1	1	0.9	0.8				
IV					0.75	0.7	0.6	0.55
IVb	0.8	0.75	0.65	0.6				
V	0.35	0.3	0.25	0.2	0.2	0.2	0.15	0.15
VI	0.2	0.15	0.1	0.05	0.15	0.15	0.1	0.05

Source: Agricultural Tax Act, Art. 4

— G (grazing animals system) - the main part of the production comes from the production of milk;
— H (hay - eating animals) have the highest volume of all types of economic and agricultural area close to the average;
— I (mixed) is the holding without a dominant branch of production of low economic size and the size of the average agricultural land.

Research results and discussion

Taxation of agricultural activity

The system of taxation in agriculture enters a broad spectrum of legal enactments:

— agricultural tax - the Act on Agricultural Tax of 15 November 1984;
— property tax – the Law on Local Taxes and Fees of 12 January 1991;
— forestry tax – the Law on Forestry Tax of 30 October 2002;
— tax on means of transport - the Act on Local Taxes and Fees of 12 January 1991;
— income tax special branches - the Act on Income Tax from Individuals of 26 July 1991;
— tax on goods and services - the Law on Tax on Goods and Services and Excise Duty of 8 January 1993; the Act on Tax on Goods and Services of 11 March 2004;
— tax on inheritances and gifts - the Act on Tax on Inheritance and Gifts of 28 July 1983;
— tax on civil law - the Law on Tax on Inheritance and Donations of 9 September 2000.

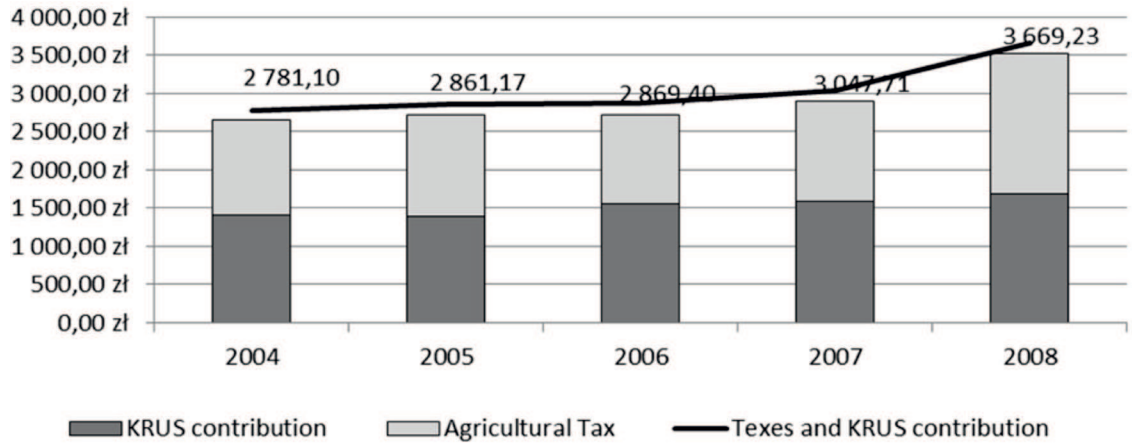
It should be emphasised that these are the same taxes paid by the rest of the society. The only difference lies in the fact that farming is not levied with the income tax on individuals, because, according to Article 1 of the Personal Income Tax Act, its provisions do not apply to "income from agricultural activities, with the exception of revenue from special branches of agricultural production." Agricultural ACTIVITY defined in Article 2 of this Law according to the statutory definition is the business of manufacturing plant or animal products unprocessed (natural) from their own crops or the rearing or culture, including the production of seed, nursery stock, breeding and reproductive stock, vegetable production land, protected ornamental plants, mushrooms and orchard crops, breeding and production of breeding material of animals, birds and insects utility, type of animal production industry - farming and aquaculture as well as the activities in which the minimum periods of detention purchased animals and plants, which occurs in the course of their biological growth, for at least a month in the case of plants and from 6 weeks to 2 months in the case of different animal species.

Agricultural tax

Instead of income tax, farmers pay the agricultural tax. Its construction and imposition is the Polish specificity. The law with its rules is effective from 1985 and its main task is to reduce the impact on the performance of management. The subject of taxation is the value in the use of land and the basis of assessment is the sum of the value in the use of land, which is determined as the product of hectares of natural and appropriate conversion factors. Hence, the accounting basis is applicable to agricultural land belonging to the farm. In the case of agricultural land, the tax base is physical hectares.

For individual municipal districts, conversion factors were classified according to the following indicators:

— indicator of valorisation of agricultural production (developed by the IUNG such as soil, water, territory, climate);
— indicator of economic development of the municipalities (as determined by 26 factors developed by the Institute of Soil Science and Plant Cultivation (yet, according to historical documents it is hardly taken into account when classifying municipalities into districts which resulted in a very strong determination of soil quality tax)).



Source: author's construction based on the FADN data

Fig. 1. **The amount of taxes and social security contributions for farm in Poland in the years 2004-2008**

The maximum rate of agricultural tax is, depending on the type of soil, the equivalent of 2.5 quintals of rye for 1 hectare of land belonging to the conversion of farms and 5 quintals of rye for 1 ha of land classified as physical off-farm agriculture. The value of 1 quintal of rye is calculated based on the average purchase price of rye in the first three quarters of the year preceding the tax year.

In literature, a broad discussion takes place whether the tax has an income or wealth character. C. Kosikowski completely rejects the wealth nature of the charge. He states that the agricultural tax is an income – revenue tax, because its collection is a source of income in the course of its development, and farms (as opposed to recreational land) are sources of income (Kosikowski C., 2007). Completely different is a discussion of M. Podstawka who defines the agricultural tax as a burden to property (Podstawka M., 1995). There is also a view suggesting to combine these two approaches, such as R. Mastalskiego who says that, although, the legal structure of tax corresponds to the revenue taxes but practically functions as the burden of property (Mastalski R., 1996).

Tax on special branches

This tax, in its present form, has been operating since 1992 and it is regulated by the Law on Income Tax from Individuals. The tax rate is currently levied in accordance with Article 2 Paragraph 3 on the following types of production: cultivation in heated greenhouses and foil tunnels; growing mushrooms and their mycelia cultivation "in vitro"; farmed game animal breeding; laying poultry slaughter, poultry hatcheries; breeding laboratory and fur animals; breeding earthworms; silkworm breeding; keeping apiaries and animal breeding animals other than on farm. A necessary condition for this form of taxation is to maintain minimum periods of detention for purchased plants and animals (terms defined in Article 2, Paragraph 2 of the Act). The tax base is the revenue generated during the tax year with this type of activity. There are two ways of determining the income. The first one is based on real income an Entity has gained being engaged in the activity. The Entity is required to keep books of expenditures and revenues, and income is determined based on the revenue-expenditure books. The second method is based on the estimated income. Its value is obtained by multiplying the standard estimate of income resulting from Annex No. 2 to the Act by the crop area or the number of animals or poultry. The legislation allows the taxpayer to choose between the two methods.

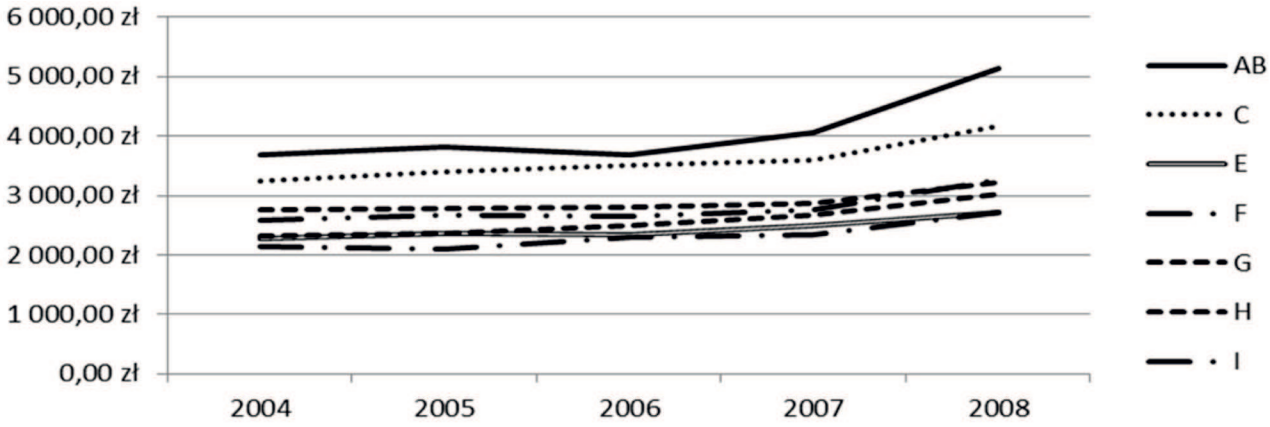
The other charge of a fiscal nature (which is outlined further in this article) is much less important, and thus, it reduces the volume because their description will be skipped.

The social security system

The social security system for farmers has been isolated from the general system. It functions under the Act on Agricultural Social Insurance Fund of 20 December 1990. This system serves as complementary in relation with the general social security. This means that, in general, only those farmers for whom the farm is the only source of income (Siekierski C., 2012) pay social contributions. Social insurance contributions under the law are determined to farmers whose farm covers an area of agricultural land over 1 hectare or a special department working with their family members who are the citizens of Poland or other EU Member States. The farmer is considered an adult individual, residing in the territory of Poland and employed in agricultural activities. Agricultural compulsory insurance covers insurance in case of pension, accident, sickness, or maternity.

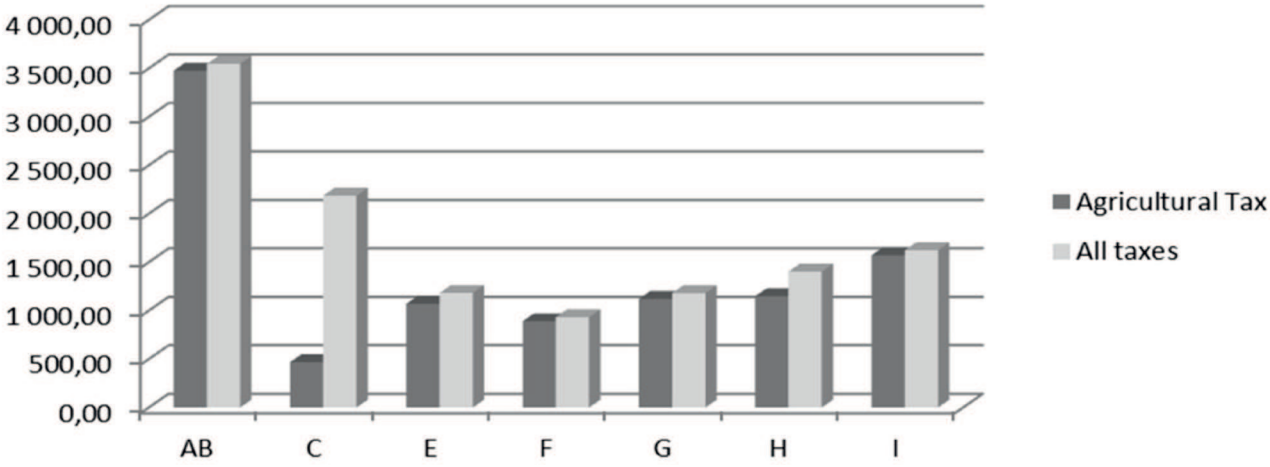
Contributions paid by farmers are on a low level; during the analysed period they have increased from PLN 894 in 2004 to PLN 1064 in 2008. For comparison, social insurance contributions paid by the self-employed amounted to PLN 8031 in 2004 and PLN 9233 in 2008. This is a very big difference, besides contributions to farmers did not depend in any way on the size of farm or farmland.

From 1 October 2009, after the amendment of the Act on farmers' social insurance contribution rate, social security is dependent on the size of the farm. Farmers who have farms with an area of 50 ha have



Source: author's construction based on the FADN data

Fig. 2. **The amount of taxes and contributions depending on the type of agricultural farms in Poland in the years 2004-2008**



Source: author's construction based on the FADN data

Fig. 3. **The average amount of agricultural tax and all taxes in Poland in 2008, depending on the type of farming**

a basic contribution of 10% from the basic pension. Owners of farms of 50 to 100 hectares have a contribution calculated with the following formula: basic contribution + 12% minimum pension for 100-150 ha basic contribution + 24% of the lowest pensions, the primary contribution of 150-300 ha +36% of the lowest pensions and for households more than 300 hectares of premium base +48% of the lowest pension. In the fourth quarter of 2009, the amount of those contributions was PLN 68 per month for farms up to 50 acres and PLN 392 for the largest holdings. However, the calculation of Agricultural Social Insurance Fund (Kasa Rolniczego Ubezpieczenia Spolecznego –KRUS) included only 16 thousand of farmers, so its importance is low to the overall situation.

Charges of farms

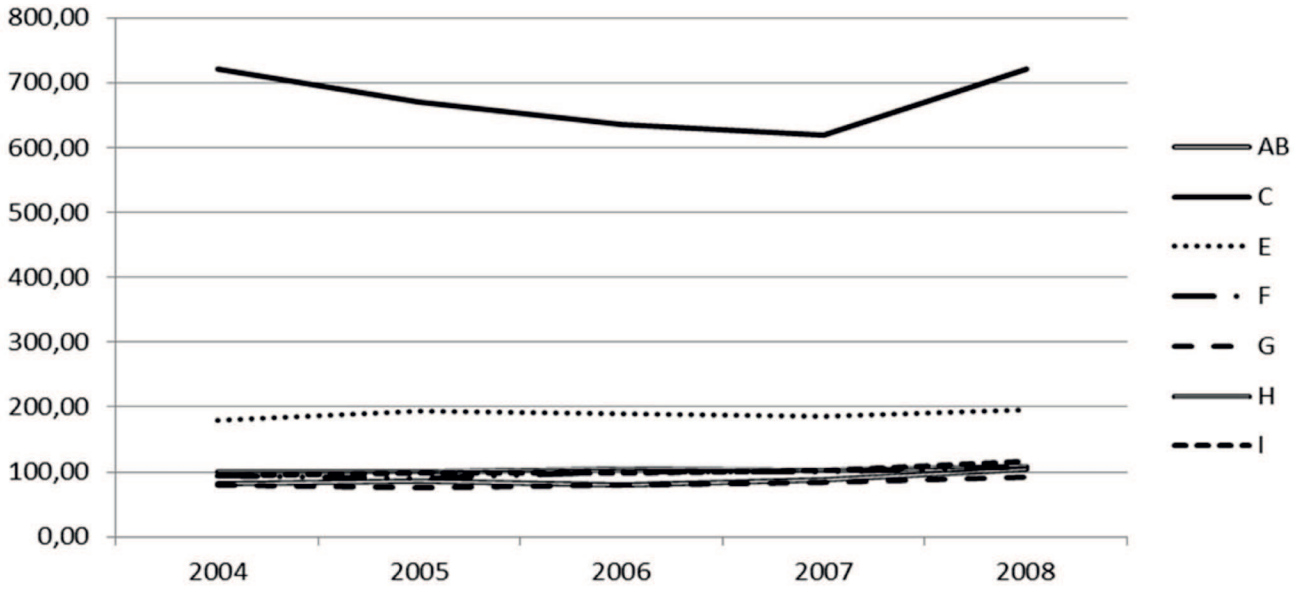
The overall situation of the farm tax charges and social security contributions is presented in the following figure.

Within five years, the payments have grown by 24.2% from PLN 2781.1 to PLN 3669.23. Two components are the most significant: the agricultural tax and insurance premiums for farmers constitute 95% of all agricultural charges. However, the level of charges of taxes and contributions have changed little per 1 ha of agricultural land within five years after the Poland's accession to the EU (an increase of PLN 93.28 per 1 ha in 2004 to PLN 112.46 for 1 ha in 2008).

The amount of taxes and contributions on farms depending on the type is shown in Figure 2.

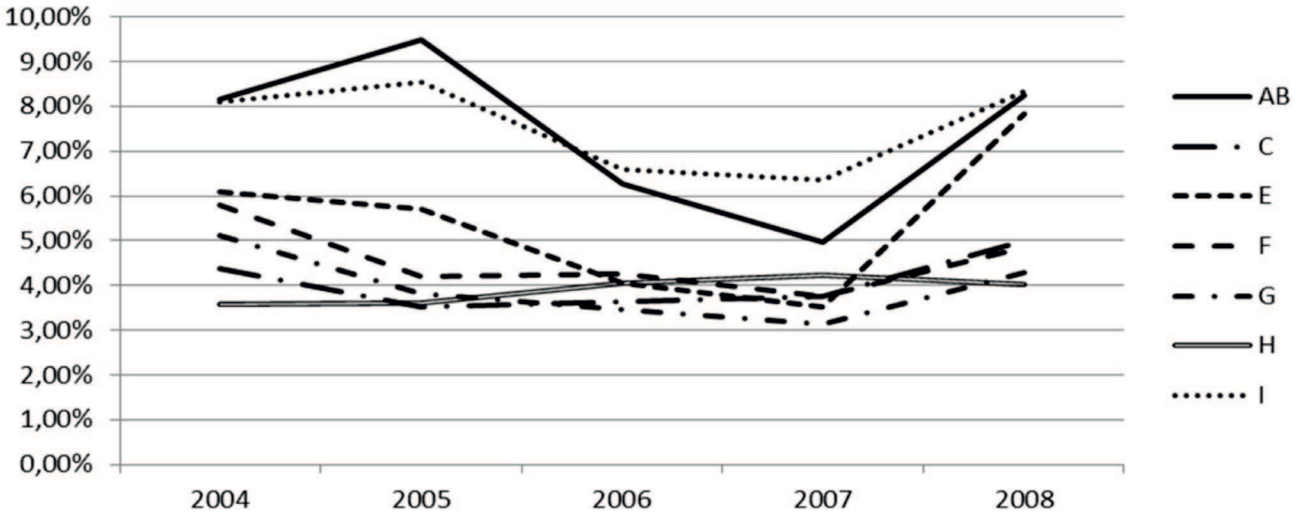
Generally, it should be noted that these charges have undergone continuous increase in all types of farms during the period. The highest charge is experienced in the groups AB and C.

So far, the highest tax charge has fallen on the household farm type AB and it has increased from PLN 2215 to PLN 3477 per year in the analysed period. The agricultural tax charge equals about 90% of the total tax charge on households with the exception of



Source: author's construction based on the FADN data

Fig. 4. **The amount of taxes and contributions in Poland in the years 2004-2008 for KRUS per 1 ha**



Source: author's construction based on the FADN data

Fig. 5. **Charge of farm income taxes and contributions KRUS in Poland in the years 2004-2008**

both C and H groups. This situation has not changed considerably throughout the period. A smaller share of agricultural tax is observed in types C and H. In the case of type C (horticultural crops), the amount of tax on special branches has increased from PLN 1128 in 2004 to PLN 1584 in 2008. These amounts represent respectively 70% and 72.5% of the total tax charges. In type H farms, charges are much lower and constitute about 20% of the total tax charges. In other types, residual volumes are less than 1%.

The total charges of taxes and contributions in the surveyed households per 1 ha shows Figure 4.

So far, the highest charge on the 1 hectare farms concerns the type C and it reaches more than PLN 700 per hectare. This is due to the heavy-duty non-farm surface (special tax departments, social security contributions). Much lower charges on the 1 ha are experienced in permanent crops farms, i.e. about PLN 200 per hectare. In the farms of other types, taxes and KRUS remained at the same level from PLN 80 to PLN 115 per ha during the period. Charge of farm income is shown a Figure 5.

Farms should be divided into two groups. Charges of income were the highest for the types AB, E, I during the period and they are subject to large changes (variations from 3.5% to 7.8% for type E). It appears that this is due to high proportion of agricultural tax and the charges modifications. However, they remain constant for the types C, F, and G at a significantly lower level of 3-5%.

Conclusions

Conclusions from the analysed data can be presented in the following sections.

1. The agricultural tax and social security contributions (above 90% of all the burden) play a decisive role in the agricultural charges of farms.
2. The average farm charge due to taxes and social security contributions during the period considered has increased from PLN 2781 per year in 2004 to PLN 3669 in 2008.
3. The highest charge of taxes and social insurance contributions during all the period was experienced by type AB farms – PLN 5180 per year in 2008 and the lowest by type I – PLN 2870 per year in 2008.
4. The largest share in the tax burden was shown by the agricultural tax for all types of farm, except type C farms.
5. Charge of farm income by taxes and contributions is low and strongly dependent on the type of farm. The types AB, I, and E experienced 8% and the types C, F, G, and H experienced 3-5% at the end considered period.

Returning to the initial argument, it shall be pointed out that the determination that Polish farmers are not levied upon with the social security contributions and taxes is not true. What is more, there are many system problems in formation of these burdens especially in agricultural tax. First, the amount of this tax is not dependent on the earned income, it only depends on the farm area and the price of rye. Second, farm income tax and social security burden is lower than in other sectors of the economy. Activities of the Polish government on the introduction of the income tax are, thus, the most reasonable at least from the point of view of social justice and equal economic operators.

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HEALTH INSURANCE OF FARMERS IN POLAND

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Abstract. In Poland, the health insurance of workers and farmers is mandatory. In the case of farmers, however, this insurance has been disabled in social insurance for farmers. Insurance for farmers is divided solely into pension insurance and accident insurance, sickness and maternity, yet it does not include health insurance. It means that health insurance premiums for farmers and their families are paid from the state budget. In addition, from 1 January 1997 persons engaged in agricultural and non-agricultural economic activities on application may qualify for only one kind of insurance, i.e. either agricultural insurance or social insurance.
The purpose of this article is to analyse the health insurance of farmers in Poland since 1999. In the following part of the situation, the author has analysed the payment of health insurance premiums for farmers in recent years. The present study is important because of the social justice aspect, which is considered in author's proposals for health insurance for farmers.
In the paper, the author has used descriptive and analytical methods. The result will be an indication of the development of possible changes in health insurance for farmers after 2013 in the Polish social security system.
Key words: insurance, health insurance, contribution (premium).
JEL code: I13; Q14

Introduction

In Poland, since 1 January 1999, a universal and compulsory health insurance system has been applied. Health insurance in Poland is operated on the basis of so-called Bismarck model. This means that health services are financed by contributions, usually mandatory. Polish insurance system is based on insurance premiums supply from the National Health Fund (Rutkowska-Podolowska M., Poplawski L., Zaleska-Tsitini M., 2011). Thereby, in accordance with the adopted law on public health insurance of 7 February 1997, everyone who works is subject to compulsory health insurance. The amount of health insurance premiums is discharged in accordance with the Act on Universal Health Insurance, which currently accounts for 9%. It is worth noting that 7.75% is written off from the PIT (The Act of 27.08.2004 on Benefits ..., 2008), and only 1.25% is paid by the insured persons.

Farmers or their family members (members born and living in the same household with a farmer), members of agricultural cooperatives, and agricultural farmers or members of their families, according to the law of universal health insurance (Article 8), are also subject to compulsory insurance sickness. Farmers are not required to pay health insurance premiums. The premiums for farmers, their spouses, and family members are paid from the State Budget. This amount is transferred to the National Health Fund through the Agricultural Social Insurance Fund (ASIF)[2].

It is worth noting that the situation, in which the state sponsored a farmer's health insurance, was unconstitutional. Thus, three Ombudsmen appealed and took the case to the Constitutional Court pointing to the contradiction with the constitutional principles of equality and social justice. According to the conclusion of the Constitutional Court of 26.10.2010, the Court declared the provisions under which the state budget pays the premium for the farmers regardless of their income as unconstitutional. This group, according to the Constitutional Court, is heterogeneous in terms of financial status, and thus there is no reason to treat the obligations to pay health insurance premiums. The Constitutional Court's objections concerned only situation that all farmers, including those who were able to pay premiums, chose having it paid from the budget sources. The Full Court of the Constitutional Court remained in the opinion that this provision is inconsistent with Paragraph 1 of Article 31, regarding Article 84 and Article 2 of the Constitution, infringes the principle of social justice (Article 2 of the Constitution), the principle of equal treatment (Article 32), and the principle of paying for any burdens and public services (Article 84). The Constitutional Court gave the legislature 15 months period to change the rules (Constitutional Court's judgment …, 2010).

Therefore, the aim of this paper is to analyse the health insurance for farmers, indicating the changes that have taken place in 2011 as well as to propose new solutions in this area.

Material and methods

Descriptive and analytical methods were used in the paper. The methods are based on an accurate description

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[2] The idea of separation of ASIF was developed to create an independent, specialized organization that would be a real host of social insurance for farmers in Poland, and this organization could take over and ensure the efficient implementation of distributed tasks in the field of pre-service insurance as well as take up new tasks not carried out so far by any of the insurance institutions in the country (Agricultural Social …,2000).

of the features and phenomena by fixing the differences between them.

The author used descriptive method as a preliminary tool. The study describes the specific phenomenon of health insurance for farmers in Poland, compares previous regulations, and compares and underlines common and differentiating factors.

The description method is carried out to deal with the numerical information. The presented research results can be compared to the characteristics and responsibilities regarding the subject.

Research results and discussion

Health insurance for farmers until 2011

Until the end of 2010, health insurance premium for a farmer who was subject to social security was equal to the amount corresponding to the price of half quintal of wheat per ha of agricultural land in an active farm (Article 20). It could not exceed the amount of the premium calculated on the basis of 50 acres of the farm operated. According to Article 20 of the law on universal health insurance, the basis of the contributions for farmers holding special areas of agricultural production, it is a declared amount, related to the fixed income tax for taxpayers. Health insurance premium is paid (Article 22) of each source of income. The contribution in cases where the insured person receives income from more than one source is discharged from all sources of income.

ASIF is responsible (Article 26 and Article 169c) for transferring the contributions to the National Health FUND (NHF) not later than 3 working days from the date of receiving them into account. In case of the delay in the transfer of contributions, ASIF (like Social Security) is imposed to discharge interest. The costs of collecting and accounting of health insurance premiums are deducted by the Agricultural Social Insurance Fund in the amount of 0.25% of the amount of contributions transferred to the National Health Fund (Article 26a) (Rutkowska, 2002).

For a farmer who was not subject to compulsory social insurance and for each member of the household, the basis of the contribution for health insurance was the amount corresponding to the minimum wage. The State Treasury paid the contribution of these individuals in the indicated base amount – 9%. On 1 January 2011, there was a significant change in the payment of health insurance premiums for farmers. The purpose of this change was independent contributions to NHF as well as solution to the situation with unpredictable prices of rye. Since that day, the health care contribution for farmers, their spouses, and family members covered by social insurance is flat, annually accounting for total cost of PLN 1.86 billion. The premium was paid by ASIF and discharged to the NFZ in monthly instalments (The Act of 26.11.2010 amending certain …, 2010).

Health insurance for farmers in 2012 and 2013

On 13 January 2012, Seym (Parliament) adopted, the law on health insurance premiums for farmers for 2012, the Act is in effect from 1 February (The Act of 13.01.2012 on Health …, 2012). This Act was initially provided for a transitional period and was valid until 31 December 2012, then it was changed (Journal of Laws, 2012), and its duration was extended until the end of 2013.

Health insurance premiums, according to the law stated, will amount for each insured person on a farm of 1 PLN per month for each fiscal ha, which was adopted for the purpose of determining the dimension of social security contributions for farmer households having more than 6 fiscal ha. As regards farms charged to 6 ha of agricultural land conversion premium, as before, the state budget will pay the amount of 1 PLN per fiscal ha for each insured farmer and member of the household. The premium will be discharged through the ASIF (The Act of 13.01.2012 on the health insurance…, 2012). By holding 6 ha, the income level for unemployment benefit is reached, wherein the unemployment health insurance premium is paid by the state budget and, therefore, a threshold of paying health premium of about 6 ha was adopted (the calculations were based on the data obtained from the Institute of Agricultural Economics and Economics Food) (Law on health premiums…, 2012).

In addition, the state budget pays premiums for each insured member of a farm household of less than 6 fiscal ha of 1 PLN per fiscal ha, or the farmer pays the premium from his own funds for each insured farmer from a special area of agricultural production, the rate of 9% of the declared income of the special area, not less than 9% of the amount of the minimum wage on farms with an area of agricultural land under 6 fiscal ha and special sectors of agricultural production.

Health premiums for farms with an area of 6 ha of agricultural land and more ha in the special conversion and agricultural production are paid for the insured member of the household on the farm in the amount of 1PLN conversion for each ha, or for each insured farmer of a special division the premium is 9% of the declared income of not less than 9% of the minimum wage (135 PLN, i.e. 9%. x 1500 PLN).

Farmers who pay individual health insurance contributions on income from agricultural production in special areas will pay more as of the next year. In fact, the amount of the contribution depends on the value of the minimum wage, which since 1 January 2013 has increased to 1600 PLN gross (Health Insurance 2013: farmers will…, 2013). From 1 January 2013, the monthly health insurance premiums for farmers are 144 PLN, or 9% minimum basis of assessment (144 PLN, i.e. 9%. x 1600 PLN).

Health insurance premiums for farmers are to be paid on a quarterly basis within the time for social security contributions. In addition, from 1 April 2012 to 31 December 2013 the basis of the contribution of health insurance is referred according to the Article 1 Item 3, an amount of 33,4% of the average monthly salary in the business sector in the fourth quarter of the previous year, including payments from profit, published by the Central Statistical Office in the Official Journal of the Polish "Polish Monitor" (The Act of 13.01.2012 on the health insurance …, 2012).

Noteworthy is the fact that from 1 January 2013 to 31 March 2013, the basis of the contribution of

health insurance is referred to the Article 1 Item 3 – an amount of 33,4% of the average monthly salary in the enterprise sector in the fourth quarter of 2011, including payments from profit, published by the Central Statistical Office in the Official Journal of the Polish "Polish Monitor" (The Act of 13.01.2012 on the health insurance …, 2012).

Possible changes in health insurance for farmers after 2013

Law on health insurance for farmers will be valid until 31 December 2013, and after that, the law must be constructed according to the target Act. Farmers should be treated the same as workers in other sectors of the industry. Health care contribution for them must and should be paid on the same basis as in other professions, which means that it should be paid from income. Income of 7-acres, according to the Institute of Agricultural Economics and Food Economy, are close to the minimum wage that exists in the economy and, therefore, might already be taxed (Portal health market.pl, 2012).

One of the best solutions, as part of the innovation in health insurance for farmers, would be to tax agricultural income. With this in mind, we should think of the changes in health premium payments for farmers. The essence of these changes would be a tax on income from agricultural income tax, i.e. the transition from the agricultural tax to income tax (Public Information Bulletin, 2012). Health premiums for farmers should be paid on the same basis as in the case of employees of other professions. Since the farmers are to be treated the same as workers in other professions, the health insurance premiums for farmers should be calculated in the same way as in the case of self-employed entrepreneurs, which means that farmers' income should be calculated statistically according to the national average. Health care contribution of farmers should be paid based on actual income. Self-employed entrepreneurs pay income 1.25 % of their own income, like other workers, and the remaining part, i.e. 7.75% is deducted from income tax. The taxation of farmers could be similarly calculated.

Conclusions, proposals, recommendations

Based on the above analysis, the author of the paper has formulated several observations and conclusions, which are as follows.

1. Previous coverage of the national health insurance for farmers was controversial, as it was insurance against the principles of equality and social justice.
2. Payments from the state budget for health insurance premiums for farmers, their spouses, and family members were socially unjust.
3. The Act of 13 January 2012 (Law on health insurance premiums for farmers, 2012) adopted by the Government was a good direction of change in reforming the Agricultural Social Insurance Fund (ASIF).
4. The amendment, introduced by the Act of 2012 and by art. 1 of Journal "Laws of 2012", pos. 1523, is temporary - valid only until 31 December 2013.
5. Ultimately, the amount of the premium should be calculated depending on the real income generated on the farm (now it depends on the size of the farm in fiscal ha).

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FINANCIAL STANDING OF THE DAIMLER AG IN THE PERIOD OF THE GLOBAL ECONOMIC CRISIS

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Abstract. The aim of the paper was to analyse the financial standing of Daimler AG and the influence of the most recent global financial crisis on it. Several financial ratios were calculated for this purpose. These ratios showed that the company's profitability suffered tremendously in 2008 and 2009, yet, it recovered in 2010, and it was even able to improve compared with the pre-crisis values in 2011. Liquidity ratios, however, suggest that Daimler was less liquid than the automobile industry on average in the researched period. Inventory analysis pointed it out as one aspect where there is still a room for improvement. Debt and long-term solvency ratios indicated moderately high values that do not give reason for concern; however, they shall be monitored closely in the future. Overall, profitability has suffered during the crisis, yet, it was able to recover afterwards. Debt ratios suffered similarly, though, they managed to remain relatively stable.
Key words: financial standing, global economic crisis.
JEL code: G01

Introduction

"The global demand for passenger cars will never exceed one million – simply due to the lack of drivers" (Gottlieb Daimler).

Luckily, from the point of view of the automobile industry, Gottlieb Daimler was not right with this forecast. After a period of little success of the industry, Wilhelm Maybach, a Daimler's employee succeeded in improving the gas engine in a way that made long distance rides possible for the first time in history. This invention paved the road for an unbowed commercial success. Nonetheless, it shall be recognised that the automobile industry has had to overcome successfully several crises including two World Wars, two severe oil crises, and two global economic crises. The last global economic crisis dating back to the year 2008 is still not forgotten due to its strong impact on industries all over the world, including the automobile industry.

Study objective, method and task

The main aim of the paper was to analyse the financial standing of the company Daimler AG, and, in particular, how it has been influenced by the most recent global economic crisis. The company's background and history was presented in the first section. Financial statements of 2007-2011 were analysed in the next section. It was an extremely interesting period, since it includes the company figures before and during the global economic crisis. Therefore, it was possible to analyse how seriously the crisis affected the company itself. Finally, an overall conclusion was given on the company's financial standing.

Financial standing of the Daimler AG in the period of 2007-2011 was analysed in this article. Each year was assessed by computing different ratios and discussing their interpretation. The Daimler AG's values were whenever possible compared with the industry average figures as published by the media group Thomson Reuters in 2012 to allow for a more accurate interpretation (MSN Money, 2012c).

Applied ratios and their interpretation

The applied ratios are presented in the following section. It also explains how these ratios help evaluate the financial data. Financial ratios are generally divided into five different categories: profitability, liquidity, debt, asset activity (Gallagher and Andrew, 2007), and leverage ratios.

Profitability ratios

Profitability ratios were calculated in the first step. Profitability ratios measure how much revenues are eaten up by expenses, respectively, how much is earned compared with sales generated and the amount earned compared with the company assets and equity. Shareholders, in particular, are interested in profitability ratios as profit leads to cash flow, which is a primary source of value for the company (Gallagher and Andrew, 2007). Five important profitability ratios include Gross Profit Margin, Net Profit Margin, Return on Equity, Return on Assets, and Return on Sales.

The Gross Profit Margin measures how much profit remains out of each sales dollar after the subtraction of cost of goods sold. The higher the ratio is, the better are costs controlled. The resulting percentage indicates how much of a profit dollar/euro the company can use for other purposes (Gallagher and Andrew, 2007).

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$$Gross\ Profit\ Margin = \frac{Gross\ Profit}{Sales} \quad (1)$$

The Net Profit Margin measures how much profit remains out of each sales dollar after all expenses are subtracted. Expenses in this case are operating expenses as well as interest and income tax expense (Gallagher and Andrew, 2007).

$$Net\ Profit\ Margin = \frac{Net\ Income}{Sales} \quad (2)$$

Return on Equity (ROE) equals net profit divided by equity. The resulting figure indicates how many dollars/euro of income were generated for each dollar invested by common shareholders (Gallagher and Andrew, 2007).

$$Return\ on\ Equity = \frac{Net\ Income}{Common Stockholder's\ Equity} \quad (3)$$

The Return on Assets (ROA) shows whether assets are used effectively. It indicates how much income each dollar of assets equals on average. Therefore, net income is divided by total assets (Gallagher and Andrew, 2007).

$$Return\ on\ Assets = \frac{Net\ Income}{Total\ Assets} \quad (4)$$

Return on Sales (ROS) is defined as ratio of net profit and net revenue. The ratio measures how efficient a company is in converting one sales dollar into a profit dollar. The ROS depends very much on the industry the company is operating in (Tyson and Schell, 2012).

$$Return\ on\ Sales = \frac{Net\ Profit}{Net\ Revenue} \quad (5)$$

Liquidity ratios

Liquidity ratios measure a company's ability to meet its short-term obligations. Calculating such liquidity ratios is important because a failure to meet these obligations may lead to bankruptcy. In general, it can be said that the higher the ratio is, the more a company is able to pay back its short-term obligations. While bankers look at liquidity ratios to check whether to extend short-term credit or not, shareholders use them to see how a company has invested in assets. Very high values may make shareholders wonder why not more resources have been invested in higher returning fixed assets instead of more liquid but lower returning current assets. The two main ratios in this category are Current and Quick Ratio (Gallagher and Andrew, 2007).

The current ratio compares all the current assets (cash and other assets that can quickly and easily be converted into cash) with all the company's current liabilities (liabilities that shall be paid soon) (Gallagher and Andrew, 2007).

$$Current\ Ratio = \frac{Current\ Assets}{Current\ Liabilities} \quad (6)$$

The Quick Ratio is similar, however, also more conservative as it excludes inventory from current assets. To calculate it, inventory is subtracted from current assets. The remaining value is then divided by current liabilities. If a company's inventory is hard to liquidate, the quick ratio is useful.

$$Quick\ Ratio = \frac{Current\ Assets - Inventory}{Current\ Liabilities} \quad (7)$$

Asset activity ratios

Asset activity ratios ensure information on how efficiently a company uses its assets. Thereby, the Working Capital Turnover Ratio measures how efficiently working capital is used. It is found by dividing cost of sales by net working capital. Net working capital is thereby found by subtracting total current liabilities from total current assets. An efficient use of working capital has a direct effect on a company's profitability. Hence, a high ratio indicates efficient use of working capital and quick turnover of current assets. However, a very high working capital turnover ratio may also indicate on the lack of sufficient working capital. In that case, the working capital employed is too little for the scale of operations (Jain, 2004). Contrariwise, a low ratio indicates under-utilisation of working capital. To judge whether the ratio is at a healthy rate, it should be compared with the past ratios results (Mittal and Jain, 2010).

$$Working\ Capital\ Turnover = \frac{Cost\ of\ Sales}{Net\ Working\ Capital} \quad (8)$$

The Inventory Turnover Ratio tells how efficiently a company converts inventory into sales. If the company has inventory for which there is high demand, the ratio value will be high. If demand is low, the ratio will also be low. The inventory turnover is calculated as dividing sales by inventory. A result of 1.5, for example, would mean that the company has turned its inventory into sales 1.5 times during the year (Gallagher and Andrew, 2007).

$$Inventory\ Turnover = \frac{Sales}{Inventory} \quad (9)$$

Debt ratios

Debt ratios measure the size of a company's debt and its ability to pay off the debt. Two primary debt ratios include Debt to Assets and Debt to Equity. When a company's debt increases significantly, bondholder as well as lender risk increases because more parties compete for the company's resources in the time of financial difficulties. Shareholders are also concerned, since bondholders are paid before shareholders. A healthy debt ratio depends on the industry. Generally, a stable industry can handle higher debt ratios.

Debt to Total Assets measures the percentage of a company's assets financed with debt. It is calculated by dividing total debt by total assets (Gallagher and Andrew, 2007).

$$Debt\ /\ Assets\ Ratio = \frac{Total\ Debt}{Total\ Assets} \quad (10)$$

The Debt to Equity Ratio indicates the amount of debt the company has for every dollar/euro of equity (Brigham and Erhardt, 2011)

$$Debt\ /\ Equity\ Ratio = \frac{Total\ Debt}{Total\ Equity} \quad (11)$$

Leverage or long-term solvency ratio

The equity ratio indicates the long term or future solvency position of the business. It contains the same information as the Debt to Equity ratio but presents it slightly different. The ratio divides shareholder's funds by total assets. A ratio of 60 % indicates that 60 cents of each dollar/euro is a shareholder's contribution, while the remaining 40 cents equal a creditor's contribution. Therefore, it indicates how much of financing is in form of liabilities (Brigham and Erhardt, 2011).

$$Equity\ Ratio = \frac{Shareholder\ Funds}{Total\ Assets} \quad (12)$$

Company presentation

Not many inventions have influenced human lives as strongly as the invention of car (Daimler AG, 2012a). Pioneers of the car industry were Gottlieb Daimler (1834-1900) and Carl Benz (1844-1929). In 1886 both of them invented the first car independent of each other. While Benz invented a motorised three-wheeler, Daimler invented the first motorised coach. While building up commercial success, both men continuously worked on the technical improvement of their automobiles. In the following years, Daimler's company DMG produced several record breaking motor sport cars and other cars suitable for people's daily use. The brand name "Mercedes" was patented in 1902 thanks to the brand's growing success.

Despite the oil crisis in 1973, the company was able to increase further revenues of all of its product lines between 1960 and 1980. The portfolio was further enlarged as result of the ongoing success. Thereby, the claim to produce premium products was kept in mind.

The environment for Daimler-Benz' business changed between 1984 and 1995. The second oil crisis, environmental concerns and increasing pressure from Asian competitors made business more and more difficult for the company. Therefore, the years from 1995 to 2007 marked a period of change for the company. More vehicle types as well as busses were added to the portfolio. Part of the change was moreover a merger with the US based company Chrysler. The merger was strived for by Daimler-Benz to improve the company's international competitiveness. It was little successful, though. Cooperation in procurement and development was less cost-effective than expected. In addition, Chrysler's debt had been underestimated which was due to insufficient investigations but also insincerities before the merger. All that and a very different company culture led to a demerger in 2007. From there on, the company was named Daimler AG (also referred to as "Daimler").

When the recession of 2008 reached all global markets, the automobile industry suffered heavily. In 2009, the global economic performance worsened for the first time after World War II. Sales of passenger cars dropped temporarily by 20-40%. The drop was even greater for utility vehicles. During that time, Daimler tried to find ways out of the crisis. Business processes were systematically analysed, efficiency was increased, and costs were reduced. Moreover, the authorised capital was increased by 10% in 2009 and new investors were found. Still, the development remained a major concern. New and more efficient models were added to the portfolio to increase competitiveness. Additional production sites were also opened on several emerging markets. After acting defensive in 2009, the company strived for new successes in 2010. Expansion rates above 20% in all branches marked 2010 and rewarded the prior business changes. Today, Daimler sells its more than 100 products in more than 200 countries over the world. Passenger cars, vans, trucks, busses, and financial services are part of the portfolio. However, the Asian and American market is expected to grow significantly, while there is negative growth expected in Europe.

Research results and discussion

1. Analysis of profitability ratios

As calculations show (Table 1), the Gross Profit Margin was 23.6% in 2007. It declined to 21.9% in 2008 and further to 16.9% in 2009. After the crisis, the ratio increased to 23.3% in 2010, before it exceeded the pre-crisis value in 2011 with 23.9%. The ratio for 2008 can be interpreted as follows. The Daimler AG's cost of products and services sold was 78.1% of its sales revenues, leaving the company with 21.9% of sales for other purposes. In 2009, a crucial year for the automobile industry that suffered enormously under the global crisis, the ratio dropped to 16.9% of sales that could be used for other purposes. However, ratios from 2010 and 2011 demonstrate that the Daimler AG found its strength back in 2010 and the ratio was even more advantageous in 2011 compared with 2007, the year before the crisis.

The tremendous drop from 2008 to 2009 can be attributed to a large decrease in sales. Sales decreased by about EUR 20 billion. However, at the same time gross profit decreased by less than EUR 8 billion, which overall lead to an increase of the ratio and was due to a comparably small decrease in production costs. The fact that the dimension of the crisis and the break-in of sales was not expected could be the reason for the small decrease in the production cost and not enough reduction of production. Another possibility is related with the economy of scale; perhaps production was sufficiently decreased but profits from production of scale also decreased at the same time.

The Net Profit Margin was calculated in the next step. Net Income and Net Profit Margin are often referred to as "bottom line" measures. Compared with the Gross Profit Margin, the Net Profit Margin includes adjustments, for example, for non-operating expenses as interest and taxes, and operating expenses (Gallagher and Andrew, 2007). In the case of the Daimler AG, operating expenses are greater than non-operating expenses. Sales, general, and administrative expenses are thereby the largest proportion of operating expenses. They account for roughly to 70-80% of operating expenses over the years. Research and Development account for the second largest proportion adding up to close to 100% of operating expenses.

Considering the Net Profit Margin, the trend is similar as for the Gross Profit Margin. In 2007, 4.8% of each sales euro remained after all expenses were paid. In 2008, the ratio decreased to 1.7% due to the crisis that hit in the middle of the year. In 2009, the ratio was even negative because net income itself was negative. In 2010, however, the year after the crisis, Daimler could

improve the ratio to the same value as in 2007, the year before the crisis. In 2011, Daimler was even able to improve the value compared with 2007 leaving the company with 5.7% of each sales euro after all expenses were paid. Yet, not only is a comparison of yearly ratios important to interpret the data but also a comparison with the rest of the industry. According to Thomson Reuters (MSN Money, 2012c), the automobile market had an average Net Profit Margin of 5.3% in 2011. Therefore, Daimler's Net Profit Margin was higher and consequently more positive than the automobile market's average.

After looking at Gross Profit and Net Profit Margin, the Return on Equity will be evaluated in the paper. In 2007, Return on Equity equalled 13.2%, meaning the corporation returned 13.2% for every euro common shareholders invested in the company. In 2008, when the crisis hit, Return on Equity was more than halved yielding 5.5% of return. In 2009, when the crisis reached its peak, the Return on Equity was even negative. However, in 2010 return was at 12.9% and had almost reached its pre-crisis value. The value of 2007 could even be improved in 2011. Return on Equity equalled 15.2% that year. The market average equalled, according to Thomson Reuters (MSN Money, 2012c), 14.5% and was consequently slightly below the Daimler AG's value. Overall, it can be said that during the crisis the Return on Equity has been low and even negative in 2009, yet, it recovered in the following years. Comparing the value of 2011 to the market average of the same year, it can be said that Daimler's value was slightly more positive than the market average.

The fourth Profitability Ratio that will be discussed in the following paragraphs is the Return on Assets. It indicates how well an organisation's invested capital is generating earnings (Stahl, 2004).

Again, there is a similar pattern as for the previously discussed ratios. In 2007, the ratio equalled 3.6%. It dropped to 1.3% in 2008 and it was negative in 2009, also due to a negative Net Income. In 2010, the ratio recovered to 3.4% and it even exceeded the value of 2007 in 2011. This is due to the fact that while both, net income and total assets were higher in 2011 than in 2007, net income increased more than total assets. The ratio's value of 4.0% is, however, below the automotive market average of 4.5% (MSN Money, 2012c).

The last profitability ratio that will be analysed is the Return on Sales, which tells how much profit is generated per euro of sales. The ratio equalled 9.0% in 2007 and it decreased to 2.8% in 2008. The Return on Sales Ratio was negative in 2009 and equalled -2.9% because the net income before tax was negative just as the net income after tax was in prior calculations. In 2010, net income before tax as well as sales increased, resulting in a ratio of 6.6%. In 2011, the ratio rose further up to 7.9%. Therefore, the company was able to increase its efficiency in the two years after the crisis. However, the ratio of 9.0% has not been reached yet. Unfortunately, there is no industry value the company's ratio could be compared with. Nonetheless, its trend has been positive in 2010 and 2011.

2. Analysis of liquidity ratios

The current ratio compares current assets with current liabilities showing how much of assets would have to be liquidated to pay all of the short-term debts.

In 2007, the Daimler AG's Current Ratio equalled 1.25 meaning the company could pay off 125% of its current liabilities by liquidating its current assets (Table 1). In 2008, the ratio decreased to 106% and so far it did not increase back to its value of 2007. In 2009, current assets remained stable compared with 2008, while short-term liabilities were reduced leading to a ratio of 114%. In 2010, it was 107% and in 2011, it equalled 111%. A ratio of less than 1 would suggest that the company is not able to pay back obligations, if they would have to pay them right away, which in turn would suggest no good financial health and consequently danger of bankruptcy. In all the analysed years, the ratio was above 1 meaning the company was able to pay back short-term liabilities any time. Nonetheless, the industry average figure outlines that it is higher than the Daimler AG's value. While Daimler would have been able to pay back 111% of its liabilities in 2011, the industry average was at 130% (MSN Money, 2012c). However, this might not necessarily be negative, since high ratios yield to the fact that the portion of current assets is high. However, current assets' return is usually comparably small. Investing money for a longer time might be more effective. Having a lower ratio, which is still above 1, means the company is liquid enough to pay back short-term debts but it does not have an unprofitably high amount of money invested in current assets.

A second liquidity ratio that will help analyse liquidity further is the Quick Ratio. The Quick Ratio is similar to the Current Ratio, however, it is more conservative because it subtracts inventory from current assets. While, as demonstrated earlier, the Daimler AG's Current Ratio is constantly above 1, this is not the case with the Quick Ratio.

In 2007, the Quick Ratio was 0.96, and thus, close to 1, which is believed to be a healthy rate. However, the rate declined in the following years. In 2008, it was 0.74, before it increased in 2009 to 0.87. In 2010, it was at the level of 0.80. A comparison of the Daimler AG's value in 2011 with the market average shows that the company's ratio is significantly lower than the market average. While Daimler could have paid back 80% of its short-term liabilities with its current assets excluding inventory, the market average was at 100%.

3. Analysis of asset activity ratios

Asset activity ratios give information how efficiently a company uses its assets. An efficient use of working capital has a direct effect on a company's profitability. Thereby, a high ratio indicates efficient use of working capital and quick turnover of current assets. However, a very high working capital turnover ratio may also indicate lack of sufficient working capital. In that case, the working capital employed is too little for the scale of operations (Jain, 2004). Contrariwise, a low ratio indicates under-utilisation of working capital.

When one looks at the development of the Daimler AG's Working Capital Turnover, changes can be seen throughout the years. It was comparably very high in 2008 when it was at 24.0 indicating that there might have been too little working capital for the scale

Table 1

Financial analysis ratios results

Specification	Years				
	2007	2008	2009	2010	2011
Profitability Ratios (in percentage)					
Gross Profit Margin	23.6	21.9	16.9	23.3	23.9
Net Profit Margin	4.8	1.7	-3.4	4.8	5.7
Return on Equity	13.2	5.5	-8.7	12.9	15.2
Return on Sales	9.0	2.8	-2.9	6.8	7.9
Liquidity Ratios					
Current Ratio	1.25	1.06	1.14	1.07	1.11
Quick Ratio	0.96	0.74	0.87	0.80	0.80
Asset Activity Ratios					
Working Capital Turnover	6.3	24.0	9.7	19.4	13.0
Inventory Turnover	1.7	1.3	1.0	1.6	1.5
Debt Ratios					
Debt to Total Asset Ratio (in percentage)	73.0	76.0	77.0	73.0	73.0
Debt to Equity Ratio	2.7	3.2	3.5	2.7	2.7
Leverage or Long-term Solvency Ratio (in percentage)					
Equity Ratio	27.0	24.0	24.0	27.0	27.0

Source: authors' calculations based on the Financial Statements of Daimler AG company

of operations. Compared with this, it was low in 2007 and 2009, when it had values of 6.3 and 9.7, respectively. Consequently, it can be assumed that working capital was not efficiently used in 2007 and 2009. Moreover, it can be assumed that a healthy rate lies between these figures, rather close to a very high value. Therefore, it can be believed that the company's working capital utilisation was the most efficient in 2010 when it was high, however, not so high as in 2008 (Table 1).

When the Quick Ratio was analysed, it became clear that the Daimler AG was less liquid than the average automobile producer. To find out more about its current assets and, in particular, the inventory situation, the Inventory Turnover will be calculated additionally in the following paragraph. The Inventory Turnover measures how fast companies sell their inventory items. It is measured by the ratio of goods moving into and out of the inventory (Stickney et al., 2010).

In 2007, the Daimler AG had an inventory turnover of 1.7. In 2008, it declined to 1.3 and reached a low of 1.0 in 2009. After the crisis, it increased up to 1.6 in 2010, and decreased slightly to 1.5 in 2011. In the same year, the Inventory Turnover of the BMW Group, Daimler's biggest competitor, equalled 1.4 and was, thus, slightly lower and less positive. Compared with that Honda and Toyota have very high inventory turnovers of 7.4 and 11.8 (MSN Money, 2012a; 2012b; 2012d). However, even though the companies are all active in the automobile industry, their products are very different in terms of price, segment and target group, which might be able to explain part of the large difference.

4. Analysis of debt ratios

The Debt to Total Assets Ratio measures the percentage of a company's assets that is financed with debt. The higher the ratio, the higher the financial risk involved. Nonetheless, it is important to remember that the amount of tolerable debt is dependent on the industry. A profitable company as Daimler can handle more debt than a non-profitable company in a non-stable industry.

The ratios of 2007-2011 show that they are relatively constant, although they did increase during the crisis. In 2007, for example, 73% of assets were financed with debt, in 2008 - 76%, in 2009 - 77%, in 2010 - 73%, and in 2011 - 73% (Table 1). Unfortunately, there is no industry average available to compare it with.

The Debt to Equity ratio measures the relative proportion of shareholder's equity, respectively, debt that is used to finance assets. A debt to equity ratio of 2.7 as it was the case for Daimler in 2007, for example, indicates that 2.7 times more debt was used to finance assets than shareholder equity. The ratio grew to 3.2 in 2008 and 3.5 in 2009. In 2010 and 2011, it fell again to 2.7 in both years. Therefore, the proportion of assets covered with debt returned to its pre-crisis value.

These values can be compared with other automobile manufacturers (Ycharts, 2012). While the Ford Motor Company had a ratio of 5.3, the Toyota Motor Corporation had one of 1.1 and Honda one of 0.9. The BMW Group whose portfolio can best be compared with the Daimler AG had a Debt to Equity ratio of 2.4 (Bloomberg Businessweek, 2012). Therefore, the range is comparably wide between companies. However, BMW who can be regarded one of Daimler's strongest competitors has a ratio only slightly more in favour of shareholders.

5. Analysis of the leverage or long-term solvency ratio

The Equity Ratio is a form of the Debt to Equity Ratio and indicates the long term or future solvency position of the business. It is also known as Net Worth to Total Assets Ratio. The resulting ratio indicates how much of the company is owned by its owners, the shareholders.

In 2007, the ratio equalled 27% meaning 27% of assets were owned by shareholders while 73% - were owned by creditors. The mentioned data show that the crisis had some influence on the ratio. In 2008 and 2009, 24% of assets were owned by shareholders. After the crisis the ratio went back up to 27% (Table 1).

Conclusions, proposals, recommendations

The following conclusions can be drawn summing up the results of the foregoing analysis.

1. The global economic crisis clearly had an effect on the Daimler AG's financial standing. Profitability ratios show that the company's profitability suffered in 2008 and even more in 2009. However, all applied ratios also suggest that the company has recovered in 2010 and 2011. Except for the Return on Sales Ratio, all ratios were even more favourable in 2011 than in 2010.
2. Liquidity ratios suggest overall that the automobile industry is little liquid compared with other industries. Still, the analysis of the Daimler AG's financials shows that the company is less liquid than other car manufacturers. Liquidity is, in particular, low when inventory is not taken into account. If the Inventory Turnover was very high, this would not be a problem. Compared with the overall industry, the ratio seams low. Yet, compared with the biggest competitor BMW, it is a little higher. Therefore, overall, the inventory does not seem high, yet, it does also not seem to be dangerously low either.
3. Debt ratios reveal that debt has increased during the crisis. The Debt to Equity Ratios also allows for a comparison between Daimler's figures and other companies' data. While Honda and Toyota, for example, finance a comparably small portion of assets with debt, BMW's ratio, which is one of Daimler's biggest competitors, is similar to the Daimler AG's value. For this reason, it can be assumed that the debt ratios in general give no significant reason for concern. Nevertheless, they should be closely monitored in the future. The same is true for the Equity Ratio and, hence, for Daimler's long-term solvency.
4. Summing up, it can be said that the Daimler AG is a financially healthy company. The company suffered during the global financial crisis of 2008 and 2009 but it was able to find its strength back in 2010 and 2011. In the future, several challenges are expected that would make it necessary to adapt further company strategy and portfolio.

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PREDICTING FINANCIAL DISTRESS OF COMPANIES IN THE AGRICULTURAL SECTOR

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Abstract. This paper is focused on predicting financial distress of agricultural companies in the Czech Republic between 2008 and 2011. This period is connected with the world crisis in many branches. Although, agriculture itself is a very specific branch, the crisis did not have such a significant impact on this sector in the Czech Republic. On the contrary, financial viability is a crucial issue for every company. There are numerous approaches how to predict the corporate financial distress. The paper deals with credit scoring systems, represented by Altman Z-Score, and CH and G indices used in the Czech Republic. The Czech State Agriculture Intervention Fund uses its own methodology created specifically for agricultural companies. A crucial question remains whether these approaches provide sufficient answers on the corporate financial viability and whether they can be considered reliable. The four mentioned models are calculated for a data sample, which consists of 142 Czech large agricultural companies. Results of the calculation and comparison between models leads to the conclusion that it is significant if there has already existed a sufficient model or if there is a gap which should be filled by a creation of a new prediction formula for a quick answer on the financial health of a company in the agricultural sector.
Key words: corporate financial viability, predicting formulas, Czech Republic.
JEL code: G33, Q14

Introduction

The financial health or viability is a crucial issue for every company regardless of the sector in which the company runs its business. No company is able to survive a long-term poor financial situation, which results in bankruptcy and the disappearance from the market. Managers are not interested in trading with companies whose financial situation indicates potential bankruptcy. There has been a serious research since the 1960s on financial indicators, which can be used for the prediction of corporate financial distress or bankruptcy. The first models were completed by American researchers such as W. H. Beaver and E.I. Altman. Although Altman´s formulas are still used, new models are being developed as well because the need to evaluate the company's situation remains. However, not the company itself lacks scoring models but the suppliers, customers, banks or other institutions, government etc. need the models in order to assess a quick evaluation, serving to support their decision.

The agricultural sector is specific in many characteristics. The difference between agricultural and industrial sector can be defined as a strong dependency on natural conditions, time discrepancy during manufacturing process, and the work and seasonality of work (Synek M. and Kislingerova E., 2010). Another difference represents high subsidising, which softens the market mechanism. The role of subsidies in managing the operating risk of agricultural enterprises was analysed by Spicka (2009) in the Czech Republic. The agricultural branch seems so specific that the models cannot be applied generally. It leads to the hypothesis that general indicators cannot be used in the agricultural sector.

The research aim is to test scoring systems, which predict the corporate financial distress. Previous studies and government practise are the sources of approaches used in the Czech Republic. Manasova (2008) has collected the best results using Altman Z Score. This model is so popular that it is the very first instance used in practise. In contrast, Susicky (2011) highlights specific agricultural approaches as CH and G indices. Third, the Czech State Agriculture Intervention Fund uses its own methodology in order to evaluate companies asking for subsidies. The research task is to investigate if these approaches provide sufficient answers about the corporate financial viability or not. Previous studies have used accounting data available before 2009.

The aforementioned approaches will be applied to real financial data obtained from the Czech corporate database Albertina. The results of used models are compared, and the differences are analysed in the following sections.

Research results and discussion

Financial health can be evaluated by many subjects using different pieces of information. This paper is focused on the quick answer for subjects as suppliers, customers, banks, or government, and thus, scoring models are used in the research. Scoring approaches provide a quick answer, which has unfortunately less explanatory power than the rating. The next sub-section introduces several models used for predicting financial distress and further applied in the author's analysis.

1. Models used for predicting financial distress

It has already been mentioned in the introduction that Altman's approaches are still used, although, their beginnings date back to the 1960s (Altman E.I., 1968). The first Altman Z-Score was mentioned only for large companies listed on the stock exchange. This paper uses Altman Z-Score, which was first introduced in 1977 and used for companies, which are not listed on capital

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markets. The reason for using revised Altman formula is that companies not listed on the stock exchange overweight in the Czech Republic. The Altman prediction model generalises companies and the sector of agriculture has its specifics as it is mentioned above. On the contrary, the agricultural companies are companies in the market economy as well and the relative comparison using Altman formula makes sense also in this case. The Altman model formula and its evaluation (Table 1) can be found bellow.

$$Z\ Score = 3.107 \times \frac{EBIT}{A} + 0.998 \times \frac{S}{A} + 0.42 \times \frac{E}{L} + 0.847 \times \frac{RE}{A} + 0.717 \times \frac{NWC}{A}, \quad (1)$$

Source: Altman E.I., 2012

where

EBIT - earnings before interest and tax;

A - total assets;

S - sales;

E - equity;

L - total liabilities;

RE - retained earnings;

NWC - net working capital.

The Altman model predicting financial distress has several disadvantages as it is a historical model, which was based on American data, especially developed for industrial sector and designed for large companies.

Slovak authors came up with their own distinctive approach, which should respect the conditions of the agricultural sector and Slovak economy, since models were created with the help of the Slovak financial data. The economic development of the Slovak Republic is very similar to the Czech Republic because of common history until 1993 - these approaches should thus be transferable within the Czech environment and conditions. The first model, known as the CH index, was introduced in 1998 by Chrastinova.

$$CH = 0.37 \times \frac{E}{A} + 0.25 \times \frac{E}{R} + 0.21 \times \frac{CA}{STL} - 0.1 \times \frac{STL}{R} - 0.07 \times \frac{D}{A}, \quad (2)$$

Source: Chrastinova Z., 1998

where

E - earnings;

A - total assets;

R - revenues;

CA - current assets;

STL - short-term liabilities;

D - debts.

The second index is called G-index after its author L. Gurcik; the G-index is newer than the CH-index. Formula of the G-index is displayed below.

$$G = 3.412 \times \frac{RE}{A} + 2.226 \times \frac{E}{A} + 3.27 \times \frac{E}{R} + 3.149 \times \frac{CF}{A} - 2.063 \times \frac{INV}{R}, \quad (3)$$

Source: Gurcik L., 2002

where

RE - retained earnings;

A - total assets;

R - revenues;

S - sales;

CF - cash flow;

INV - inventories.

Table 1

Evaluation of Z Score, CH and G indices

Evaluation	Z Score	CH index	G index
Unhealthy	Z <1.23	CH <-5	G <-0.6
Grey Zone	1.23<Z<2.99	-5<CH<2.5	-0.6<G<1.8
Healthy	2.99<Z	2.5<CH	1.8<G

Source: Altman E.I., 2012; Chrastinova Z., 1998; Gurcik L., 2002

Table 2

Evaluation of SAIF methodology

Category	Value	Financial support
A	25.01 – 31.00	Acceptable financial situation
B	17.01 – 25.00	Acceptable financial situation
C	15.01 – 17.00	Acceptable financial situation
D	12.51 – 15.00	Unacceptable financial situation
E	9.00 – 12.50	Unacceptable financial situation

Source: Statni zemedelsky intervencni fond, 2012

The last introduced approach is used nowadays in the Czech Republic by the State Agricultural Intervention Fund (SAIF). The agricultural sector can be highly subsidised in the Czech Republic, which changes and softens market conditions. The models mentioned above use annual financial data for evaluation, taking into account five basic criteria. Methodology used by the Fund uses annual financial data as well but it demands three years for evaluation. Results, based on nine criteria displayed below, are averaged. This approach is based on points allocation (7 criteria - possible results 1, 2 or 3 points and two criteria - 1, 3 or 5 points) according to the value of a selected indicator. Indicators selected by the State Agricultural Intervention Fund are as follows:

— return on assets;
— long-term return;
— value added / inputs;
— return on sales, counted from cash flow;
— total debt;
— interest coverage;
— period of debt repayment, counted from cash flow;
— cover inventory by net working capital;
— total liquidity.

Unfortunately, indicators are not defined as ratios of two items because the case is more complex. Details are specified in the State Agricultural Intervention Fund (2012). The State Agricultural Intervention Fund evaluates applicants who ask for financial support. The financial health or situation is one of the criteria, which is crucial for the final decision. Applicants are divided according to the results of nine financial indicators in three years into five categories as shown in Table 2.

The author has introduced four different approaches. The Altman formula is general and one of the oldest. The CH index and G index were created especially for agricultural companies and they should not follow any concrete aim. In contrast, the methodology used by the SAIF is used in the Czech Republic and it should support the decision if the business units can or cannot gain agricultural subsidy. The following section is dedicated to the description of units whose financial conditions are evaluated in the research.

2. Analysed units

The reliability of introduced models will be tested with the help of the Czech agricultural businesses. The data sample consists of large agricultural companies because of several reasons. First, large companies have available financial data; although, it is obligatory to publish basic financial statements, the Czech companies sometimes do not fulfil this requirement because there is no punishment specified. Second, large companies are relatively stable and have the best potential to survive in the turbulent environment because of diversified production. The third reason is based on the results of scoring models, which are most reliable for large or medium sized companies (Neumaierova I., Neumaier I., 2005; Narayanan L., 2010).

Basic financial statements of companies are obtained from the Czech corporate database Albertina. According to the classification CZ-NACE, the author uses the section A and Part 1 – "Agriculture, hunting and related service activities". The first constraint, belonging to the agricultural sector, leads to 86 538 records in the database. The second constraint is represented by data availability (annual statements for 2008, 2009, 2010, and 2011) and it narrows down the data set to 3 747 records. It is necessary to exclude all companies, which do not have data available at least for three last years because the SAIF methodology works with three years' time series. The third constraint is based on the company size (over 100 employees) and it is the most restrictive one. After restriction of Number 3, there were 155 individual records, yet, during the analysis, they were limited to 142 companies. This could be attributed to the following

Table 3

Results for Altman Z-Score, CH and G indices

Number of subjects			
Evaluation	**Z Score**	**CH index**	**G index**
Healthy	3	4	11
Grey Zone	63	138	116
Unhealthy	76	0	15

Source: author's calculations based on financial statements

Table 4

Results for the SAIF methodology

Category	Number of subjects	Acceptance of financial situation
A	99	yes
B	39	yes
C	3	yes
D	1	no
E	0	no

Source: author's calculations based on financial statements

Table 5

Basic financial ratios for agriculture and manufacturing industry

Financial ratio	Agriculture 2010	Agriculture 2011	Manufacturing 2010	Manufacturing 2011
ROE	3.74%	5.71%	11.61%	11.52%
ROA	4.03%	6.12%	7.30%	7.2%
Total asset turnover	0.26	0.2	1.3	1.37
Equity/Assets	88.34%	88.89%	51.04%	49.77%

Source: Ministerstvo prumyslu a obchodu, 2012

reasons – some units did not have compact three years time series or the unit did not develop economic activity in one year and the results would be negatively affected.

3. Results

This part includes tables, which describe the results obtained by the four aforementioned approaches evaluating corporate financial situation. At the end, 142 companies were analysed in the research. The Altman Z-Score, CH and G indices were calculated for the most recent data available and the SAIF methodology was calculated for recent 3 years. The Z-Score, CH and G indices were evaluated as described above without any modification. The SAIF methodology was modified in terms of indicator 6 - interest coverage. This variation was necessary because if the company has no interest, the author divides EBIT by zero, which is impossible. If the company has zero interest, it can receive up to three points at maximum. No other modifications had been applied apart from the aforementioned.

Results obtained are displayed in Tables 3 and 4. Table 3 presents the Z-Score, CH and G indices, since all three approaches divide the analysed units into three zones. Table 4 displays the SAIF methodology itself.

Obtained results significantly differ. The SAIF methodology sees the majority of subjects (141) as having sufficient financial health for getting subsidy. Almost 70% (99 subjects) are classified as the best category A. On the contrary, the Altman Z-Score is the strictest predictor because over 50% (76 units) are evaluated as unhealthy and 44% are part of the grey zone. Results obtained with CH and G indices do not differ. Majority of subjects ended up classified in the grey zone (97% for CH index and 81% for G index).

4. Discussion

The valuation of financial health or situation strongly depends on choosing the appropriate model. The Altman Z-Score is not primarily designed for agricultural sector. Professor Altman used financial data of companies from the industry branches when he created his formula. The results obtained by his formula detect the shift to the bankruptcy zone. The main sources of poor results are the indicators based on profits – especially ROA or retained earnings divided by total assets. The weight of ROA in formula exceeds 3 and it transfers companies to the bankruptcy zone because the profitability of the agricultural

sector is not so high. Table 5 provides a basic comparison between the value of indicators for agriculture and manufacturing industry.

Agricultural companies are less profitable, especially measured by the ratio return on equity because they prefer more equity than debts, and their turnover ratio is lower as well. The Altman formula was used as the general prediction model and the results were not sufficient. The agricultural sector is very specific in its need for caution approach.

In contrast, specific approaches (G and CH indices) did not provide reliable answers because the majority of units were classified in the grey zone. If a company is classified in the grey zone, it is impossible to evaluate its financial viability and time development. Researchers simply invented this zone for ambivalent results. There are several reasons why the results obtained by the CH and G indices are almost identical. These models originated at similar period in the Slovak Republic. There are also the factors of time, place and use of two identical indicators – E/R and E/A.

The SAIF methodology is the newest and it should provide the best results according to time criteria as well as the number of indicators and the number of evaluated years. It evaluates nine indicators based on the period of three years and if the company is affected one year by natural disasters such as flood or drought, this year is not taken into account. The methodology classifies all companies in very good condition. The main reason is that this approach is used for evaluating companies who ask for financial subsidies which are primarily focused on small and medium sized companies, although the present sample consists of large companies (over 100 employees), and thus, large subjects are advantaged and classified as the "A" subjects. The biggest disadvantage of this model is that the subject can get 1, 2 or 3 points (some criteria 1, 3 and 5) according to the value of each indicator and boundaries set up by a methodology creator. It does not distinguish between individual subjects because it does not use a continuous distribution of points.

Conclusions, proposals, recommendations

The research aimed to investigate whether the approaches used for predicting financial distress provide sufficient answers about corporate financial viability and if they can be marked as reliable. Scoring systems provided different answers. The Altman Z-Score does not respect the specifics of agricultural businesses and it disadvantages companies with lower profitability, higher content of equity, and lower asset turnover compared with manufacturing industry. The hypothesis, that general indicator Altman Z Score can be applied on agricultural companies, has to be rejected. Specific approaches (CH and G indices) also failed because classifying majority in the grey zone does not provide any answer for users. The usage of SAIF methodology is limited because it favours large corporations.

The research poses this question: Is there a scoring model, which would provide a quick answer for suppliers, customers or other related subjects about corporate financial viability if the subjects are not able to perform the real rating? According to the results obtained in this paper, the conclusion is ambiguous. This paper detects a space for creating a new scoring formula which would be applicable in this time period in the agricultural sector in the Czech Republic. This conclusion is supported by calculation and comparison of four most used models in the Czech Republic in the past couple of years. These models, unfortunately, did not provide sufficient results and they can be hardly marked as reliable.

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AGRICULTURAL CLUSTERS – EFFICIENCY MEASUREMENT

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Abstract. Cluster is defined as a group of the same or similar elements gathered or occurring closely together; a bunch. Business cluster was introduced and popularized by Michael Porter (1998), who saw clusters' potential by increasing the productivity of the companies in a cluster by driving innovation in the field and by stimulating new businesses. If it is true that clusters are more effective in operating and also in a strategic way, we can propose that it is possible to measure their rate of efficiency. The published approaches for measuring the performance of a cluster evaluate clusters in terms of actual performance of the companies involved. The question is whether such methods measure the actual effectiveness of a cluster. We think that they do not. Firms entering into clusters have already been successful before. Therefore, it is necessary to answer the question: how to measure the contribution of the cluster, i.e. how much of success can be attributed to the individual companies and what part to their actual involvement in the cluster. The objective of this article is to find indicators that would measure the real benefits of access to the cluster with the help of mathematical-deductive methods. The focus is on the core of the cluster. Short case study shows the possibility of using the created indicators in practice.
Key words: agricultural cluster, cluster advantage, synergy, efficiency measure.
JEL code: M21

Introduction

Cluster can be defined by Porter (1998) as geographically close groups of interconnected companies and associated institutions in a particular field, linked by common technologies and skills. They normally exist within a geographic area where ease of communication, logistics and personal interaction is possible. Clusters are normally concentrated in regions and sometimes in a single town. The definition developed by OECD (1999) characterizes clusters as networks of production of strongly interdependent firms (including specialized suppliers), knowledge producing agents (universities, research institutes, engineering companies), bridging institutions (brokers, consultants) and customers, linked to each other in a value-adding production chain. The European Commission (2003) defines cluster as "a mode of organization of the productive system, characterized by a geographical concentration of economic actors and other organizations, specialized in a common field of activity, developing inter-relations of a market and non-market nature, and contributing to the innovation and competitiveness of its members and the territory". Porter (1998) means that through the interaction in a cluster the firms are able to produce goods with a higher value than average enterprises and sectors. According to Pavelkova (2009), there is no sharp distinction between corporate networks and strategic alliances - in both cases this is a free collaboration of enterprise partners. In enterprise networks, cooperation is usually bound in a separate agreement, but it is a more equal relationship partners.

According to Czechinvest (2005), the major external benefits for firms in a cluster are:

— easier availability of skilled staffs;
— specialization and greater collaboration with suppliers;
— attracting customers, mutual reference;
— new and faster flow of information and innovation.

Simply we can say that in addition to making better use of Porter's model (5 forces), there is an expansion of innovative potential of higher order, and it indicates new investment. Moreover, if we are looking for possibilities for long-term growth of economy, then support for the clusters is certainly a step in the right direction.

The national government and the EU support cluster initiatives. Clusters for their projects could receive funding that gave rise to a higher cluster activity. The CzechInvest and other organizations promote the formation of clusters and provide advice and finance. In other countries, clusters are typical in the agricultural sector, yet, in the Czech Republic, this sector disregards clusters (Ministry of Agriculture issued a document for Vision for agriculture (2010) that consisted of 100 pages, yet the word "cluster" was mentioned only once in the context of future biomass).

Clusters are often considered a fashion issue, which is advantageous to establish because of subsidies. Tools that measure the efficiency of clusters are difficult to apply or are not sufficiently developed. The aim of this paper is to create appropriate indicators for evaluating the success of a cluster. We show problems and evaluate the effectiveness of a particular cluster. For creating efficiency, indicators will be used as basic methodology for financial analysis. To evaluate the homogeneity of the cluster, the author will use statistical tools. To evaluate the net benefits of a cluster, the author built an index based on the correction of composite indices of growth of aggregate inputs. Net benefit of the cluster will be evaluated by an index that will be formulated based on the correction of composite indices of growth of aggregate inputs.

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Research results and discussion

Literature and research confirms that there are many approaches to measuring the performance of a cluster. CIMP model of Solvell (2003) recommends to measure performance in three dimensions:

— innovation and competitiveness;
— internal and external growth of the cluster;
— the goals' fulfilment and information about cluster activities by cluster members.

CIM authors assume that performance is affected by:

— the business environment;
— the objectives of the cluster;
— processes that develop the cluster's activity.

The disadvantage of using the CIMP model is the unbalanced objectivity of the answers – factors' evaluation depends on the evaluation of cluster facilitators.

Quantitative methods can include benchmarking of the initiative Cluster Linked Over Europe (2006), which monitors key indicators (number of members, the aggregate turnover, number of employees), skills (the number of training events and their participants), joint projects, and other indicators (proportion of MSE in the cluster, the proportion of public finance etc.). However, this model does not purely follow performance goals, but rather soft development factors (expressed quantitatively).

Canadian model of NRC created by Cassidy (2005) is a very complex quality system that evaluates the cluster in terms of its relations and development depending on the stage of the life cycle. The model is comprehensive; however, it is very complex.

In scope of British study, the Department of Trade and Industry UK (2003) designed a model that recommended measuring the net change in employment, the increase in GDP, number of firms in the cluster and its growth, ROE, and rate of investment as the results.

The Cluster Benchmarking Project performed by Andersen (2005) and implemented in Norway also attempted to develop a model. Its key performance indicators were economic results that can be measured by employment, productivity, wages, profits, sales, turnover etc.

There are many other models that clusters themselves consider as good, yet they are ultimately not implemented for their complexity. In the following study, we will try to take the best practice of these models and based on that propose a simple way to measure the performance of clusters.

1. Structure of clusters and its goals

The success of a cluster should be measured:

— by the objectives of a cluster and individual members;
— by further benchmarking with relevant entities that are not parties to the cluster;
— by comparing of each company with its previous developments.

According to Czechinvest (2005), we can provide a well-built cluster layers:

— **core** consists of companies whose revenues come mostly from the external environment - outside the cluster;
— complement the **company's subsidiary**, suppliers companies in the nucleus;
— in relation to cluster them together with so-called **soft infrastructure**, formed by knowledge intensive organizations, R & D;
— adds the **hard infrastructure**, consisting of distributing channels, telecommunications, and waste management.

The fourth layer in the cluster is often missing.

Each layer of the cluster has specific goals and objectives, and it should use specific indicators of success.

Firms in the core can be evaluated using conventional indicators of financial success. Appropriate indicators can be ROE, liquidity, indebtedness, working capital to revenues, balance sheet growth, assets turnover etc.

These parameters can be used both for the evaluation of companies and for the evaluation of the core as a whole. When companies implement performance externally and not among them, most of the effects can be summed up, and it is possible to monitor the development of the core through its main financial indicators. It is more appropriate to do benchmarking then - both in space (sector averages) and in time (the value in the past).

The question was: Does it mean that the cluster is successful if companies improve over time and are better than the average company in the industry is? How successful the cluster is?

2. Creating the indicator Net Cluster Efficiency (NCE)

For this measurement, we can use some indices of growth indicators, which are important for the development of the company, such as sales growth (Sales Index). The sales growth of the cluster development involves the macroeconomic situation, the industry, also the position of firms in the sector, and finally a synergistic effect of the cluster.

If X is an indicator of success, then we denote that, in the case of successful development of the cluster (for the core), it should be

$$\frac{X_{CB}}{X_{BB}} \leq \frac{X_{CN}}{X_{BN}}, \qquad (1)$$

where

X_{CB} - a value of the indicator X for the cluster, but before enter to cluster,

X_{BB} - a value of the indicator X for the branch in the same year as XCB,

X_{CN} - a value of the indicator X for the cluster now (in this year),

X_{BN} - a value of the indicator X for the branch now (in this year).

We can also say that

$$\frac{X_{CN}}{X_{BN}} = NCE_X \cdot \frac{X_{CB}}{X_{BB}}, \qquad (2)$$

where

NCE_X - the Net Cluster Efficiency in the indicator X,

X_{CB} and others - see above.

Then we can say that the Net Cluster Efficiency (NCE) can be calculated as follows:

$$NCE_X = \frac{\frac{X_{CN}}{X_{CB}}}{\frac{X_{BN}}{X_{BB}}} \quad (3)$$

What does the indicator NCE_X correctly say?

The NCE_X eliminates the success that is not the result of collaboration in the cluster and measures how growth in X has caused the cluster efficiency.

In case, if X is an indicator, then there is optimal maximization.

If $NCE_X > 1$, that means that the cluster position in the sector is better than when participants were separate companies, and the cluster efficiency is better, if NCE_X is higher.

If $NCE_X = 1$, that means that the cluster position in the sector is the same as when participants were a separate companies, and activity of the cluster is probably weak.

If $NCE_X < 1$, that means that the cluster position in the sector is worse than when participants were separate companies.

The indicator NCE can be calculated in the same way for any maximization economic indicator, including growth indices. In the case of minimization indicator, calculation is similar; one just has to replace the fraction in the formula (3). Therefore, if the Y is indicator, which has minimum in the optimal value, then

$$NCE_Y = \frac{\frac{Y_{CB}}{Y_{CN}}}{\frac{Y_{BB}}{Y_{BN}}} \quad (4)$$

Meanings and applications of NCE_Y are exactly the same. NCE indicators can be used to assess the significance of the cluster in the sector and to assess core companies in the cluster.

3. Measuring cluster homogeneity

A very important principle in the formation of the cluster is the equivalence of companies that can be statically evaluated by indicators of homogeneity in the key indicators (assets, sales, and profits). Homogeneity can be measured, for example, by using a coefficient of variation (V_{coef}) according to Synek (2009). For indicator A:

$$V_{coef}(A) = \frac{\sigma(A)}{\overline{A}},$$

where

$\sigma(A)$ - a standard deviation on A,

$\overline{A}$ - a mean of A.

If V_{coef} (A) is less than 50%, then the cluster can be considered as a homogeneous set in the key indicator A.

Afterwards, we can dynamically evaluate the uniformity of development in the cluster - if the NCE of the firms in the cluster core is significantly different, then it does not indicate good functioning of the cluster.

4. Indicators for cluster's firms out of core

Profitability and supply savings of core companies limit **supporting companies** and their profitability; however, we can positively evaluate their stability or turnover of assets. A negative phenomenon and a sign of unequal status in the cluster would be a reduction of profits, especially with the same turnover. Using NCE is again possible, just the basic indicators will be different.

Soft infrastructure and its objectives are long-term and primarily non-financial. Although both sides (core and supporting companies, on one hand, and R&D and information service, on the other side) want to project their efforts in the financial results, certainly the focus is not on the short term. The benefit for soft infrastructure is a long-term cooperation and the possibility of application of research. The measure of efficiency there could be the number of direct orders coming from the cluster firms and their growth measured by the number or by profit.

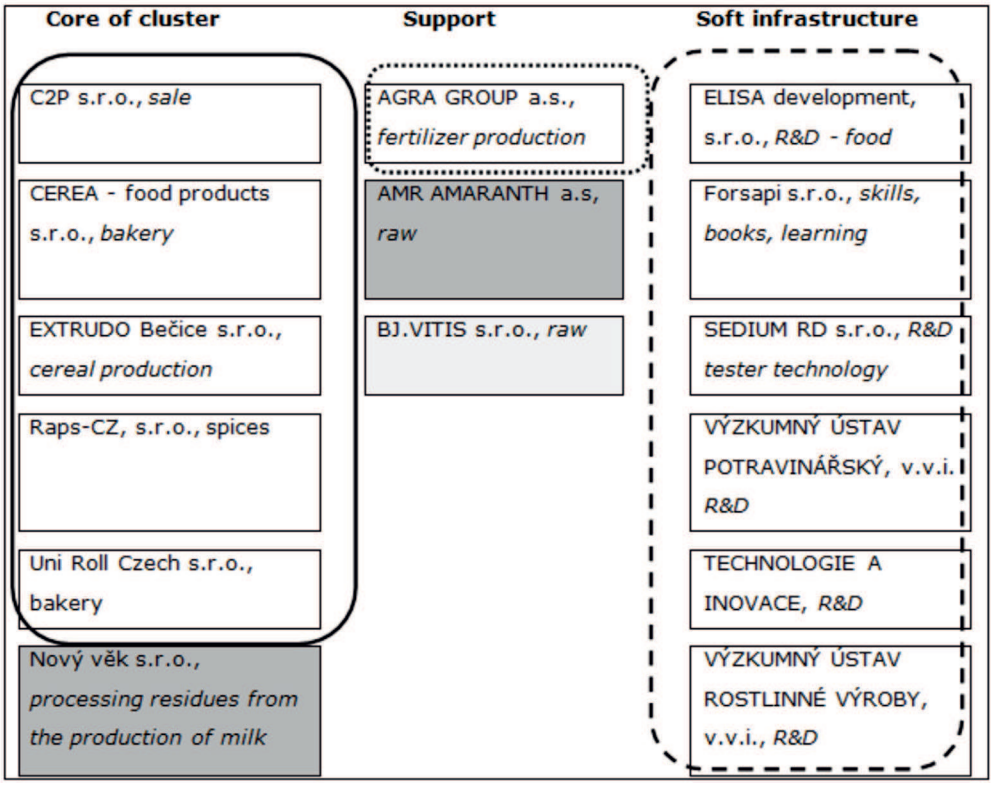
Alternatively, the level of cooperation may be indirectly reflected using the indicated amount of investment or simply the growth in net investment of core and support companies.

Objectives of **hard infrastructure** are the same for all clusters and are already outside the cluster's worth. If we mention the measures, then there could be a fundamental measure of value growth companies, i.e. EVA. For a cluster, it is particularly important that these companies are stable and have no problems, and thus could perform long service activity for the other layers of the cluster. For this reason, we can also use any of the bankruptcy or credibility models, for example, Altman Z-score for their evaluation.

5. Case study Nutripol

The aim of the next part is to verify the above-proposed standards for agricultural clusters in the Czech Republic. Unfortunately, there are few agricultural clusters with sufficient history, therefore Nutripol Cluster was chosen for the study. It is an interest association of legal entities with a focus on the CZ NACE 72 190, other research and experimental development on natural sciences and engineering. The firms in the core of the cluster correspond to CZ NACE 10.6 - Flour and starch industry and 10.7 - Bakery and Bakery and Confectionery, and benchmarking is made with them.

The declared aim of Cluster Nutripol is to strengthen the competitiveness of its members in three main directions:



Source: author's construction based on www.nutripol.eu

Fig. 1. **Cluster Nutripol - Members**

Table 1

Indicator Sale index and his NCE indicator for Nutripol

Sale index	2009/08 (before cluster)	2010/2009 (in cluster)
NACE 10.6	0.725	0.924
NACE 10.7	0.887	0.958
Core of Nutripol	1.016	1.078
NCE (10.6)	0.833	
NCE (10.7)	0.982	

Source: author's calculations based on the data from Czech Ministry of Agriculture (2011), Nutripol (2012) and Czech Ministry of Justice (2012)

Table 2

Homogeneity – measured with variation coefficient (in %)

Key index	2008	2009	2010	2011
Sales	71	64	62	72
Assets	79	65	81	93
EAT	162	164	128	174
TA	36	44	89	51

Source: author's calculations based on the data from Czech Ministry of Agriculture (2011), Nutripol (2012) and Czech Ministry of Justice (2012)

— increase of capacity for innovation by joint development of technological processes that can be used by more cluster members;
— the common procedure of verification and certification of the product or in the direction of the cluster allergenic security – offer of services to third parties in determining the allergenicity of their products;
— a common procedure in marketing and by the realization of researches and experiments for the health claim, which significantly increases the

effectiveness of communication with customers and defines the product being offered. These are either people who suffer from certain allergies (an increasing percentage of the population), or a person who prefers a healthy lifestyle. For Nutripol (2012), both markets are «niche» but they are very dynamic in the Czech Republic, strong, and stable in Europe.

The cluster was founded in 2009 and operates throughout the country. It has not done any extraordinary activity for a year. Figure 1 summarizes the cluster members to be included in each cluster's group (core, support, soft infrastructure, hard infrastructure).

Immediately, it is clear that the cluster now has very few companies in the core and very many companies in the soft infrastructure. Companies that are outside the frames were not recorded in the evaluation, because they are either in bankruptcy (gray) or do not publish data and do not communicate.

For benchmarking, the data from Czech Ministry of Agriculture (2011) were chosen as a key indicator of the growth index of sales and will be compared to the period before the cluster and then in the cluster. Table 1 shows that although the cluster is better than the industry growth rate and its sales are increasing, the position has still worsened both for 10.6 and 10.7 (NCE indicator is less 1). That means that the cluster effect in this time is not positive.

We can also calculate the cluster variation coefficient for homogeneity evaluation. The key indicators for this measure are sales, assets, profit, and turnover of assets (TA). Table 2 shows low homogeneity in absolute and in relative indicators of firms in the core of the cluster.

It is very likely that the cluster Nutripol is not working as well as it could. (Note: it is clear that it depends on economic recession.)

Conclusions, proposals, recommendations

The aim of the article was to develop and validate performance measures for clusters. From the literature review, it is clear that a number of projects and research have been devoted to this issue, and existing methodologies can be divided into two groups. The first one is very complex and difficult to determine clearly what to watch, and it is not obvious how to do it. The second group consists of methodologies to evaluate the performance of clusters classical applications of selected economic indicators, and generally follow the success of the cluster relative to other entities. The article presented a simple methodology that does not follow the growth of the cluster separately from the growth of the sector, but also in comparison with the position of the firms in the cluster before the cluster. This allows you to separate the net effect from the effect of the previous position of the cluster companies. Furthermore, it would be necessary to evaluate the companies involved in the cluster, their role in the cluster, and thus different conditions and objectives.

The objective was to develop indicators for cluster efficiency measuring

— The created indicator NCE_X eliminates the success that is not the result of collaboration in the cluster and measures how much the growth in X has been caused by the cluster efficiency. It can correctly say what the cluster position in the sector is - it is better than when they were separate companies if $NCE_X > 1$. It can be used for economic indicators X the aim of which is to maximize, but also for indicators the aim of which is to minimize.

— The second indicator - indicator V can tell us about homogeneity in the core of cluster.

In the second part, we showed the effectiveness of the agricultural clusters in CZ, concluding that the actual effects of the cluster are minimal. Unfortunately, this fact is confirmed by the recognition that in the CZ agricultural clusters actually don't exist, or their companies, despite reporting obligations, have disclosed their data. Therefore, we finally applied the methodology to a small cluster, which is, of course, very loose, and firms in it do not cooperate intensively but rather use their abilities. The core of the cluster is uneven and inhomogeneous. The contrast group of soft infrastructure is strong not only numerically, but its results are obvious in terms of development. Despite the positive results of benchmarking, the cluster has large reserves. Positive results are achieved thanks to activities of the firms rather than engaging in the cluster. There should be more attention paid to measuring the actual effects of clusters.

We believe that it is necessary to look for other such rating scale cooperation among companies (such as at the level of clusters) to be clearly legible, easily verifiable, objective, and such that the actual operators could monitor and control their activities, but not just wait for the ratings of advisory and consulting firms or government initiatives.

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ATTRACTION OF INVESTMENTS INTO VENTURE CAPITAL AND PRIVATE EQUITY FUNDS OF LATVIA

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Abstract. The paper deals with the issues of attracting investments into venture capital and private equity funds in Latvia. The aim of the research is to assess changes in the venture capital and private equity industry and evaluate its condition in the post-crisis period. The period of analysis is the years 2004-2012, focusing on processing information for the period 2010-2012. The issues regarding the demand for and supply of venture capital and private equity, the specialisation of funds, and the changes in their number are investigated. The author has performed an analysis of the reasons why some funds continue their operation after the crisis. Furthermore, the positions of Central and East European countries in the Global venture capital and private equity Country Attractiveness Index before the crisis and in 2012 and the possible effect of "cross-border factor" on the attractiveness of Central and East European countries for venture capital and private equity are analysed in the paper. Based on the present research, one can draw a general conclusion that the venture capital and private equity industry in Latvia suffered substantial losses during the crisis in terms of both quantity and quality. There are imbalances between the demand for and supply of investments in the venture capital and private equity market. The demand does not match the supply regarding financial instruments and size of investments as well as the number of "prepared" projects for investing is small. It especially relates to venture capital projects. Owing to the existence of factors that repel investors, additional instruments of government support are needed for boosting venture capital, including developing the infrastructure of venture capital.
Key words: venture capital, venture capital funds, private equity funds, attraction of venture capital, venture capital market, venture capital attractiveness index.
JEL code: G24, G28, G32, F21, M13

Introduction

The share of knowledge-based economy continues increasing in the developed countries. This is a global trend, and if Latvia follows it, the country might take a respectable position among such countries. Not only financing the transfer of knowledge, but also the transformation of knowledge into efficient production (services), i.e. commercialisation through technology transfer and (or) developing new business models play a special role in such economies.

One of the basic sources of financing the commercialisation of new technologies (and the development of new business models) is venture capital (Financing Innovative Development, 2007; Prohorovs, Jakusonoka, 2012).

Venture capital and private equity (hereinafter – VC&PE) investments and other aspects of the functioning of VC&PE represent a new field for science and practice in Latvia. VC&PE, as a class of financial assets, exists in the market for slightly more than ten years (Grisins, 2010; Calitis, 2010) and functions in Latvia in minor quantities (Rungainis, 2012).

One of such interesting and significant aspects is the attraction of investments into VC&PE funds.

This theme is topical not only because VC&PE funds, according to many researchers, take up to 50% of the venture investment market in many countries. The remaining market share is occupied by the informal sector – business angels, whose market share is estimated at not less than 50%, and corporative venture capital. According to researchers, the potential investments of business angels accounted for 6-15% in the years 2004-2006 (Dijokas, Vanags, 2004). Six years later, the share of business angels is estimated at 10-20% (Vanags, Stasevska et al., 2010). Nowadays, the sector of corporate venture capital is poorly developed in Latvia. Therefore, this is the reason why Latvia takes the last position in Europe regarding innovative development (Innovation Union Scoreboard, 2011). The issues of attracting investments into VC&PE funds became topical after the crisis began, as the majority of investors changed their strategy and reduced their appetite for risk (Karsai, 2009). It was expected that European and national institutions would increase the regulation of VC&PE industry (Global Scenarios for Private Equity and Venture Capital, 2009), and in 2011 it took place in the EU and presently takes place in Latvia.

Aim, tasks, and novelty of the research

The aim of the research is to assess changes in the VC&PE industry and evaluate its condition in the post-crisis period. The period of analysis is the years 2004-2012. The tasks of the research are as follows: to describe the condition of the VC&PE industry in Latvia in the post-crisis period; to provide the latest information (as of the end of 2012) on the quantitative and qualitative composition of market participants; to identify the causes and factors hindering the attraction of VC&PE into the Latvian economy; to identify and justify differences between the attraction of investors into venture capital funds (hereinafter – VC) and private equity funds (hereinafter – PE); to perform the analysis of the values

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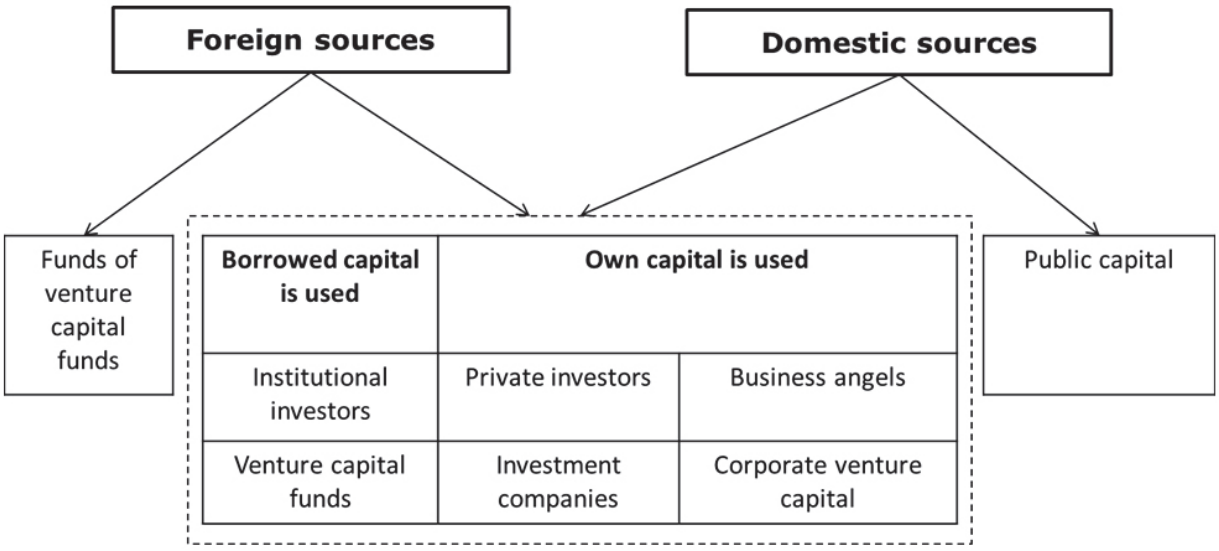


Source: developed by the author

Fig.1. **Venture capital sources**

of the Attractiveness Index for Central and East European (hereinafter – CEE) countries for the period before the crisis and in 2012; and to identify the specific causes negatively affecting the attraction of VC&PE from abroad, including the "cross-border factor".

Research methods

Methodologically, the present research is based on: an analysis of up-to-date scientific sources of information, and analysis of European and Latvian legal acts, recommendatory and informative documents, a comparative analysis, an analysis of EVCA (the European Private Equity and Venture Capital Association) materials and the Global VC&PE Country Attractiveness Index (hereinafter – the Attractiveness Index). Logical and constructive methods for identifying basic interrelationships between the researched phenomena and statistical analysis methods are also employed in the study.

Research results and discussion

Investment sources and participants of the VC&PE marker

All sources of VC&PE attracted by funds may be classified into two groups: foreign sources – imported capital and domestic sources – capital obtained from investors who are residents of the country. Besides, business angels rarely make their investments through funds; they do it in a direct way by investing into innovative companies at the early stage of their development (Avdeitchikova, 2008). Corporative venture capital (hereinafter – CVC) is also rarely invested through funds. In the developed markets, VC funds face significant competition for investment projects from CVC (Ghalbouni, Rousies, 2010). Foreign investment sources are not the main ones for Latvian VC&PE funds – it is too small and impermanent market for a fund of funds (George, Nathusius, 2007). This is probably the reason why no foreign investments have been made into Latvian funds of funds. This and many other reasons are topical for other foreign institutional investors, which are the key investment players on developed venture capital markets. In terms of investment amount, the key investment sources for new funds in Europe in 2006 were pension funds – 27.1%, funds of funds – 18.2%, banks – 14.4%, and insurance companies - 10.1%, and private investors were only in the fifth position with 8.9% (Global Scenarios for Private Equity and Venture Capital, 2009). The potential sources of VC&PE are presented in Figure 1.

In Latvia, all the classes of institutional investors have not yet been fully formed, besides, there are no large insurance funds and endowment funds. Presently, there is no such a class as potential investors – private wealth management companies (Lucas, 2007). Due to several reasons, local pension funds are not the key VC&PE investors on many emerging markets (including Latvia). Insurance companies in Latvia are among the few of CEE countries with significant restrictions regarding investments into VC&PE funds imposed (Financing Innovative Development, 2007). Private investors are one of the main investment sources for VC&PE funds in Latvia.

The author believes that the dominant role among private investors is played not by foreign, but by Latvian private investors. With the development of the Latvian economy since the mid-1990s, the number of VC&PE funds increased as well. In 2004, there were twelve operating funds (Dijokas, Vanags, 2004). In 2008, their number increased by one and reached thirteen (Vanags, Stasevska et al., 2010).

To provide Latvian enterprises with VC&PE capital, according to Vanags and Stasevska (Vanags, Stasevska et al., 2010), 15 operating funds are needed. Unfortunately, researchers have not so far classified VC&PE funds by specialisation and by their stage of development (capital attraction, investment stage, or investment limits are exhausted), which is important

Table 1

Number and specialisation of VC&PE funds in Latvia

	2004	2008	2012
Total number of funds (operating funds registered in Latvia)	12	13	6
VC funds (SEED and early stage)	No data	No data	1*
VC&PE funds	No data	No data	3
PE funds	No data	No data	1
VC, PE&real estate funds (mixed strategy)	No data	No data	1
Funds with Latvian capital	9	9	5
Funds with foreign capital	3	4	1
Currently searching for projects	No data	No data	2

* two small VC funds (EUR 4.5 and 6 million in size) are administered by the same managers (the general partner), are mutually interrelated (and were founded simultaneously), therefore, they are regarded as one fund

Source: developed by the author

Table 2

Distribution of VC&PE market participants in Latvia at the end of 2012

	LVCA members				Non-members of the LVCA	
Funds	Imprimatur Capital	ZGI	Eko investor	Baltcap	NCH Advisor	AB LV
Investment companies	Proks Capital				Dyaltos Capital	
Corporate venture capital funds and companies	no				no	
Business angels (clubs)	no				LBAA, Amber	

Source: developed by the author

information for both theoreticians and patricians. As the crisis developed, six VC&PE funds remained in the Latvian market (Table 1). It has to be noted that all foreign funds left the market, except NCH Advisor, which over the recent years was known for its numerous investments in real estate rather than VC&PE investments (Pavuk, 2006). One may assume that there are several reasons why this fund continues operating in Latvia. First, it is a global fund whose strategy includes operations in emerging markets and whose financial possibilities are the greatest among all the funds that made investments in Latvia. Second, it needs to manage its portfolio of numerous investments in real estate that could not be sold at a good price in the period 2008-2001 as well as in 2012. Besides, it is the only fund that is not purely a VC&PE fund, as it owns a large portfolio of real estate objects and has a relevant management team. Probably it does not allow the fund to focus on VC&PE investments (Cumming, Dai, 2011). All the other VC&PE funds operating in the market are domestic ones, and it has to be noted that all of them (except the direct investment fund ABLV founded in 2010) received government support, and 50-67% of their equity capital is government investment. All the VC&PE funds operating in the market after the crisis, except NCH Advisor and the recently founded fund ABLV, are members of the Latvian Venture Capital Association (hereinafter – the LVCA). The distribution of VC&PE market participants in Latvia at the end of 2012 is presented in Table 2.

Two funds, Baltkap and Imprimatur Capital, started attracting capital in the years 2008-2009, after the crisis began, and are presently in their active phase – in the investment cycle – and received government support accounting for 67% of their capital. One may assume that if the government support had not been available, the number of funds after the crisis would be smaller (Table 3). Two funds, which presently make investments, might have only 33% or even less of their capital attracted, as the government investments into the equity capital of the funds were made on the condition that the government would get its investments back not in proportion to their profit, but only at an annual rate of 6%. It was the main reason for many private investors to make investments in these funds. One can conclude that if no government investments had been made into the funds Baltkap and Imprimatur Capital, the total investment capacity of these two funds would be as much as EUR 13-45 million instead of EUR 40 million. This estimate is based on an assumption that all the private investors of these funds would have made their investments without co-investments of the government, which is unlikely due to the mentioned reasons. As the result, all the Latvian projects that needed VC&PE investments might have had no such chance. It is possible that the government institutions made appropriate conclusions considering the existing situation, and the establishment of two or three new funds is expected at the beginning of 2013; the size of

Table 3

Comparative indicators of attracting private capital by a VC fund and a PE fund (in the years 2009-2010)

Indicators of attracting private capital	VCF Imprimatur capital	PEF *Baltcap
Private investments attracted	EUR 2 million	EUR 11 million
Amount of expected private investments **	EUR 5 million	EUR 10 million
«Under-subscription» of shares of the fund	60%	-
Ratio of attracted private capital between the funds	1	5 (times)

* the fund has a mixed investment strategy, i.e. financing innovative venture companies is allowed.

** the indicator is calculated based on quotas of co-funding from the government and European financial institutions: EUR 10 million for Imprimatur Capital and EUR 210 million for Baltkap.

Source: developed by the author

each is estimated at EUR 10-15 million, and the Latvian Guarantee Agency (hereinafter – the LGA) tender on their management is coming to an end. This time, the government funding will reach 95% (the management company has to provide the remaining finances), which will enable the management company to focus on selecting and financing projects instead of dealing with problems of attracting capital. At the same time, the LGA considers a possibility to invest EUR 20 million in the Baltic Innovation Fund, whose size will reach EUR 100 million (if supported and managed by the European Investment Fund). The Fund will be able to support much smaller funds by investments of EUR 3-10 million in size, i.e. it will be actually a fund of funds (LGA, 2012). In any case, the author believes, it is a very positive factor, which will provide substantial support for developing the VC&PE industry in many aspects.

Lace and Laizans (Lace, Laizans, 2010) also point out that government support for VC&PE companies is a very significant precondition for the development of this industry. However, some questions remain, such as whether the goals are set and sizes of projects are selected correctly.

The lack of government support for the funds would limit the development of 20-30 companies, as banks adopted a more conservative lending policy in the post-crisis period and the situation for innovative projects would be more problematic because these projects would not be implemented without venture capital; it is even more important for Latvia due to two reasons. First, the National Development Plan (hereinafter – the NDP) envisages an "economic hike" (Nacionala attistibas plana 2014. - 2020. gadam prioritasu pamatojums, 2012), which is possible only by creating new innovative products and business models for which venture capital is the key source of finances. Second, Latvia takes the lowest position in the EU regarding introducing innovations, which is directly related to venture financing (Financing Innovative Development, 2007). One more conclusion may be drawn – attracting investments into venture funds is difficult for smaller funds. Regardless of the fact that Baltkap's strategy allowed the company to make investments in venture projects, it attracted the planned number of investors; moreover, even over-subscription of 10% took place, and the amount of attracted private capital totalled EUR 10 million. Whereas Imprimatur Capital did not attract the expected amount of investments from investors, under-subscription reached 60%, and the amount of attracted private investments amounted to approximately EUR 2 million. If absolute figures are compared, Baltkap attracted 5 times more private capital regardless of the fact that Imprimatur Capital had a more flexible schedule for investors to make their investments. It is possible that an additional argument for the reluctance of investors towards Imprimatur Capital was the fact that this fund, unlike Baltkap, did not operate in the Latvian market before, and the investors did not have experience in dealing with this fund and had no positive reviews, which is important in attracting investments (Hochberg, Ljungqvist, et al., 2012).

Demand, supply, and VC&PE investments

In an ideal situation, the market tends towards equilibrium, otherwise imbalances are observed. Imbalances may be specific both to a transitional period from an emerging economy to a developed economy (like in the case of Latvia) and to the periods of various crises. According to Dijokas and Vanags, the demand for VC&PE amounted to EUR 60-130 million in 2004, and the supply of VC&PE might be about EUR 243 million in the period of 2004-2006, while the amount of such investments made in 2004 totalled EUR 16.5 million (Dijokas, Vanags, 2004). Thus, the potential supply was 2.7 times higher than the arithmetic mean of the demand. It seems paradoxical, but at a demand of EUR 60-130 million, the 5.5 times smaller investments have been made. The fact that the supply exceeded the demand in that period may be explained by the expectations of investors for the economic growth and stabilisation, which have been prospected after the accession of Latvia into the European Union. There might be some imperfections in the methodology of calculating demand and supply, since Finland has been taken as an example, and the case of Hungary with adjustment coefficients has been used for calculations (indicators of investments relative to population and GDP have been applied, which the author believes to be very reasonable). Yet, among the leading countries of the Western Europe, Finland is the leader in attracting VC&PE, while Hungary is the leading country in terms of liberal legislation for VC&PE investment among CEE countries (Financing Innovative Development, 2007). A calculation based on the statistical data of these countries might lead to the significant inaccuracy in the

calculations of the adjustment coefficient. Besides, the factor of market capacity is also significant for certain countries and for the entire Europe (Gerard George, Eva Nathusius, 2007). The population in Hungary (market capacity) was almost five times greater than in Latvia in that period. Perhaps this fact was not taken into account either in the forecast of the supply of and demand for VC&PE in Latvia.

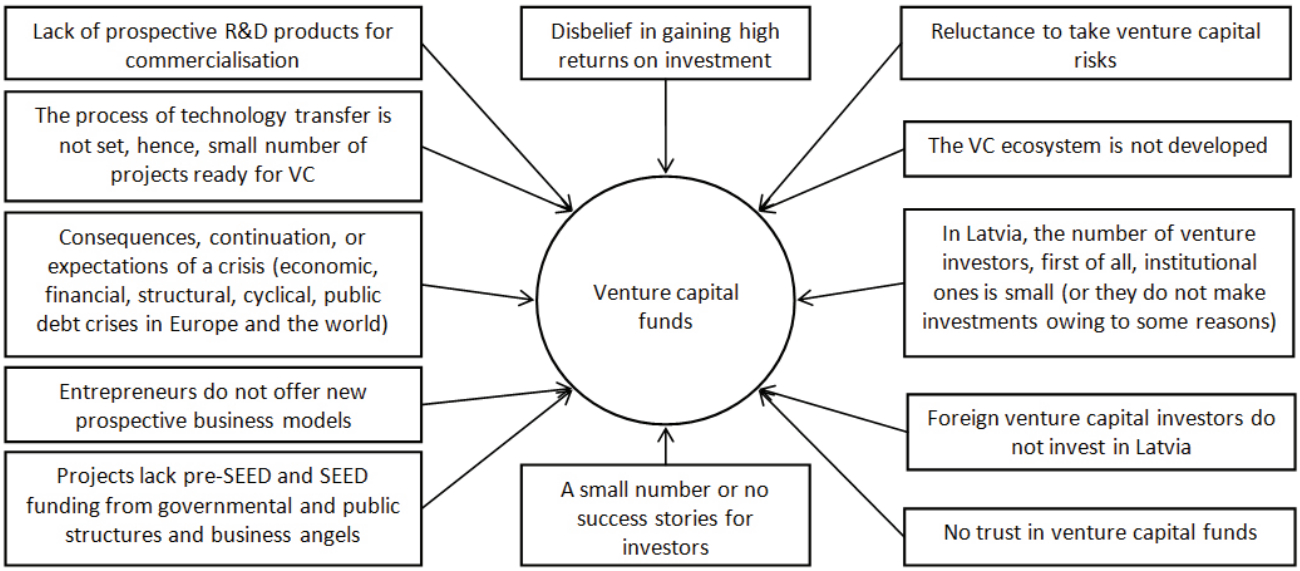
The basic reason for the small amount of investments relative to the demand for VC&PE is associated with other factors such as; first of all, the patterns of supply and demand do not match in terms of both amounts and kinds of investments (Landsrom, Mason, 2012). Besides, the culture and psychology of entrepreneurs have not yet been fully formed for attracting this kind of capital as a financial source for the development of private companies, which is also a significant factor (Andersson, Napier, 2007). As regards to the VC investments, there is one more very important factor – the number of entrepreneurs and innovative projects and (or) new business models is quite small. It is very likely that the small number of business angels, financial investment companies (listed in Table 3), and the number of other instruments (grants, government support) applied for financing the initial stages of venture projects, after which VC funds start making their investments, affected the amount of investments that was many times smaller than the demand for investments.

It has been found further in the research that the supply of capital, as of the middle of 2008, rose by approximately 20% to EUR 295 million, whereas the demand for capital increased almost 3.5 times to EUR 320 million and exceeded the supply for the first time (Vanags, Stasevska et al., 2010). It should mean that the VC&PE industry became significantly active. At the same time, the situation with investments in enterprises did not change so globally. If the amount of investments made in 2004 is subtracted from the investment amount of EUR 68.2 million (as of the middle of 2008), the sum for this period is equal to EUR 51.7 million. For the purpose of comparison of private investments, the amount of actual government investments for this period, which was EUR 14.6 million, has to be subtracted (LGA, 2007). It turns out that with the excess of demand of 3.5 times or EUR 230 million (average) over supply, the amount of private investments in four years (2004-2008) has been only EUR 37.1 million, EUR 20 million of which approximately were invested through the funds having no government financial support, which can be compared to the amount of investments made in 2004 and, thus, confirms the conclusions that have been previously made by the author of the present article. If the total amount of investments is compared to the number denoting the demand for investments and only private investments are taken into account, the excess of supply over demand reaches 6.2 times. If government investments are included, the excess of supply over demand is 4.7 times. It is actually the same amount reached in 2004 (5.5 times). As the result, one can conclude that the need for VC&PE capital for Latvian enterprises was satisfied at the extent of 18.2% in 2004 and 21.3% in 2008. If no government support had been provided, the demand would have been met at the extent of 16.2%, which would have been less than in 2004. Researchers point at large fluctuations in attracting VC, depending on the fluctuations in the economy (Yung, 2008). Yet, the crisis only began in this period and, therefore, the extent and duration of the crisis were not known. That is why it is unlikely that the beginning of the crisis significantly affected the amount of investments (in particular companies) in this four-year period. If an effect existed, it would be a two-way effect – on the one hand, investors became more cautious. However, the need of companies for re-capitalisation increased during the crisis owing to the worsening situation in the bank lending sector. According to the experts, the total amount of VC&PE investments made by private investors amounted to EUR 30-42 million in 2012 (Rungainis, 2012). This amount decreased by 29.6% as compared with the amount of investments in 2008. The author believes that only approximately 10% of this amount has been intended for investments into VC funds, while the remaining 90% – into PE funds or funds having a mixed investment strategy. Based on the above-mentioned, not only in 2008, but also in 2012, compared with 2004, the imbalances among the demand for, supply of, and real VC&PE investments, regardless of the government financial support, have remained. It means that the instruments used and the amount of financial support do not fully match as well as the greater government support is needed for raising venture capital, including developing the infrastructure of VC. At the same time, the Minister of Economics of the Republic of Latvia admitted that venture capital funds have sufficient finances, however, "if analysing why the existing finances are not absorbed, one can see problems – the more money is needed, the more knowledge is necessary, but there is a lack of knowledge among the market participants". He also stressed that there are not many projects in Latvia in which to invest, but it is not the problem of venture capital. "Rather, one has to look at what conditions a company has to comply with to attract venture capital", Pavluts said (Nozare.lv, 2012). The lack of projects "prepared" for investments to be made by VC funds is also a reason for an imbalance between the supply of capital and the amount of investments actually made and a consequence arising from the poorly functioning process of technology transfer.

Causes and factors affecting the attraction of VC&PE investments

There are various reasons why, in Latvia, VC funds may be less popular for investors than PE funds. The most significant of these reasons are presented in Figure 2.

In an open economy, investors may choose among various kinds of investments, instruments for making investments, and territories (countries) for investments. For instance, investments of the Estonian VC fund Martinson Trigon Venture Partners (the amount of attracted investments is approximately EUR 23 million, the fund manages Scandinavian finances and employs three full-time employees) mainly focuses on the Russian projects (Susi, 2007). In case public funding is invested in the fund, the author believes that it would be logical, that the fund makes investments into the domestic projects (companies). The government has to support



Source: developed by the author

Fig.2. **Possible factors and reasons for the unwillingness of private investors to invest in venture capital funds in Latvia**

Table 4

Comparison of risks for investors investing in venture capital and other assets

Kind of assets/parameters	VC	Stocks and bonds	Gold	Real estate
Possibility of the total loss of an asset	Yes	No*	No *	No *
Price recovery is not possible after the "loss" of a project	Yes	No	No	No
Not possible to abandon the investment project with partial loss	Yes (often)	No	No	No
Lending is not possible	Yes (usually)	No	No	No
Using an asset as collateral is not possible	Yes (usually)	No	No	No

* In the absence of trade with financial leverage

Source: developed by the author

VC funds, so that higher risks may be adequately offset for venture investors (Table 4). At the same time, the presence of public funding in a VC&PE fund is not a significant argument for institutional investors (Groh, 2009). If considering VC&PE investments in the context of stimulating an innovation economy, first of all, it is related to VC, but not PE, as new innovative projects are financed particularly by VC (Financing Innovative Development, 2007 and Pearce, Haemmig, 2010). Many countries across and beyond Europe quite extensively use various instruments to stimulate venture capital (Financing Innovative Development, 2007).

The author believes that it is not sufficient, and the government has to support the development of the infrastructure of venture capital and to stimulate the transfer process of technologies for their commercialisation (Jakusonoka, Prohorovs, 2012). Many large foreign investors use ratings of VC&PE attractiveness to identify the attractiveness of countries (Groh, Liechtenstein et al., 2010; Groh, Liechtenstein et al., 2011; Groh, Liechtenstein et al., 2012).

The given rating is so far the only comprehensive "meter" of comparative attractiveness of countries for VC&PE. The rating has been prepared by a team of scientists led by professors Alexander Groh and Heinrich Liechtenstein. The rating is based on six key indicators: Economic Activity, Depth of a Capital Market, Taxation, Investor Protection and Corporate Governance, Human and Social Environment, and Entrepreneurial Culture and Opportunities. These indicators are very important for investors, when making decisions on VC&PE investments in a country. To assess the international competitiveness of Latvia regarding attracting VC investments, particularly VC rating values have been obtained from VC&PE Attractiveness Index and considered. According to these figures, the comparison of CEE countries that are members of the European Union has been made. The research results are presented in Table 7. The table shows that before the crisis, Latvia was ranked in the last position considering the attractiveness for investments among the compared countries. Latvia has not changed its position during the post-crisis period. The number of

Table 7

Comparison of ratings of CEE countries for VC attractiveness

No.	Country	Rating 2007	Rating 2012	Change in ratings in 2007-2012
1.	Bulgaria	53	58	-5
2.	Czech Republic	39	38	+1
3.	Croatia	51	57	-6
4.	Estonia	41	43	-2
5.	Hungary	46	44	+2
6.	Latvia	60	61	-1
7.	Lithuania	43	48	-5
8.	Poland	34	28	+6
9.	Romania	47	48	-1
10.	Slovakia	44	51	-7
11.	Slovenia	50	46	+4

Source: developed by the author, based on the Global VC&PE Country Attractiveness Index for 2012

Table 8

Presence of a neighbouring country with a higher rating in the VC Attractiveness Index

Country	Rating in the VC Attractiveness Index in 2012	Neighbouring countries (with a higher rating in the VC Attractiveness Index)	Rating in the Attractiveness Index in 2012 for the neighbouring countries	Difference in ratings in the Attractiveness Index for countries compared
Latvia	61	The Russian Federation	40	21
Estonia	43	Finland	17	26
Lithuania	48	Poland	28	20
Hungary	44	Austria	23	21
Slovakia	51	Austria	23	28
Czech Republic	37	Germany	9	28
Slovenia	45	Austria	23	22

Source: developed by the author

the countries ranked in the position point 50 and lower remained the same, namely 4 countries. Estonia holds the third place, while Lithuania shares the sixth and the seventh. This indicates to the fact that Latvia is not regarded as an attractive object for VC investments not only among the considered countries, but also for the neighbouring Lithuania and Estonia. These data confirm the previous conclusions made in the present research and indicate why both foreign and domestic VC investments in Latvia as an open economy are presently less attractive. Yet, it has to be noted that four of the considered countries managed to increase their attractiveness for VC in comparison to their before the crisis rating value. One of these countries is Hungary, which like Latvia, has also received international financial support.

In the process of analysing the Global VC&PE Index, the author made a hypothesis that several other factors probably affect the level of development of VC in a particular country. For instance, three top positions in the Attractiveness Index Rating are occupied by the USA, Canada, and the UK, for which the English language along with the Anglo-Saxon economic model are common. To examine this hypothesis, the author has analysed the following indicators of the CEE countries presented in the left column of Table 8: population size, area, whether it is a transitive or post-transitive economy, whether it borders on a country whose rating in the VC Attractiveness Index is significantly higher. For comparison, a neighbouring country having the highest rating of the index was selected. The results are presented in Table 8.

It was detected that a country having a neighbouring country with a high rating in the index also has a higher rating in the VC Attractiveness Index as compared to the other CEE countries. One can draw a conclusion that the cross-border factor also exists, which affects ratings in the VC Attractiveness Index.

Conclusions

1. Before the crisis as well as now, domestic capital sources are the main sources of VC&PE investments

in Latvia. Among the domestic capital sources, institutional investors do not dominate.
2. In the post-crisis period, the number of VC&PE funds has halved. All the foreign funds left Latvia market, except for the NCH Advisor, the main activity of which, over the recent years, was a real estate business.
3. Of all the Latvian funds, only the funds that received government support remained in the Latvian market.
4. In Latvia, there is only one fund specialising in VC investments. Besides, in Latvia, the number of clubs of business angels is small (2), there are no network and association of the business angels, there are a few investment companies, whose strategy includes venture investing (2), and there are no corporative VC companies (funds).
5. Regardless of co-funding from the government and favourable conditions for investors, it is much more difficult for the VC funds to attract investors as compared to the PE funds.
6. In the VC&PE market, there are imbalances among the demand for, supply of, and real amount of investments, as the demand does not match the supply regarding financial instruments and the amount of investments as well as the number of "prepared" projects for investing is small. It especially concerns the VC projects.
7. Owing to the factors distracting investors, additional instruments of government support are needed for boosting venture capital, including developing the infrastructure of VC.
8. Among CEE countries that joined the European Union, Latvia, as in 2007, is ranked in the last position considering the attractiveness for VC investments and is considerably less attractive for VC investments than Estonia and Lithuania.
9. The level of attractiveness of Latvia (and other countries) for VC investments is affected by the cross-border factor – the presence of a neighbouring country with a much higher rating in the VC Attractiveness Index.

Practical use of the results of the research

The results of the present research may be used by:

1) state administration institutions – as analytical material and a source of new data on the VC industry for assessing the effects of stimulative instruments for this industry and developing additional support measures;
2) public structures managing the VC industry – for analysing the present condition of this industry and assessing the effects of the crisis on the VC industry in Latvia;
3) VC&PE funds and other market participants – as material for assessing the market potential and products needed for the market;
4) researchers – for exploiting the information and findings presented in this paper for their further researches related to the VC&PE industry and innovative development.

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ANALYSIS OF TRENDS IN THE TAX BURDEN IN LATVIA

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Abstract. Latvia's "Tax Policy Strategy 2011-2014" was elaborated, taking into account the need to ensure the stability and predictability of its tax policy and to increase the competitiveness of Latvia's national economy as well as Latvia's intension to introduce the euro in 2014. The research aim is to analyse changes in the trends in tax burden in Latvia in 2009-2012 within the common context of the EU tax environment by employing comparative analysis. To achieve the aim, the following research tasks were set: to characterise the changes in the trends in tax burden in Latvia in 2009-2012 and to perform an international comparative analysis; to identify factors promoting and hindering business and social development basing on the analysis of trends in the tax burden performed in the present research. To make statistical data on the EU States comparable, the European system of national and regional accounts 1995 (ESA 95) and the tax classification based on ESA95 were used.
The majority of tax revenues in Latvia are composed of labour taxes, although, over the recent years, the proportion of these taxes in the total tax revenue has been reduced from 52% in 2009 to 50.8% in 2011. Labour taxes in Latvia, to a greater extent, reduce the real income level, particularly for population groups with the lowest income.
The country's fiscal policy for 2013-2015 is determined by several factors: a course towards a balanced government budget over the economic cycle, observance of the fiscal policy terms set by the Stability and Growth Pact (SGP), and economic growth measures to be implemented in the post-crisis period. The most significant measures affecting tax revenues in the period 2013-2015 will be: a reduction in the personal income tax rate from the present rate of 24% (in 2013) to 22% in 2014 and to 20% in 2015 and a reduction in the tax burden to 26.3% of GDP in 2015. The enhancements in the tax policy have to be oriented towards the improvement of Latvia's demographic situation, systematic and purposeful attraction of foreign investments, and faster transferring of the tax burden from labour to consumption.
Key words: tax burden, fiscal policy, Latvia, labour taxes, EU-27.
JEL code: E62, H24, H72, J38, K34, O16

Introduction

The objective of any nation is to justify and set a tax burden that makes as small negative effect on economic activity in the country, as possible. Therefore, a topical problem is the structure and rates of taxes, which may, to a great extent, affect business activity, consumption, and other important macroeconomic indicators. The indicator of total tax burden and a structural analysis of tax groups are one of the most essential issues of examination and analysis, which is regularly tackled both by the European Commission's planning departments and by national strategic planning commissions, the task of which is to create favourable conditions for economic development and to prevent crises and their effects.

Since 2001, Eurostat's national account team has set four key indicators that are widely used for international comparisons. Since 2009, the European Commission has performed international comparisons in accordance with a single methodology elaborated by it, and a full text of the methodology was included in the European Commission's report *„Taxation Trends in the European Union*" (2009). Theoretical studies and situation analysis aimed at enhancing the tax system from various aspects have been conducted by several authors in Latvia: Juruss M. (1999); Ketners K., Titova S. (2009); Joppe A. (2010); Jarve K. (2010); Tkacovs O. (2008); Sproge I. (2010); Vitola I., Leibus I., Joma D., Jakusonoka I. (2012); Stucere S. , Mazure G. (2012); Vitola I., Joma D. (2012). Tax burden analysis becomes increasingly urgent, therefore, the **research aim** is to analyse changes in the trends in tax burden in Latvia in 2009-2012 within the common context of the EU tax environment by employing comparative analysis.

To achieve the aim, the following **research tasks** were set:

— to characterise the changes in the trends in Latvia's tax burden in 2009-2012 and to perform an international comparative analysis;
— to identify the factors promoting and hindering business and social development basing on the analysis of trends in the tax burden performed in the present research.

Materials and methods

In the present research, the following research **methods** were employed: the logical and constructive methods, induction, statistical data processing methods as well as statistical grouping methods and the graphic method.

Materials published by Eurostat, the Central Statistical Bureau of the Republic of Latvia (RoL), the Ministry of Finance of the RoL, and the Treasury of the RoL for the period 2004-2012 were analysed and theoretical and methodological studies on fiscal policy management were used in the present research. To make statistical data on the EU states comparable, the European system of national and regional accounts 1995 (ESA 95), which

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Table 1

Tax changes in the EU-27 to prevent the crisis in 2009

Tax group	Member States	
	Decrease	**Increase**
Labour taxes		
Personal income taxes	OE, DK, FI, FR, DE, HU, **LV**, LT, LU, MT, NL, PL, PT, SI, SK, SE	EL, IE, UK
Social contributions made by employers	CZ, FI, HU, NL, SE	IE, RO, UK
Social contributions made by employees	CZ, NL, SE, SK	LT, RO, UK
Capital increase	RO	IE
Reform is postponed		CZ, EE
Enterprise income taxes		
Rate of social contributions	EL, LU, PT, SE	IT, LT
Government benefits	OE, BG, ES, IT, NL, DE, FR, LT, PL, PT, SI, SK	
Consumption taxes		
Value added tax		
Standard rates	UK	HU, IE, **LV**, LT
Reduced rates	BE, CY, CZ, FI, FR, MT, RO	HU, EE, IE, **LV**, LT
Capital income taxes		
Property and inheritance taxes	EL, ES, IT, LU, PT	
Environmental taxes	DE, NL, RO	FI, IT, **LV**, LT, SI, UK

Source: European Commission (2009) Taxation Trends in the European Union …

was introduced in accordance with Council Regulation (EC) No.2223/96 on 25 June 1996, was employed. The tax classification was designed based on the ESA95 methodology.

Research results and discussion

Any nation makes its fiscal policy based on the extent of government functions and the number and scope of services provided to the public. However, affected by the economic crisis, GDP in several EU states sharply decreased: 5.8% in the EU-27 in 2009, 3.5% in the eurozone (EU-17), whereas in Latvia – 19% (Eurostat, 2013).

Measures of the EU Member States to combat the economic crisis were different, depending on their government budget balance and the social situation in the country. Usually, the measures consisted of tax reductions, but the states with an insufficiently balanced budget or those whose GDP sharply fell, including Latvia, Lithuania, and Estonia, were forced to increase taxes. Information on the measures in the EU-27, summarised by the European Commission, is presented in Table 1.

According to the European Commission's data on the measures taken in the EU Member States to decrease the effects of the crisis, mainly fiscal consolidation measures were taken to change expenditures, while in several Member States tax burdens were increased as well (European Commission, 2010).

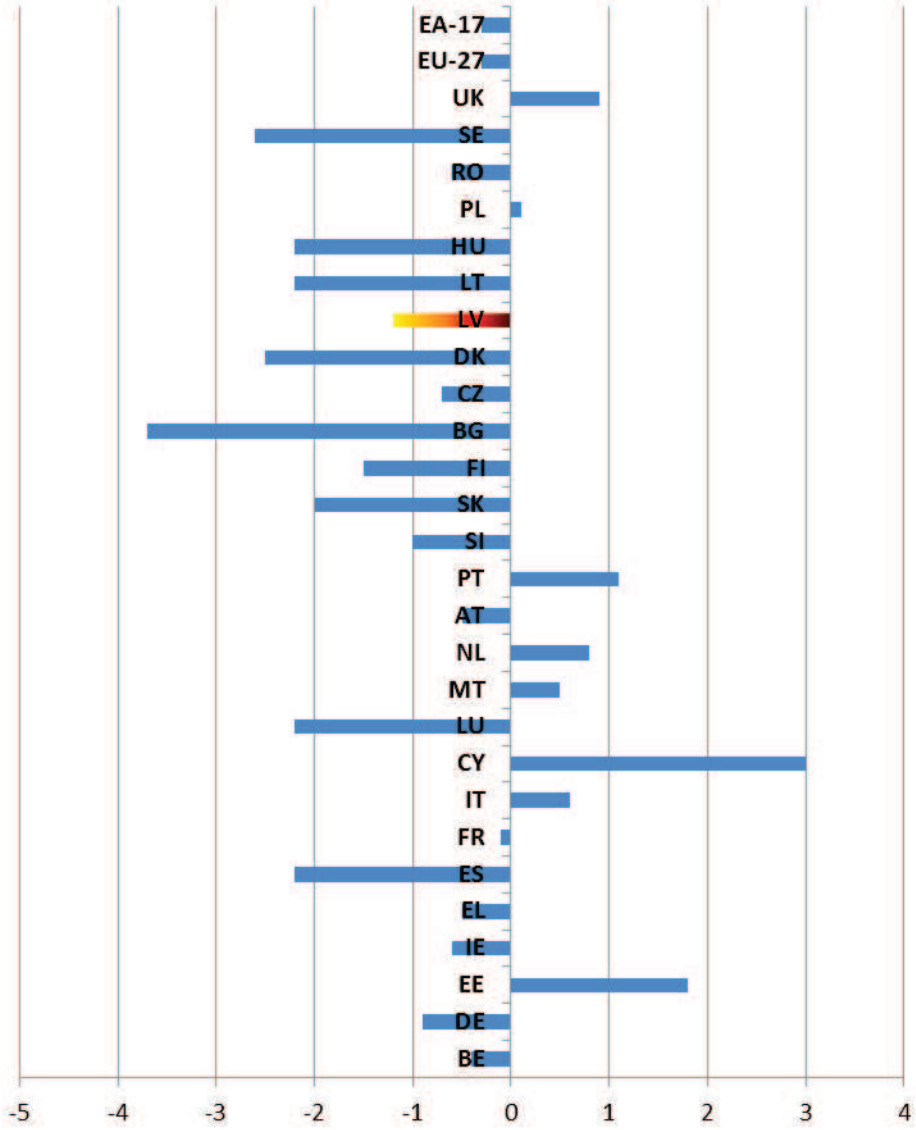
As regards the measures aimed at balancing the government budget and reducing the effects of the crisis on businesses, the majority of these measures targeted reductions in labour taxes, especially, reductions in personal income tax rates or increases in the tax base.

Many Member States, as the main measure, reduced their enterprise income tax, i.e. reduced the tax rate or the tax base (Table 1).

In the period 2008-2011, a series of measures were taken for balancing Latvia's national government budget: state administration costs were significantly reduced, salaries in the public sector were cut by 10-30%, expenditures on government procurement were decreased, and other unpopular measures were taken. As a result, domestic consumption and the population's purchasing power considerably declined. To offset the decrease in budget revenues, several tax rates were raised. On 1 January 2009, the standard VAT rate was raised by 3 percentage points (from 18% to 21%), but in 2011, the standard VAT rate was raised to 22%; at the same time, the reduced VAT rate was raised by 2 percentage points (from 10% to 12%).

These rates negatively affected the competitiveness of Latvia's goods in the local market and decreased the population's purchasing power even more. On 1 July 2011, the excise tax on natural gas was also raised. The rights of local government on setting immovable property tax rates were extended, as this tax was 100% collected by local governments.

The measures aimed at raising the tax burden caused a decrease in business activity. The analysis of tax revenues as a percentage of GDP in 2011 compared



Source: author's construction based on European Commission (2011) Taxation ...

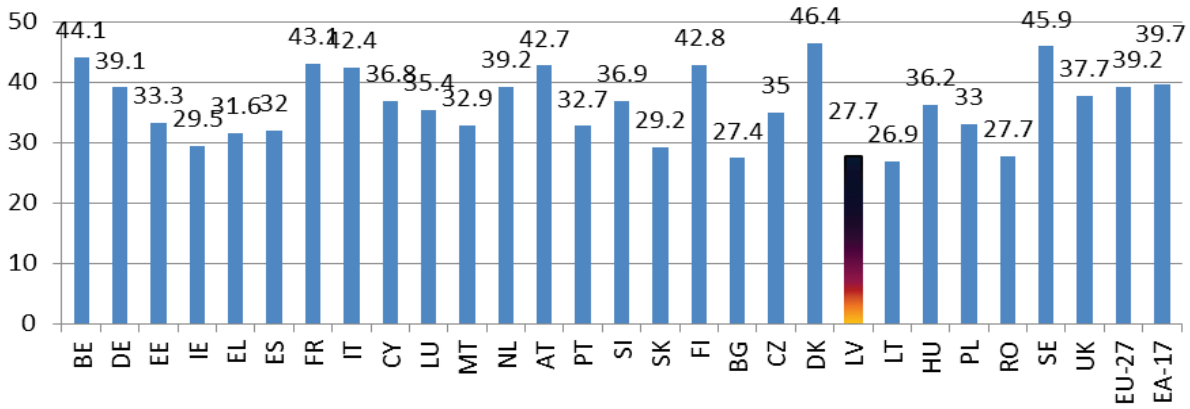
Fig.1. **Changes in tax revenues as a percentage of GDP in 2011 compared with the average of ten years (2000-2009)**

with the average of ten years (2000-2009) showed that in Latvia, like in the EU-27 and in East European countries EA-17, the tax burden was slightly lower – by approximately 1% in Latvia, 0.4% in the EU-27 and EA-17 (Figure 1). The average tax burden in the EU-27 accounted for 39.2% of GDP, while in Latvia it was 27.7% of GDP (Figure 2).

Although Latvia's total tax revenue as a percentage of GDP was one of the lowest in the EU, yet, its effect on the business environment was negative, as the proportion of labour taxes in the total tax revenue was too high (50.8% in 2011), and, given the large social contributions to be paid by employers, it significantly hindered Latvia's economic development and caused an increase in the grey economy. Being aware of the seriousness of the problem, Latvia's government took a series of measures aimed at reducing the grey economy. The "Plan of Measures to Combat the Grey Economy and Promote Fair Competition 2010-2013" is being implemented in Latvia. The Plan includes 66 various measures, based on the priorities set in the Euro Plus Pact for combating grey economies. The most important emphasis is placed on establishing a more effective tax system:

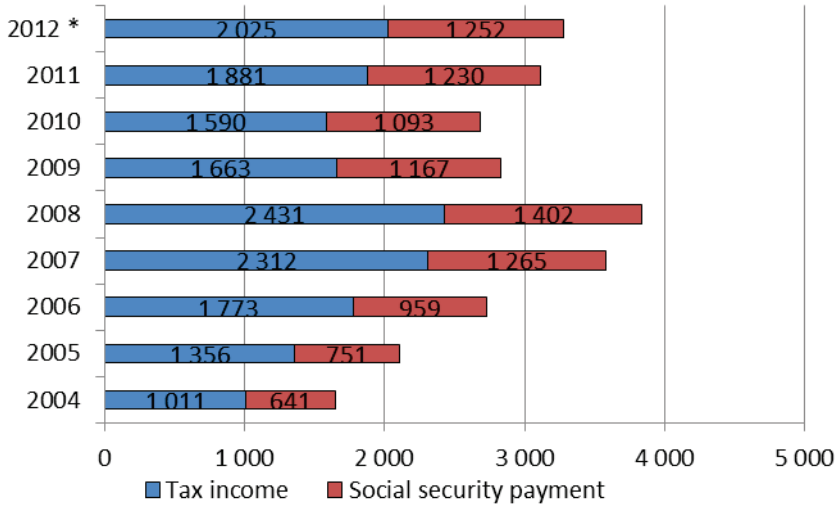
- tax burden has to be transferred to areas where the risk of tax evasion is lower (from labour taxes to property and consumption);
- reduction of the number of tax relief and exemptions;
- changes in the procedure of paying taxes (for instance, reverse VAT for scrap metals, the procedure of paying the personal income tax on prizes);
- cancellation of several unreasonable requirements (for instance, a reduction of the tax rate on interactive games).

The Plan also includes support for businessmen who faced problems during the crisis: for instance, the



Source: European Commission (2011) Taxation Trends in the European Union …

Fig.2. **Tax revenues as a percentage of GDP in the EU Member States in 2011**



Source: author's construction based on Treasury, 2012; * forecast;

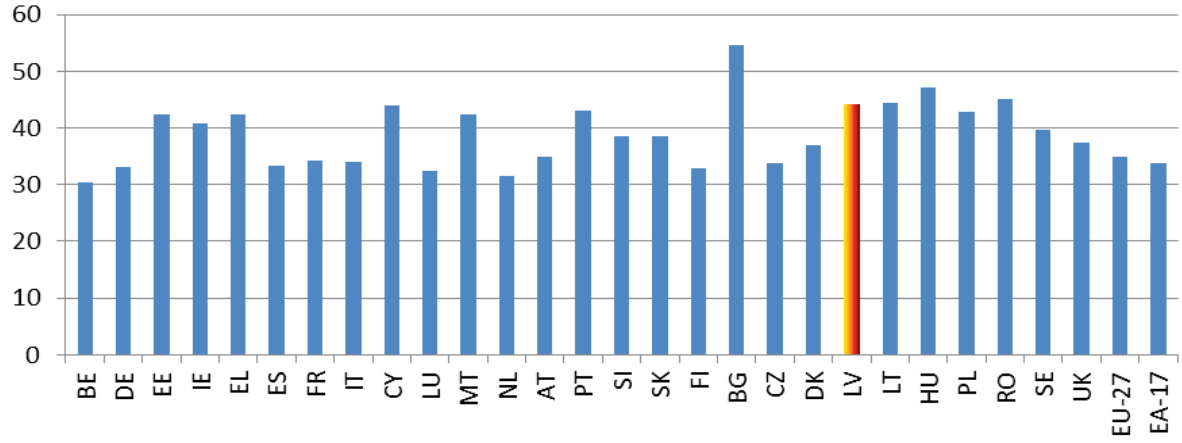
Fig.3. **Changes in tax revenues in Latvia in 2004-2012, mln LVL**

measure "Tax Amnesty" is an extraordinary activity to write off fines and delay penalties to those businessmen that have paid the principal amount of tax debt until a certain day; the measure "Income Legalisation" enables persons who evaded taxes to cover the loss caused to the government in relation to tax evasion, but at the same time such persons are released from legal responsibility as well as funds acquired in unregistered economic activity were legalised, thus facilitating the transition to the legal economy; the measure "Initial Declaration" is the initial declaration of one's material status, which states that any property is considered as acquired illegally, if it is acquired after submitting the initial declaration and if it is not possible to prove its origin.

In addition to the mentioned plan for combating the grey economy and providing fair competition, the "Plan of Measures to Reduce Unregistered Employment 2010-2013", the "Action Plan to Combat Illegal Trade and Smuggling", and the "Tax Collection Strategy of the State Revenue Service 2010-2013" were elaborated and implemented. In the period after the tax amnesty, the intensity of audits was increased and the tax collection process was intensified as well as the procedure of liquidation of enterprises was simplified. To implement these measures effectively, at the same time, the capacity of control institutions had to be increased by granting them additional rights, providing them access to additional information, optimising their functions and operational tasks as well as allocating additional resources to these institutions. Already in 2011, in the result of implementing the complex of these measures, additional revenue of LVL 60 million was collected. In 2011, the proportion of grey economy in Latvia was 30.2%, which was 7.9 percentage points less than in 2010 when the proportion of grey economy in the national economy reached 38.1% (Putnins T., Sauka A., 2012).

Changes in tax revenues in Latvia in the period 2004-2012 are presented in Figure 3.

The most significant risks for the stability of Latvia's economy and the collection of tax revenues are associated with events in the eurozone, changes in prices of commodities in the world market, and economic growth in



Source: European Commission (2011) Taxation Trends in the European Union in 2011

Fig.4. **Proportion of direct taxes in the total revenue in the EU, %**

other largest world economies. To determine the positive or negative effect of taxes on business development, it is necessary to make a comparative analysis of trends in the collection of direct taxes, paying special attention to trends in the collection of enterprise income tax (EIT).

In Latvia, the flat EIT rate of 15% is relatively low, compared with other EU Member States, while in the EU, EIT rates range from 12.5% to 33.9%. According to I.Vitola (Vitola I., Leibus I., Joma D., Jakusonoka I., 2012), the major EIT payers in Latvia are small and medium enterprises, and the conditions of applying the EIT are the same for both large and small income enterprises, which is not socially fair. In many EU Member States, the progressiveness of enterprise income tax is based on support introduced for small and medium companies (in Belgium, France, Great Britain, Luxembourg, Lithuania etc.).

In such EU Member States as Italy, France, and others, different EIT rates are applied depending on a region in which a company operates. In the case of Latvia, on 1 September 2010 the micro-enterprise tax was introduced, the rate of which was 9% of annual turnover. It was an effective fiscal instrument to support small businesses during the crisis, especially in countries with high labour costs. This tax comprises all the taxes to be paid to the government on the condition that the turnover is less than LVL 70000 (EUR 99600), the number of employees is less than five, and the income of employees does not exceed LVL 500 (EUR 711) a month.

The author agrees with an opinion expressed by I.Leibus (Vitola I., Leibus I., Joma D., Jakusonoka I., 2012) – in order to ensure that the criteria set for micro-enterprises in Latvia do not limit the possibilities for increasing the turnover of a micro-enterprise, the number of its employees, and its income, it is necessary to elaborate one-year transitional provisions that would enable micro-enterprises to expand their business without raising their tax burden.

The proportion of direct tax revenues in the total revenue in the EU-27 is shown in Figure 5. In Latvia, labour taxes contribute to the largest proportion of tax revenues, although a reduction of the proportion of these taxes in the total revenue was implemented over the recent years – from 52% in 2009 to 50.8% in 2011. Labour taxes in Latvia, to a greater extent, reduce the real income level particularly for population groups with the lowest income, as incomes exempt from the PIT are very low. For example, persons living and working in Belgium and earning EUR 7000 (after paying social contributions) pay no income tax, whereas in Latvia a PIT of EUR 1680 has to be paid (Troch R., 2013).

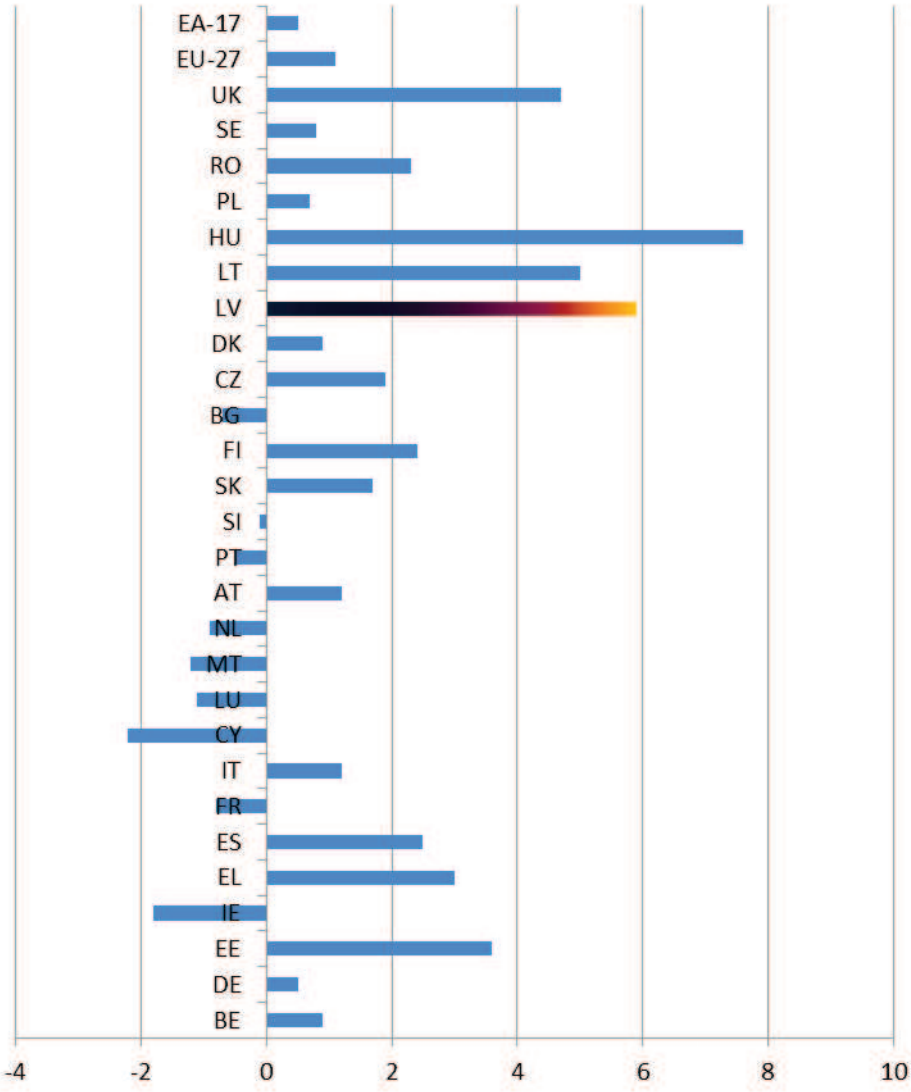
Along with the reduction of labour taxes, the overall tax system environment, its simplicity, predictability, and administration are not less important issues. According to the annual World Bank and Price Waterhouse Cooper study "Paying Taxes", three indicators are used to evaluate the ease of paying taxes: number of payments, time to be spent on complying with all tax laws and regulations, and costs – the total tax rate. In 2012, among all the countries included in the study, Latvia was ranked, based on these indicators, 11th, 128th, and 86th, respectively.

In 2013 in Latvia, a company has to make 7 payments to pay all the taxes, 8 in Estonia, and 11 in Lithuania; the calculation and paying of taxes take 264 hours a year in Latvia, 85 in Estonia, and 175 in Lithuania; the total tax rate in Latvia is 36.6%, 67.3% in Estonia, and 43.7% in Lithuania (Paying taxes, 2013).

As regards the ease of paying taxes in 2012, in the PwC rating, Latvia was ranked 62nd, Estonia 47th, and Lithuania 57th (Paying Taxes, 2012), whereas in 2013, Latvia's rating has considerably improved and Latvia was ranked 52nd, Estonia 50th, and Lithuania 60th (Paying taxes, 2013).

In the period 2008-2012 in Latvia, in total, there were taken fiscal consolidation measures with a fiscal effect of 17% of GDP, of which 6.8% of GDP were composed of measures on the revenue side, while measures on the expenditure side accounted for 10.2% of GDP. In the period 2008-2012, on average per year, Latvia took fiscal consolidation measures accounting for 3.4% of GDP (Convergence Programme 2012-2015).

On 7 September 2011, the Ministry of Finance together with cooperation partners of the government: the Latvian Confederation of Employers, the Latvian Chamber of Commerce and Industry, the Farmers' Parliament, and the Latvian Association of Commercial Banks signed the



Source: author's construction based on European Commission (2011) Taxation …

Fig.5. **Changes in the proportion of direct taxes in the total tax revenue, percentage points (2001/2008)**

Table 2

Tax revenues in the national budget (ESA code S.13) and the tax burden in 2012-2015, mln LVL

Type of taxes and ESA code		2012	2013	2014	2015	2015/2012 +/-
		Forecast				
1.Taxes on production and imports	D.2	1 731.5	1 810.3	1 888.8	1 967.9	+236.4
2. Current taxes on income and property	D.5	1 109.0	1 160.3	1 213.1	1 268.4	+159.4
3. Taxes on capital	D.91	1.7	1.7	1.8	1.8	+0.1
4. Social contributions	D.61	1 292.2	1 243.1	1 256.6	1 318.6	+26.4
of which real social contributions	*D.611*	1 272.2	1 223.1	1 236.6	1 298.6	+26.4
Total tax revenue		4134.4	4215.4	4360.3	4556.7	+422.3
Tax burden, % of GDP		**28.3**	**27.3**	**26.7**	**26.3**	**- 2.0**

Source: author's calculations based on the data of Latvia's Convergence Programme 2012-2015

Tax Policy Strategy 2011-2014. The tax strategy was elaborated, taking into account the need to ensure the stability and predictability of its tax policy and to increase the competitiveness of Latvia's national economy as well as Latvia's intension to introduce the euro in 2014.

Latvia's fiscal policy for 2013-2015 is determined by several factors: a course towards a balanced government budget over the economic cycle, observance of the fiscal policy terms set by the Stability and Growth Pact (SGP), and economic growth measures to be implemented in the post-crisis period. The most significant measures affecting tax revenues in the period 2013-2015 will be: the reduction in the personal income tax rate from the present rate of 24% (in 2013) to 22% in 2014 and to 20% in 2015. According to Latvia's Convergence Programme 2012-2015, it is envisaged to reduce the tax burden to 26.3% of GDP in 2015 (Table 2).

To prevent from returning to a pro-cyclical policy and fiscal indiscipline, which contributed to the economic crisis, as well as to maintain fiscal sustainability in a medium-term, i.e. to develop a balanced general government budget for a medium-term, Latvia started working on introduction of the provisions of the Fiscal Discipline Law (FDL) that clearly states the following: the principle of counter-cyclical fiscal policy, fiscal balance as an instrument of counter-cyclical fiscal policy, transitional conditions for public debt, including compliance with the terms of the SGP, and requirements for monitoring and informing to ensure that fiscal rules are observed.

The Fiscal Discipline Law stipulates the framework for a multi-year budget and sets an expenditure ceiling of 2+1 years – every year it shifts one year ahead. Latvia has all the possibilities for making a fiscal policy that results in persistent and gradual reductions in its budget deficit, leading to a balanced government budget. The economic growth indicators of 2012 allow Latvia to design an optimistic development scenario, in which the nominal budget deficit in the period 2013-2015 is set at 1.4%, 0.8%, and 0.3%, respectively, of GDP (Informativais…, 2012). The enhancements in the tax policy have to be oriented towards improving Latvia's demographic situation, systematically and purposefully attracting foreign investments, and faster transferring the tax burden from labour to consumption.

Conclusions, proposals, recommendations

1. Although Latvia's total tax revenue as a percentage of GDP is one of the lowest in the EU, yet, it has a negative effect on the business environment, as the proportion of labour taxes in the total tax revenue is too high (50.8% in 2011), and, given the large social contributions to be made by employers, it significantly hinders Latvia's economic development and causes an increase in the grey economy as well as to a much greater extent reduces the real income level, particularly for population groups with the lowest income.
2. To prevent from returning to a pro-cyclical policy and fiscal indiscipline, which contributed to the economic crisis, as well as to maintain fiscal sustainability in a medium-term, i.e. to develop a balanced general government budget for a medium-term, Latvia started working on introduction of the provisions of the Fiscal Discipline Law (FDL) as well as implemented a series of measures oriented towards reducing the grey economy.
3. The enhancements in the tax policy have to be oriented towards improving Latvia's demographic situation, systematically and purposefully attracting foreign investments, and faster transferring the tax burden from labour to consumption.

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