ISSN 1644-0757

ACTA SCIENTIARUM POLONORUM

Oeconomia

10 (2) 2011

Konkurs
o nagrodę Rektorów Polskich Uczelni Rolniczych
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COMPETITION FOR SPACE BETWEEN CEREALS AND OIL CROPS IN TERMS OF ITS WORLDWIDE DYNAMICS

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Abstract. Cereals and oil crops are primary crops worldwide both in terms of their production and cropped area. Production of these two groups in the last four decades has been developing dynamically and – as it is indicated by forecasts – will continue to do so in the future. Development of cereal and oil crop production results from the constantly growing food demand for processing products of both these types of crops, as well as the non-food demand, developing significantly in recent years. Plant production may be increased through an increase in yields or in cropped area, or at the simultaneous effect of both these factors. The constantly growing demand for cereal and oil products and the limited land resources may cause competition for space between these two groups of crops. The aim of this study was to conduct investigations in order to verify whether such competition actually takes place.

Key words: cereals, oil crops, production, competition for space

INTRODUCTION

Cereals and oil crops are major product groups in agriculture. At present the biggest cropped area is that of cereals and oil crops. In 2007 it was 700 million hectares for cereals and 250 million hectares for oil crops. As it was reported by Klepacki [2007], in the contemporary world we have a cereal civilisation, since a vast majority of energy and protein used to sustain the world population comes from cereal grain. In turn, oil crops

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are a group of plants, which economic role has increased considerably and will continue to do so in the future. In the past seeds of oil crops were treated mainly as raw material for the production of edible or technical oils. In the course of the last 40 years they have become a major source of fodder protein, for which we may observe a considerable and increasing demand. Another dynamically developing direction of production is the use of cereals and oil crop materials for energy purposes. The situation in the markets of cereals and oil crops has a significant effect on the other sectors of agriculture and food economy. Changes in the production of cereals and oil crops results in consequences affecting both food and feed markets, and thus – also markets of meat and dairy products [Sznajder 1997; Żmija 1996; Stańko 2002]. Taking into consideration the above, it may be assumed that in view of the increasing demand for cereal and oil crop materials, production of both these groups of crops will be increasing.

Plant production may be increased through an increase in yields or in cropped area, or at the simultaneous effect of both these factors. An increase in yields is determined by a set of external factors, among which a decisive role is attributed to biological progress [Hayami and Ruttan 1985; Wilkin 1986]. In turn, an increase in cropped area is connected with the problem of limited land resources and the relatively low elasticity of this production factor. Thus it may be expected that a simultaneous increase in cropped area for both the above mentioned groups of crops might be connected with competition for space. However, a question may arise whether globally competitiveness in the past referred to thee competition for cultivated area between cereals and oil crops, or rather production of both these crops was increased at the expense of other crops. Thus the aim of this study was to present changes in world economy depending on the area cropped to cereals and oil crops, and to make an attempt at their economic justification.

Investigations were conducted in relation to the situation worldwide and covered the period of 1961–2007. The starting point for the analyses comprised statistical data published annually by FAOSTAT. Their results may lead to further analyses describing this problem in relation to the regional situation.

DEVELOPMENT OF CEREAL AND OIL CROP PRODUCTION

An introduction to the considerations concerning trends in changes, depending on the area cropped to cereals and oil crops, comprises the characteristic of the development of production for both analysed groups of crops. Figure 1 presents evaluations of parameters of linear and exponential trends describing cropped area, yields and total harvested crops of cereals[1]. Properties of these models made it possible to characterise the development of a given phenomenon in absolute and relative values [Pietraszewski et al. 1989].

In the years 1961–2007 production of cereals increased from 877 million ton to 2342 million ton. Production of these crops increased mainly thanks to an increase in yields, which in the analysed period increased from 13.5 dt/ha to 33.5 dt/ha. In terms of

[1] The group of cereal crops include maize, wheat, rice, barley, rye, sorghum, millet, buckwheat and mixtures of grain crops.

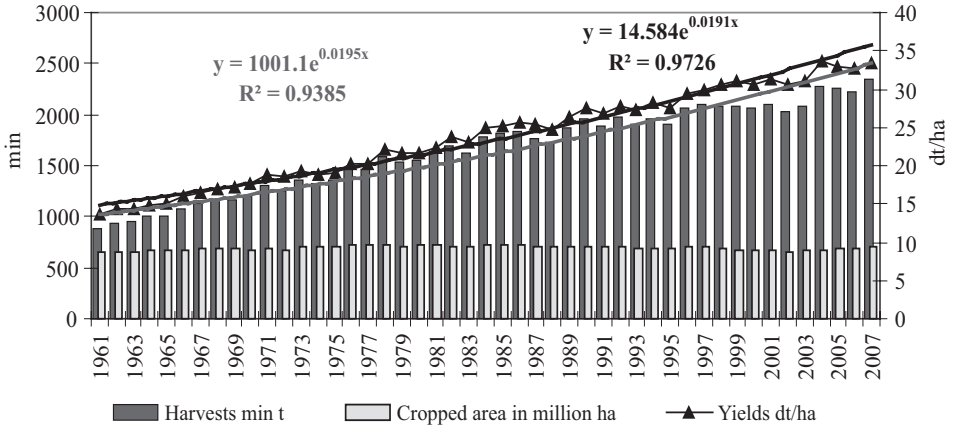

Fig. 1 Harvests, cropped area and yields of cereals worldwide in the years 1961–2007
Rys. 1. Zbiory, powierzchnia uprawy i plon roślin zbożowych w świecie w latach 1961–2007

Source: Own study based on FAOSTAT 2009.
Źródło: Opracowanie własne na podstawie FAOSTAT 2009.

cropped area in the analysed period we may distinguish three periods in the development of cropped area. In the first period, covering the years 1961–1981, we may observe an upward trend in the area cropped to cereals from 648 million ha to 726 million ha. The years 1982–2002 were connected with a downward trend in the area cropped to cereals, to 661 million ha in 2002. The next years were related with a repeated increase in the area of cereals to 700 million ha in 2007.

Development trends presented in Figure 1, concerning harvests, cropped area and yields of cereals, were described using a linear and an exponential function. Evaluations of parameters of these functions (b_0 and b_1), together with their standard deviations (s_0 and s_1) as well as their goodness of fit, measured by the coefficient of determination (R^2) were listed in Table 1. As it could have been expected, due to fluctuations in the area cropped to cereals both models showed a very low degree of fit. In turn, on the basis of evaluations of estimated parameters concerning the volume of production, we may say that harvests grew on average by 30 million ton annually (in Table 1 the value of 30.108), which amounts to an almost 2% mean annual increase (in Table 1 the value of 1.966). A decisive effect on the increase in the volume of production in case of cereals was also found for the increase in yields. This is also indicated by the fact that in the analysed period yields of cereals went up on average by 43.6 kg/ha annually, which in relative numbers amounted to mean annual increase of 1.9%.

An analogous analysis was conducted for oil crops. Figure 2 presents fluctuations in total cropped area, yields and harvests for oil crops[2]. Yields of crops and production,

[2] Statistics of FAO distinguish over 20 plant species, from which edible oils are produced. These include soybean, peanuts, coconut palm, oil palm, from which palm oil is produced and oil from palm seeds, olive tree, shea butter tree, castor oil plant, sunflower, rape, tung oil tree, jojoba, safflower, sesame, mustard, poppy, melon, Chinese tallow-tree, from which two oils are obtained, i.e. Chinese vegetable tallow oil and stillingia oil kapok, cotton, flax, hemp, etc.

Table 1. Evaluations of parameters of linear and exponential trends describing cropped area, harvests and yields of cereals worldwide in the years 1961–2007
Tabela 1. Oceny parametrów trendu liniowego i wykładniczego, opisujące powierzchnię, zbiory i plony roślin zbożowych w świecie w latach 1961–2007

Values	b_0	s_0	b_1	s_1	R^2	Growth rate
Linear function						absolute
Area in million ha	687.161	5.740	0.233	0.215	0.025	
Harvests in million t	961.934	20.199	30.108	0.756	0.972	30.108
Yields in dt/ha	13.836	0.171	0.436	0.006	0.990	0.436
Exponential function						relative
Area in million ha	685.684	5.894	1.000	1.000	0.027	
Harvests in million t	1020.833	20.502	1.020	1.001	0.939	1.966
Yields in dt/ha	14.899	1.013	1.019	1.000	0.973	1.930

$S(b_0)$, $S(b_1)$ – mean errors of estimates of structural parameters

Source: Own study based on FAOSTAT 2009.
Źródło: Opracowanie własne na podstawie FAOSTAT 2009.

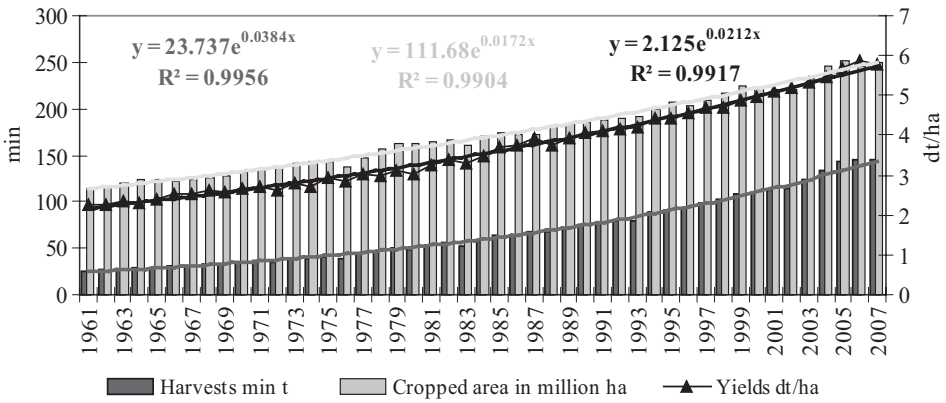

Fig. 2. Harvests, cropped area and yields of oil crops worldwide in the years 1961–2007
Rys. 2. Zbiory, powierzchnia uprawy i plon roślin oleistych w świecie w latach 1961–2007

Source: Own study based on FAOSTAT 2009.
Źródło: Opracowanie własne na podstawie FAOSTAT 2009.

due to the differences in oil contents in raw materials and unit yields per 1 ha, were expressed in oil equivalents[3]. Similarly as in case of cereals, estimations were also performed for models of growth trends, characterising both changes in the volume of production for oil crops as well as their yields and cropped area. Results of linear and exponential estimations are presented in Table 2. Evaluations of estimated parameters

[3] Physical yields of oil raw materials were converted into yields of oil.

Table 2. Evaluations of parameters of linear and exponential trends describing cropped area, harvests and yields of oil crops worldwide in the years 1961–2007

Tabela 2. Oceny parametrów trendu liniowego i wykładniczego, opisujące powierzchnię, zbiory i plony roślin oleistych w świecie w latach 1961–2007

Values	b_0	s_0	b_1	s_1	R^2	Growth rate
Linear function						absolute
Area in million ha	105.364	1.865	2.957	0.070	0.976	2.957
Harvests in million t	10.250	2.716	2.521	0.102	0.932	2.521
Yields in dt/ha	1.897	0.057	0.078	0.002	0.967	0.078
Exponential function						relative
Area in million ha	113.615	1.007	1.017	<E-03	0.990	1.733
Harvests in million t	24.666	1.010	1.039	<E-03	0.996	3.913
Yields in dt/ha	2.171	1.008	1.021	<E-03	0.992	2.143

$S(b_0)$, $S(b_1)$ – mean errors of estimates of structural parameters

Source: Own study based on FAOSTAT 2009.
Źródło: Opracowanie własne na podstawie FAOSTAT 2009.

and the value of coefficients of determination indicate very good fit of these functions to empirical data.

In the years 1961–2007 production of oil crops, expressed in oil equivalents, increased from 25.7 million ton to 144.8 million ton. With each successive year harvests of oil crops increased on average by 2.5 million ton (in Table 2 the value of 2.521), while in relative figures this increase amounted to 3.9% (in Table 2 the value of 3.913). An increase in production occurred at the simultaneous increase in cropped area, from 113.6 million ha to 250.6 million ha, as well as yields from a unit area, from 2.3 dt/ha to 5.8 dt/ha (Figure 2). Each year yields of oil crops increased on average by 7.8 kg, which amounts to 2.1%. In turn, cropped area of these plants increased each year by almost 3 million ha, which in relative figures amounted to 1.7%.

Based on the information presented in Figs. 1 and 2 as well as Tables 1 and 2 it may thus be observed that in the years 1961–2007 production of cereals increased by 270% (on average by 1.97% a year), while production of oil crops expressed in oil equivalents increased by 563% (on average by 3.9% a year). The relative increase in the production of oil crops was thus more than two-fold than that for the production of cereals.

Conducted analyses indicate that in case of cereals in the investigated period an increase in the level of production was obtained mainly thanks to improved production efficiency for these crops. An almost 250% increase in yields (on average 1.930% year by year) resulted in a 270% increase in production. The other 20% of an increase in harvested crops may be attributed to an increase in cropped area or the positive effects of interactions of both above mentioned factors. In turn, for oil crops the level of harvests was considerably affected both by cropped area and yields. The mean annual growth rate for the production of oil crops, amounting to 3.91%, was accompanied by an increase in yields amounting to 2.14% and an increase in cropped area, which for these plants was 1.73%.

COMPETITION FOR SPACE

As it was shown in the previous part, in the years 1961–2007 an increase was observed both for the production of cereals and oil crops. In both cases this increase was obviously affected by biological as well as agrotechnical progress, which was reflected in the dynamic increase in yields of both groups of crops. However, it needs to be observed here that for oil crops an increase in production was also accompanied by an increase in cropped area. In case of cereals fluctuations were observed in cropped area. In the investigated period the mean area of 692.5 million ha was used for the production of cereals. This value in individual years deviated from the mean by 20 million ha. In turn, for area cropped to oil crops a regular upward trend could be seen, from 113.5 million ha in 1961 to 205.6 million ha in 2007. Thus a question may arise whether the area cropped to oil crops may be treated as competitive to changes in the area cropped to cereals. Or maybe changes in cropped areas for both analysed groups of crops were complementary in character, i.e. areas cropped to cereals and oil crops increased at the expense of other crops.

In order to answer the above questions, from the aggregate of cereals a rice was removed, and in the aggregate of an oil plants exclusively annual plants have been left. Described in this way analysis referred to plants being characterized by a similar production technology in case of which the competition for space was theoretically and practically possible.

To analysis of competition for space two models of functions were applied, i.e. linear and power functions. The strength and direction of the relationship between the area cropped to cereals and that of oil crops were investigated using the least square method. However, due to the above mentioned fluctuations in farmland area involved in the production of cereals the segment model was used [see e.g. Nowak. 1986 and 2004; Jurek and Guzik 1989]. First of all parameters of both models were estimated in relation to the dependence between total area cropped to cereals (the explained variable $\boldsymbol{y}$) and oil crops (the explanatory variable $\boldsymbol{x}$). The dependence based on the linear function is presented in Figure 3. Apart from the standard evaluation of fit for the entire model and evaluations of estimated parameters, intuitive turning points were also additionally verified based on the Fisher-Senedecor F-statistics [Jurek and Guzik 1999]. Results of estimations for linear and power models, together with the theoretically determined values of intuitive turning points (x_z, y_z), are presented in Table 3. Properties of power models made it possible to characterise the development of a given phenomenon in relative values. Evaluation of parameter b_1 determines a relative increment in the explained variable per 1% change in the value of the explanatory variable [Pietraszewski et al. 1989].

The application of the segment model, both with the linear and power segments, made it possible to indicate two turning points in the dependence between area cropped to oil crops and that of cereals, one in 1976 and the other in 2002. However, these dates may not be treated as too definite, since testing of marginal turning points also brought positive results and the final selection of turning points was determined by testing results concerning their significance [Jurek 1989].

In the years 1961–1976 cultivation area increased both for cereals and oil crops. That increase by 1 million ha for oil crops was accompanied by an increase for cereals by 1.1 million ha (in Table 3 the value of 1.118). In relative values a 1% increase in area

Table 3. Evaluations of parameters of linear and power models describing the dependence between area cropped to cereals (y) and that of oil crops (x) in the years 1961–2007

Tabela 3. Oceny parametrów modeli liniowych i potęgowych opisujących zależność między powierzchnią upraw zbóż (y) a powierzchnią upraw roślin oleistych (x) w latach 1961––2007

	Linear model				Power model			
	x_z	y_z	b_1 [s_1]	R^2	x_z	y_z	b_1 [s_1]	R^2
1961–1976	101.062	531.575	1.118 [0.201]	0.705	101.062	531.093	0.234 [0.042]	0.705
1977–2001	138.255	573.172	–0,906 [0.079]	0.847	139.170	572.316	–0.257 [0.025]	0.810
2002–2007	199.415	517.759	0,655 [0.201]	0.726	202.295	519.832	0.254 [0.077]	0.731

Source: Own study based on FAOSTAT 2009.
Źródło: Opracowanie własne na podstawie FAOSTAT 2009.

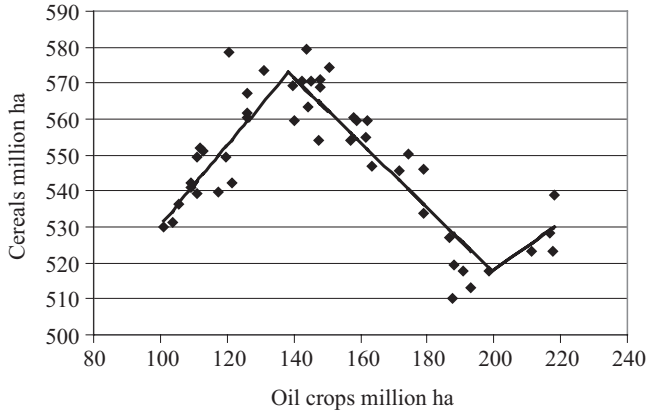

Fig. 3. Dependence between area cropped to oil crops and that of cereals worldwide in the years 1961–2007

Rys. 3. Zależność pomiędzy powierzchnią upraw oleistych a powierzchnią upraw zbóż w świecie w latach 1961–2007

Source: Own study based on FAOSTAT 2009.
Źródło: Opracowanie własne na podstawie FAOSTAT 2009.

cropped to oil crops was accompanied by a 0.2% increase (in Table 3 the value of 0.234) in cultivation of cereals. Thus in the years 1961–1976 we may talk of complementarity of cultivation for both groups of crops.

The situation changed around 1976, when the area cropped to oil crops was almost 138 million ha, while that for cereals was approx. 573 million ha (values for the theoretically determined turning point). From that time until approx. 2002 an increase in the area of oil crops was accompanied by a reduction in the area cropped to cereals. With an increase in the area of oil crops by 1 million ha the area cropped to cereals was reduced by 0.9 million ha (in Table 3 the value of 0.906). In relative values a 1% increase in the area of oil crops was accompanied by a 0.3% (in Table 3 the value of 0.257) reduction of area cropped to cereals. Such a situation remained until the area of oil crops reached approx. 199 million ha and that of cereals almost 518 million ha.

In the last years of the analysed period the area cropped to both groups of crops was increasing. On average an increase in the area of oil crops by 1 million ha was accompanied by an almost 0.7 increase (the value of 0.655 in Table 3) in the area cropped to cereals. In turn, the value of parameter b_1 estimated based on the power model indicates that the rate of changes in the area of oil crops was almost 4 times bigger than changes in the area of cereals (the value of 0.254).

AN ATTEMPT AT AN ECONOMIC JUSTIFICATION

Analysis of relationships between the area cropped to cereals and that of oil crops resulted in the identification of three periods, i.e. 1961–1976, 1977–2002 and 2002–2007, of which the first and the last turned out to be periods of area complementarity for both analysed groups of crops, while in the years 1977–2002 we may talk of competition between these two groups of crops for cultivated area. This situation is influenced by several economic phenomena. For the sake of clarity of the line of reasoning, this study was limited to the presentation of the relationship of the existing situation with the following elements: technical change in agriculture, changes in prices and related changed in the structure of foreign trade in these products and changes in area of utilization of cereals.

1. Technical change: yields

An improved level of yields is directly related with progress in science and technology. Intensity of conducted research and as a consequence the rate of introduced changes, are dependent on many external factors. Figure 4 presents relative changes in yielding for both groups of crops throughout the entire investigated period. As it may have been expected, yields of both groups of crops were growing; however, the rate of these changes varied in individual years.

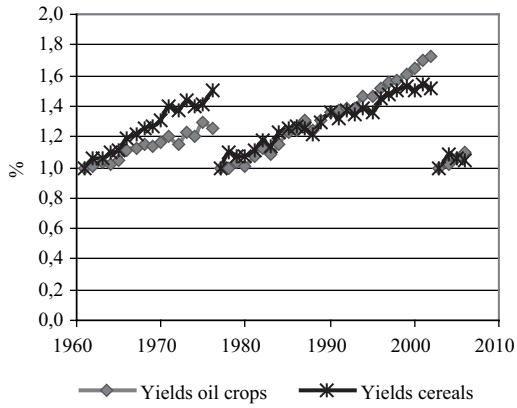

Fig. 4. Dynamics of changes in yielding of cereals and oil crops in analysed periods
Rys. 4. Dynamika zmian plonowania roślin zbożowych oleistych w analizowanych okresach

Source: Own study based on FAOSTAT 2009.
Źródło: Opracowanie własne na podstawie FAOSTAT 2009.

In order to emphasize trends in changes of yielding, Table 4 presents results of estimation based on the exponential function in reference to the period distinguished in the previous chapter. Values of estimated parameters b1 are determined by the mean rate of changes in yielding in the groups of crops per 1 year of the analysed period [Jurek and Guzik 1989]. In the years 1961–1976 yielding of cereals improved by 50%, from 13.5 dt/ha to 20.3 dt/ha, i.e. on average by 2.6% annually (in the Table the value of 0.0264). In turn, yields of oil crops increased by 25%, from 2.3 dt/ha to 2.8 dt/ha, i.e. on average by 1.7% annually. In turn, in the second and third period the growth rate for the increase in yielding of oil crops was already higher in comparison to that of cereals, amounting for oil crops to 2.3% and 2.4%, respectively, as well as 1.7% and 1.6% for cereals.

Table 4. Evaluations of parameters of exponential models describing changes in yielding of cereals and oil crops in the years 1961–2007
Tabela 4. Oceny parametrów modeli wykładniczych opisujących zmiany w plonowaniu roślin zbożowych i oleistych w latach 1961–2007

Analysed periods	cereals		oil crops	
	b_1 [s_1]	R^2	b_1 [s_1]	R^2
1961–1976	0.0264 [0.0015]	0.9584	0.0168 [0.0013]	0.9254
1977–2001	0.0169 [0.0007]	0.9600	0.0228 [0.0006]	0.9850
2002–2007	0.0159 [0.0064]	0.6075	0.0237 [0.0035]	0.9212

Source: Own study based on FAOSTAT 2009.
Źródło: Opracowanie własne na podstawie FAOSTAT 2009.

In the entire analysed period the rate of an increase in yielding for cereals was decreasing, while that for oil crops was growing. This situation may be connected with potential improvement of yielding in the discussed groups of crops. In case of cereals, due to the relatively higher level of yields relative increments in yields are more difficult to obtain that in case of oil crops, where the level of yields is relatively lower. However, it needs to be remembered that in the first period yields of cereals were growing faster than those of oil crops. Starting from the second period a faster growth rate was recorded for yielding of oil crops.

2. Changes in prices of oil crops and cereals

Economic decisions connected with the selection of crops are mainly dominated by a broader evaluation of the economic and market situation, which is reflected not only in the level of market prices, but also their changes. Figure 5 presents dynamics of changes in prices for cereals and oil crops in relation to those of 1961. The first period was characterised by the predominance of changes in prices for cereals over those of oil crops. After 1972 dynamics of changes in prices for both groups of crops increased. We may not definitely indicate the group of crops, which prices were growing faster. It may only be stated that prices of oil crops were more stable than those of cereals, which could have been an argument persuading producers to select this type of production and in the end to become the argument for selection an oil plants instead of cereals.

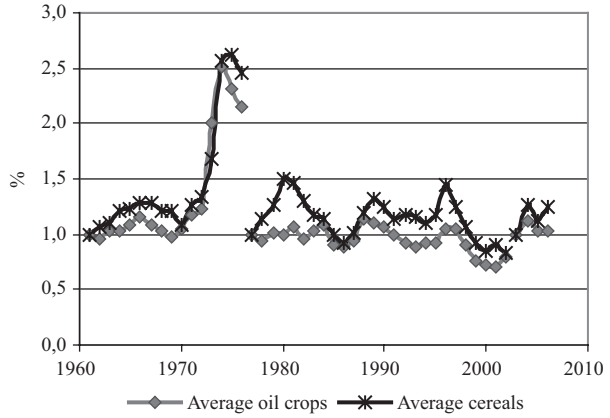

Fig. 5. Dynamics of changes in prices of cereals and oil crops in analysed periods
Rys. 5. Dynamika zmian cen roślin zbożowych i oleistych w analizowanych okresach

Source: Own study based on FAOSTAT 2009.
Źródło: Opracowanie własne na podstawie FAOSTAT 2009.

3. Changes in the structure of importers and exporters of cereals and oil crops

Changes in the competition for space between cereals and oil crops may also be connected with changes in the structure of importers and exporters on the world market of cereals and oil crops, i.e. the development of cultivation of these two types of crops and changes in the level of their demand in individual countries. Main changes on the world markets of cereals and oil crops include increased amounts of exported and imported cereals as well as oil crop materials, and the diversification of the market. In the analysed period we may point to the fact that EU countries since 1976 (that is the year preceding the first turning point) became net cereal exporters instead of net importers. This situation pertains particularly to Great Britain and Germany.

However, the much bigger quantity changes were observed in China, India and Brazil. China in 1961 imported the net amount of almost 12 million ton of cereals, while from the beginning of the 21st century the country has been a net exporter. In the last analysed year net export of that country was 2.5 million ton. Even more marked changes were recorded in India, a country which in 1961 imported a net amount of over 8 million ton of cereals and starting from the beginning of the 21st century net export of that country has been almost 8 million ton. Similar changes, although shifted by several years, were recorded in Brazil. So it is possible to tie the growth of importance of China of India and Brazil in the analysis of competition for space together with the second turning point.

Changes in the direction of competition for space in the last of analysed periods we can also chain with the no-consumer utilisalion of oil crops materials. Due to the potential directions in the utilisation of oil crop materials on the world market of oil crops a constantly growing demand has been observed. The biggest demand is found in the European Union, which has been a net importer of oil crop materials. Among net importers of oil crop materials, next to the EU, an important role is played by Japan and China, which in the last analysed period was characterised by the strongest dynamics of growth in the demand for oil crop materials.

4. Changes in dynamics of utilisation of cereals

Changes in the competition for space between oil crops and cereals was also affected by changes in the directions of utilisation of cereals. Figure 6 presents the dynamics of production and utilisation of cereals for food and fodder purposes in the years 1961–2003. Changes were shown in reference to the first years of the above mentioned periods. In the first year we may observe a bigger dynamics of utilisation of cereals for food purposes, while in the second period utilisation for fodder purposes predominated.

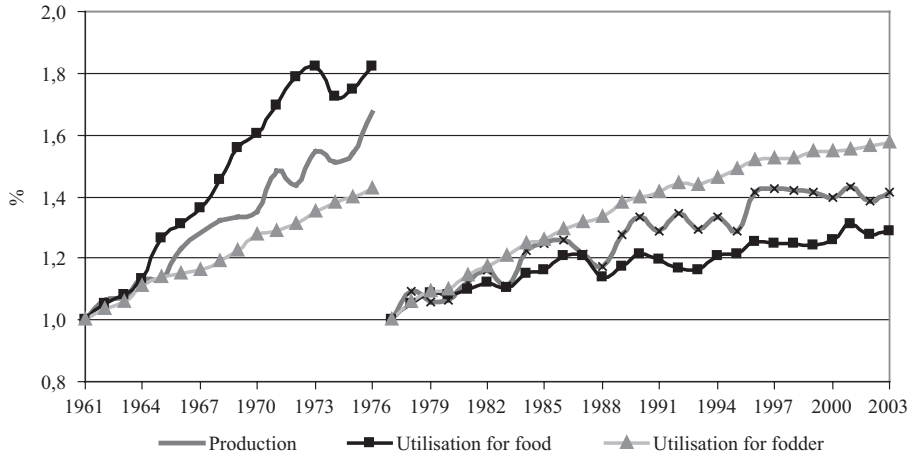

Fig. 6. Dynamics of production of cereals and their utilisation for food and fodder purposes in the years 1961–2003

Rys. 6. Dynamika produkcji zbóż oraz ich wykorzystania na cele spożywcze i paszowe w latach 1961–2003

Source: Own study based on FAOSTAT 2009.

Źródło: Opracowanie własne na podstawie FAOSTAT 2009.

CONCLUDING REMARKS AND CONCLUSIONS

Based on the conducted investigations it may be stated that there is no competition for space between both groups of crops in reference to the entire analysed period. It may only be indicated that such competition was recorded in the years 1976–2002, in which with an increase in the area cropped to these plants by 1 million ha the cultivation of cereals was reduced by 0.9 million ha. In turn, in the years preceding this period and following it a simultaneous increase was reported in the area cropped to both these groups of plants. It was found that in the first period an increase in the cultivation of oil crops by 1 million ha was connected with an increase in the cultivation of cereals by 1.1 million ha. In the last period, which was also considered complementary, an increase in the cultivation of oil crops was accompanied by 0.7 million increase in the area cropped to cereals.

It was attempted to link this situation with the following factors: technical change in agriculture, changes in prices and related changes in the structure of foreign trade, as well as changes in the dynamics of directions in the utilisation of cereals.

An upward trend was observed in the entire analysed period for the area on which oil crops were cultivated. This situation was obviously affected by the constantly growing demand and as a consequence shortages of this raw material on the world market. In turn, changes in the area cropped to cereals may be explained by changes in the dynamics of demand for cereal products. The first years of the analysed period are connected with the strong demand for cereals both for food and fodder purposes, resulting from economic growth in developed countries. After the demand for meat products in these countries had been satisfied, the area cropped to cereals was reduced. It is also of importance that in that period many developing countries (e.g. China, India, Brazil), from being net importers turned into considerable net exporters. Due to a lack of data concerning the utilisation of cereals after 2003 it is difficult to draw conclusions concerning the last analysed period. However, it may be assumed that the third period was connected with a repeated increase in the dynamics of demand for cereals for fodder purposes, caused by the economic development in developing countries, as well as an increase in the demand for cereals for energy purposes.

It was shown in the study that a more dynamic increase in the cultivation of oil crops in comparison to cereals was also connected with differences in the dynamics of increase in yields and fluctuations in prices. A faster increase in yields of oil crops and their smaller fluctuations in prices and as a consequence more reliable yields all contributed to an improvement of the economic standing of their producers. These factors also had an obvious effect on technical change in agriculture in that area.

Complementary periods need to be linked with external factors in the cultivation of both these plant groups. The development in the area cropped to cereals and oil crops in the first period took place mainly at the expense of forested areas. In turn, in the third period the area of cultivation for both these groups of crops was increased at the expense of both forests and other groups of crops, primarily grassland. In the years 2002–2007 the area of arable land increased by approx. 15 million ha, while the area of meadows and pastures decreased by approx. 43 million ha and the forested area by approx. 37 million ha[4].

We need to consider within this study also the effect of actions, which aim is to guarantee food and energy security. Food security was a priority in the economic policy of developed countries. As we may observe on the basis of the European Union and the United States, state interventionism in that area ended in food surpluses in the late 1970's. Food surpluses and the situation on the markets of energy raw materials have contributed to the development of the non-food utilisation of agricultural produce, thus justifying an increased demand for these products.

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KONKURENCJA POWIERZCHNIOWA ZBÓŻ I OLEISTYCH NA ŚWIECIE W UJĘCIU DYNAMICZNYM

Streszczenie. Na światowym rynku podstawową grupę roślin pod względem produkcji, jak i powierzchni upraw stanowią zboża oraz rośliny oleiste. Produkcja tych obu grup w ostatnich czterech dekadach mocno się rozwija i jak pokazują prognozy nadal się będzie rozwijać. Rozwój produkcji zbóż i roślin oleistych jest wynikiem ciągle rosnącego popytu spożywczego na produkty przerobu tych dwóch grup roślin, jak również mocno rozwijającego się w ostatnich latach popytu niespożywczego. Zwiększenie produkcji roślinnej może odbywać się przez wzrost plonów lub zwiększenie powierzchni upraw albo przy jednoczesnym wpływie obu tych czynników. Rozszerzenie powierzchni upraw jest związane z problemem ograniczonych zasobów ziemi. Ciągle rosnący popyt na produkty zbożowe i oleiste oraz ograniczoność zasobów ziemi mogą powodować konkurencję powierzchniową między tymi dwoma grupami roślin. W pracy podjęto badania mające na celu stwierdzić, czy taka konkurencja ma miejsce.

Słowa kluczowe: zboża, oleiste, produkcja, konkurencja powierzchniowa

Accepted for print – Zaakceptowano do druku 27.05.2011

ACTA SCIENTIARUM POLONORUM *Oeconomia 10 (2) 2011, 19–27*

AGRITOURISM ACTIVITY AS AN EXAMPLE OF DIVERSIFICATION OF AGRICULTURE

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West Pomeranian University of Technology

Abstract. A characteristic feature of human behavior is their poly motivations, which means that the person taking deliberate action is guided by more than one motive. Deciding on the economic activity we are also choosing a number of motives. The paper presents the analysis of farm agritourism activity with particular zoom on the motivations and profitability of the surveyed farms. The study was undertaken to analyze the function of tourism farms with particular emphasis on the motivations and profitability of the surveyed households. Due to the fact that the motives for taking up business in tourism are similar in many countries, a study by the author allowed the separation of the three main motives for taking up agritourist farms surveyed in Western Pomerania Region. An important objective of the study was the relationship between the motives and activities undertaken at the farm source of income, age and education of respondents. Also determined the degree of economic viability as a result of agritourism activity undertaken, opportunities and barriers to their development.
Data were collected from the original character of the agricultural operators in the rural areas of the West Pomeranian region which was conducted in the first quarter of 2011 and one hundred randomly farms were selected. Method of measurement was the questionnaire method and a questionnaire as a research tool.

Key words: multifunctional development, motivation, income, rural tourism

INTRODUCTION

In spite of the external support subsidies, farms are not able to provide sustained and sufficient basis for a satisfactory level of prosperity and the maintenance of the rural population. Therefore, an important element is to diversify holdings and attempt to develop new activities which include the development of tourism in rural areas.

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Regional and local development in rural areas is dependent on three very general factors:

– the role of the state, including government institutions and local governments in establishing legal, administrative, economic and organizational conditions for such development;
– the natural attractiveness of the area and the resulting scale and rate of flow of the external investment;
– the current level of economic development including agriculture.

At the level of these three factors it's now a competitive development of the regions.

In addition to so-rich economically advanced areas, with high levels of survival, there are regions with clearly faulty economic structures. Sometimes even within the same region are enclaves that are developing rapidly and those that survive long-term crisis or not at all have found opportunities for professional development and activation of the inhabitants.

The occurrence of disparities at the level of rural development is a consequence of their geographical location and impact of natural, social and economic policy. There was and still exist a different professional and cultural activity of people, different meaning is also the demographic situation in the historical processes and all these groups of factors are mutually dependent and thus form a current level of development and location of each region in the country. The most general and most important features resulting from these differences are now differently shaped standards of living for rural people in the different regions of the country. The processes of regionalization of rural areas or spatial differentiation of living conditions in rural areas are dynamic however, therefore are subject to change over the time [Heller, 2000].

It seems that the fundamental factors influencing the regional differences in the rural areas could include:

– historical factors, where the mere passage of time and processes are producing diversification of the rural areas;
– natural factors, including geographical location which naturally form the rural areas;
– economic factors which are referred to as a synthesis of economic potency, its structure, production techniques and efficiency;
– social and cultural factors which express trends and aspirations, ambitions and expectations of people;
– political factors by formation of the general conditions of the country or supranational organizations including organizations of the favorable development of self-residents;
– difficult or even immeasurable factors, and so those that occur in practice and significantly affect the level of development of regions where the impact is still very difficult or impossible to measure.

Diversity of rural areas is influenced by external features, different history and different levels of development as well as different environmental conditions [Rosner, Stanny 2008]. We must say that the money in the form of targeted subsidies to agriculture does not create a higher income for farmers and thus does not contribute to the development of the rural areas and are paid only to those industries, which supply agriculture, such as the means of production. Thus arise the problems of separating the measures that would

directly feed the development of rural areas, not just agriculture. It is quite an important signal for our policy and that the rural development does not occur by way of grants to farmers but through the development of these areas with non-agricultural functions [Kłodziński 1998].

DATA RESOURCES AND METHODOLOGY

The study was undertaken to analyze the function of tourism farms with particular emphasis on the motivations and profitability of the surveyed households. Due to the fact that the motives for taking up business in tourism are similar in many countries, a study by the author allowed the separation of the three main motives for taking up agritourist farms surveyed in Western Pomerania Region. An important objective of the study was the relationship between the motives and activities undertaken at the farm source of income, age and education of respondents. Also determined the degree of economic viability as a result of agritourism activity undertaken, opportunities and barriers to their development.

Resources were collected from the original character of the agricultural operators in the rural areas of the West Pomeranian Region, which was conducted in the first quarter of 2011 and one hundred households were randomly selected. Method of measurement was the questionnaire method and a questionnaire was a research tool. Data were collected in connection with the source data and prepared in the form of summary figure tables, drawing in order to present the discussed issues.

RESULTS

The owners of the agritourism farms in the surveyed West Pomeranian counties were primarily men (60%) and women in 40%. The vast majority of respondents were in ages between 36 to 45 years and between 46 to 55 years (both 38%). Our data show that in the majority of agritourism activities engaged in the majority the middle-aged people (47%) with secondary education. Vocational training declared 27% of respondents, 5.8% of people declared primary education. 19.2% of respondents showed higher agricultural education but there were no people with higher non-agricultural education. In the surveyed farms the largest percentage was represented by multilateral farms (90%) and only 10% of respondents were engaged in crop production but there were no owners of agritourism farms specializing in livestock production. The average size of agritourism farm was 44.4 ha.

In fact, to indicate the power relationship between age, education and the number of people involved in running the agritourist farm and farm size, the material was subjected to statistical analysis using factor V-Cramer based on the χ 2 statistics (Table 1).

The larger farms (more than 50 ha) were carried out mostly by young, better educated farmers. From the other hand, the smaller farm area was related to more people involved in work on the farm. We can deduct that in the small farms agritourism activity contributes to the use of excess of labor.

Table 1. Household size and age, education and number of persons engaged in agri-tourism activities
Tabela 1. Wielkość gospodarstwa a wiek, wykształcenie i liczba osób zaangażowanych w prowadzenie działalności agroturystycznej

Specification	Size of the farms	
	V-Cramera,	$\chi 2$
Age	0,36	21,6
Education	0,33	24,o
Number of persons engaged in agritourism activites	0,23	11,6

Source: Own research.
Źródło: Badania własne.

The owners of farms in the vast majority (30%) learned about agritourism from theirs friends, already engaged in such activities, from the municipal office, television and newspapers and from passing tourists (18.2%). Small parts in the promotion of agritourism activity were advisory centers. 30% of respondents said that their start was difficult due to the small number of tourists (20%) and the need to incur significant financial investment (10%). The main source of income for the surveyed households was working in agritourism farm (47.3%) and work in the traditional farm (33.8%) (Figure 1).

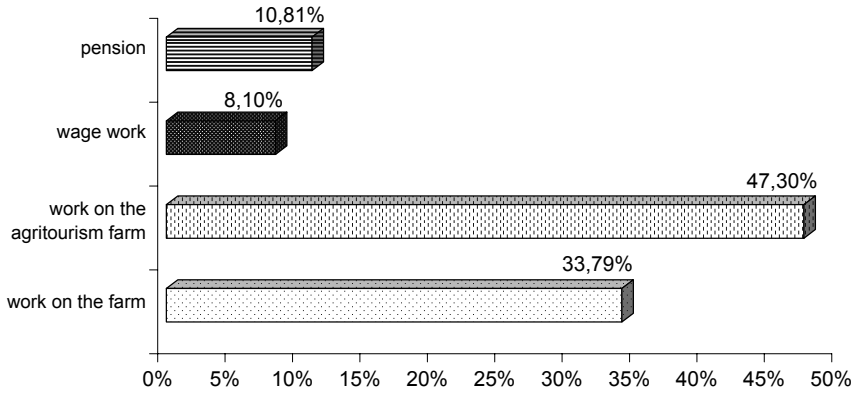

Fig. 1. Source of revenue in the farm
Rys. 1. Źródło dochodów w gospodarstwie

Source: Own research.
Źródło: Badania własne.

*Respondents could indicate more than one answer
*Ankietowani mogli wskazać więcej niż jedną odpowiedź

Working for an employer constituted a source of income for the 8.1% of the respondents. 10.8% of the surveyed farmers used non profitable resources. The analysis showed that raising farm income from various resources was significantly varied according to the age, education, and farm area. There were no significant relationship between the type of income resources and education of the agritourist farms owners (Table 2).

Table 2. Sources of income and age, education and area in agritourism farms
Tabela 2. Źródła dochodów w gospodarstwie a wiek, wykształcenie i powierzchnia gospodarstw agroturystycznych

Specification	Sources of income in agritourism farms	
	V-Cramera,	$\chi 2$
Age	0,29	26,1
Education	0,10	3,9
Farm size	0,34	35,2

Source: Own research.
Źródło: Badania własne.

Farmers under the age of 40 were the largest group (13.9%) which delivered the income of the budget from the additional resources, the second largest group were the farmers between 41–55 years old (10.6%). 4.71% of farmers were aged over 55 years, the lowest percentage (3.6%) was characterized by the farmers under the age of 40. Education of the farmers due to having additional resources of income did not differ significantly from the farmers working exclusively on their own farms.

Studies showed that increasing size of the farm is related to a higher percentage of households declaring raising farmer's income from farm labor and the declining importance of the other resources. For small size farms, supplementation of low income by other, non rural income is an opportunity to improve their general income situation.

Owners of agritourism farms were asked about the motives which led them to adopt new forms of management. Determined the percentage of farmers said that the decision to take agritourism activity encouraged them to exploit the potential of the holding (60%) and additional income (28.6%). For further positions respondents placed the: non-revenue of farm (11.4%) such as those working in harmony with ecology (12%), the opportunity to try a new ways of self-management (2,3%) and observation and assessment of the new developments and innovations (3,4%).

The studies concerning the relationship between the motive of setting up agritourism and the age of surveyed respondents (see Figure 2) revealed that for the respondents between the age of 45–55 years an important motive were non-revenue of the farm (75%) and in 50% utilization of existing capacity and the opportunity for additional income. However, for those aged from 19–36 to 19–45, the primary motive was to use the potential of farm (35%) and non-revenue of farm 25%.

In order to indicate the relationship between age, size, source of income and motives to start agritourism activity, the material was statistically analyzed using factor V-Cramer, based on the $\chi 2$ statistics (Table 3).

Age of respondents, area of farms and the type of income resources had a significant impact on the motives of agritourism activity. With the increase farm size decreased the percentage of farmers indicated that the motive of starting agritourism activity was non-revenue of the farm. Farmers of these households undertook non-agricultural economic activities in order to increase the potential of the farm (Figure 3).

Running a business entails a number of barriers. Most of the farmers, the most common obstacles encountered in the conduction of agritourism activity, placed too low number of tourists visiting the farm. Equivalent space occupied additional duties

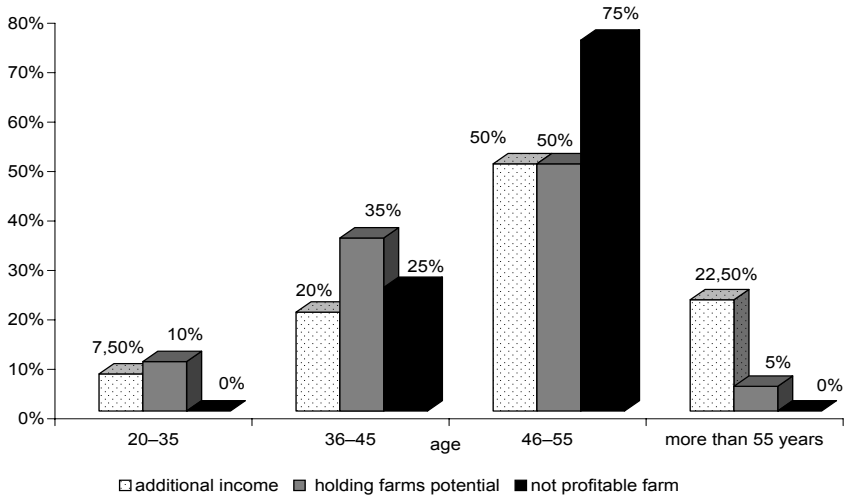

Fig. 2. Motives of starting agritourism activity and age of the farm worker
Rys. 2. Motywy rozpoczęcia działalności agroturystycznej a wiek osoby prowadzącej gospodarstwo

Source: Own research.
Źródło: Badania własne.

Table 3. Motives of starting activity and age, farms size and income resource
Tabela 3. Motywy podjęcia działalności a wiek, wykształcenie i źródło dochodów

Specification	Motives of starting activity and age, farms size and income resource	
	V-Cramera,	$\chi 2$
Age	0,30	15,4
Farm size	0,32	23,2
Sources of incomes	0,4	45,8

Source: Own research.
Źródło: Badania własne.

in respect of tourists and a lack of money of the people visiting the farm (10%). In contrast, 30% of respondents reported that in agritourism activity they not encountered any barriers. Respondents, among the factors which could improve agritourism activity mentioned above all, a better promotion and advertisement of the farm (30%). Equally pointed as well municipal support, low-interest loans and infrastructure improvements in rural areas (20%). For 10% of the surveyed farmers, the way of improving of agritourism could be the reduction of the bureaucracy in the offices. Among the products which are the main source of income of the working farm, all the respondents mentioned renting rooms (37%) and tourism service (25.9%). The average price of a single room was 53,25 PLN, double rooms cost of 75,16 PLN triple and quadruple rooms respectively 100 and 131 PLN. A new stage in the development of agro-tourism in Poland is also characterized by the development of comprehensive proposals to promote joint initiatives, including the territory of one or more villages and sometimes even a few

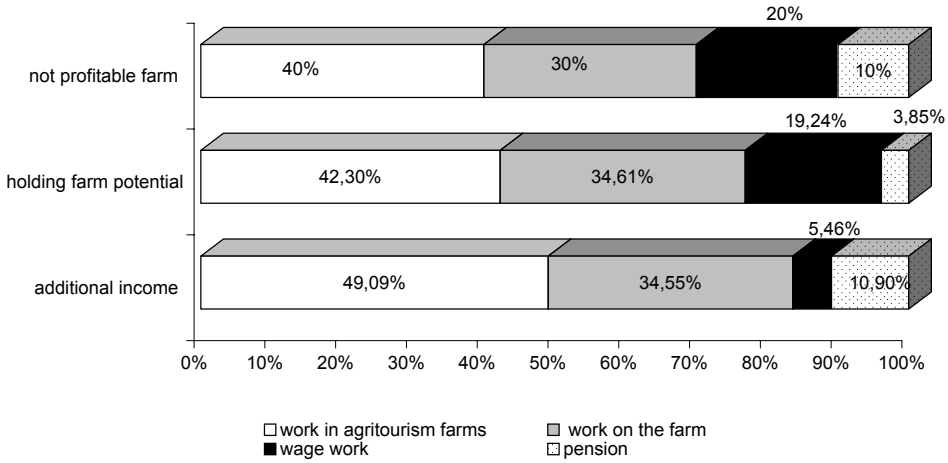

Fig. 3. Motives of starting agritourism activity and source of income of the farm
Rys. 3. Motywy rozpoczęcia działalności agroturystycznej a źródło dochodów w gospodarstwie

Source: Own research.
Źródło: Badania własne.

counties. It's common to depart from the offers of the single farms and we are dealing in this matter with rational tourist products with clearly established images. Such products- especially if use regional elements, make it easier to offer the customers and is more competitive which is confirmed by studies of markets in Europe and Poland. Another factor raised in the study was to determine the viability of farms throughout undertaken agritourism activities. The study showed that profitability increased in the majority of households in a small degree. Every fifth respondent stated that profitability has increased his income in a very small and medium-size (20%) degree. However, only 10% of the agritourism farms owners indicated that farm incomes have increased greatly. For the question of the need to increase the number of tourist farms most respondents (90%) were supportive. According to the respondents, this favors particular opportunity for additional income, the development of tourism (by 33.3%) and attractiveness of the area (22.2%).

The development of agritourism in Poland is one of the directions of state policy towards agriculture and rural areas, designed to stop the reduction in income of rural families and launch mechanisms, include pro-revenue mechanisms through the creation of a new jobs. Recreation in the countryside was found very fast theirs supporters, as it represents a real opportunity to improve the income of poor rural families in Poland – a country, where agriculture has over L' of the national labor force and its share in the GDP does not exceed 10%. Therefore, this form of tourism has become one of the ideas for multifunctional development of rural areas. Rural tourism seems to be an appreciate tool to revitalise the declining rural areas and to ensure their sustainable future by job retention or even job creation, increased job diversity, service retention, farm support broadened cultural provision, landscape and nature conservation or the maintenance or rural arts [Brelik 2009].

CONCLUSIONS

Based on this study there are following conclusions:

- The owners of the agritourism farms in the surveyed West Pomeranian counties were primarily men (60%) and women in 40%. Our data show that in the majority of agritourism activities engaged in the majority the middle-aged people (47%) with secondary education. The average size of agritourism farm was 44,4 ha.
- The owners of farms in the vast majority (30%) learned about agritourism from their friends, already engaged in such activities, from the municipal office, television and newspapers and from passing tourists (18.2%). Small parts in the promotion of agritourism activity centers were advisory.
- The analysis showed that raising farm income from various resources was significantly varied according to the age, education, and farm area.
- The studies concerning the relationship between the motive of setting up agritourism and the age of surveyed respondents revealed that for the respondents between the age of 45-55 years an important motive were non-revenue of the farm (75%) and in 50% utilization of existing capacity and the opportunity for additional income.
- Age of respondents, area of farms and the type of income resources had a significant impact on the motives of agritourism activity. With the increase farm size decreased the percentage of farmers indicated that the motive of starting agritourism activity was non- revenue of the farm.

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DYWERSYFIKACJA ROLNICTWA NA PRZYKŁADZIE DZIAŁALNOSCI AGROTURYSTYCZNEJ

Streszczenie. Charakterystyczną cechą zachowań ludzkich jest ich polimotywacyjność, co oznacza, ze człowiek podejmując zamierzone działanie kieruje się więcej niż jednym motywem. Decydując się na prowadzenie działalności gospodarczej kierujemy się również wieloma motywami. W pracy została podjęta analiza działalności gospodarstw agroturystycznych, ze szczególnym uwzględnieniem motywacji i dochodowości badanych gospo-

darstw. Ze względu na to, iż motywy podejmowania działalności gospodarczej w turystyce są podobne w wielu krajach, badania przeprowadzone przez autorkę pozwoliły na wyodrębnienie trzech podstawowych motywów podejmowania działalności agroturystycznej badanych gospodarstw w województwie zachodniopomorskim. Istotnym celem badań było poznanie zależności między motywami podejmowanych działalności a źródłem dochodów w gospodarstwie, wiekiem i wykształceniem respondentów. Określono również stopień rentowności gospodarstw w wyniku podjętej działalności agroturystycznej, szanse i bariery ich rozwoju.
Materiały źródłowe o charakterze pierwotnym zebrano od osób prowadzących gospodarstwa rolne na obszarach wiejskich województwa zachodniopomorskiego, które przeprowadzono w pierwszym kwartale 2011 roku, na stu losowo wybranych gospodarstwach. Metodą pomiaru była metoda ankietowa, narzędziem badawczym kwestionariusz ankiety.

Słowa kluczowe: rozwój wielofunkcyjny, motywacja, dochód, turystyka wiejska

Accepted for print – Zaakceptowano do druku 09.05.2011

ACTA SCIENTIARUM POLONORUM *Oeconomia 10 (2) 2011, 29–39*

MUNICIPAL BONDS AS A TOOL OF FINANCING THE LOCAL GOVERNMENTS' INVESTMENTS IN RURAL AREAS IN POLAND

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Abstract. The aim of the paper is the evaluation of the role of municipal bonds in financing the local governments' investments at rural areas in Poland. The paper presents some theoretical background of municipal bonds and provides the analyses of empirical data. The investigation showed that the municipal bond market in Poland developed very quickly, especially in 2009 and 2010. The non-public character of bond issues, small value of an average bond issue and the significant role of banks as organiser agents and investors are the characteristic features of this market. During 2005–2009 local governments in rural areas in Poland used the issues of bonds as a source of financing the investments but the role of this instrument was very small, whereas in the other kinds of local governments the revenues from bond issues played much higher role. However, the high dynamics of issued values is a positive signal for the future. It seems that the tighter cooperation between rural gminas in the area of infrastructural investments and common issuing of municipal bonds would help to obtain the advantages of this way of getting of capital.

Key words: bond issue, rural gmina, local government expenditures, infrastructure

INTRODUCTION

The issue of municipal bonds is an alternative way compared with bank credit to gain the financial means by local government entities. This way is well known and used in countries with well developed capital markets [Fearber 1996]. In Poland, the first issues of the municipal bonds took place in the mid of 90ties. The knowledge and experiences in using this tool have increased since then noticeably. In result, more and more local governments decided to use the bond. It is very important problem in the context of underdevelopment of infrastructure and necessity to improve the situation in this area rather

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quickly. The infrastructure decides about the quality of life of the inhabitants and is a basic condition to conduct economic activity for different kind of enterprises. In result, the attractiveness of the region is strictly connected with the level of the development of technical and social infrastructure.

The aim of the work is the evaluation of the role of municipal bond in financing the local governments' investment in rural areas in Poland. The answers to the following questions were discussed: (i) what is the level of municipal bond market development and what of its features are typical, (ii) what is the level of interest of local governments in rural areas in using the issue of the bond as a tool of gaining financial means, (iii) what is the role of the bonds in the support for the investments made by local governments in rural areas, especially co-financed from EU funds.

METHODOLOGY AND SOURCES OF DATA

Analyses carried out in the paper covers period of 2005–2009. A local communities governed by local governments in rural areas are an object of investigation. They are defined as rural gminas in contrast to urban or urban-rural gminas. Gmina is the basic unit of administrative territorial division on the local level in Poland. The poviats, cities with poviat status and voivodhips are the other kinds of local communities. At the beginning of 2010, there were 2479 gminas in Poland of which, 1576 had rural gmina status, 314 poviats, 65 cities with poviat status and 16 voivodhips [The list… 2010].

The data about the development of municipal bond market was taken from the Polish Central Bank (the National Bank of Poland) and rating agency – Fitch Poland S.A. Ministry of Finance was the main source of information about the rural gminas' budgets.

In the paper the descriptive and comparative methods were used. To analyse the problem the simple statistical method was helpful.

The paper starts with the presentation of the theoretical aspects of municipal bonds, next the municipal bond market in Poland is characterized. In the third part, the evaluation of the scope and the role of bonds in financing the investments of rural gminas is made as well as conclusions.

THEORETICAL ASPECTS OF MUNICIPAL BONDS

There are many definitions of bond, which focus on different aspects of this financial instrument. For example, Dusza's definition [2008] draws attention to the maturity of obligation. According to him, the bond is medium- or long-term financial instrument that confirms the debt of issuer to bond holder. Juridical definition taken from Bond Act points out the fact that the bonds are issued in the form of series [Act 1995], definition in Columbia Encyclopaedia enumerates the agents that are eligible to the issue – governments or business corporations [The Columbia Encyclopaedia 2004].

There are many classifications of the bonds. The criteria by issuer is very popular. It classifies bonds into three groups: treasure bonds, municipal bonds and enterprise bonds Treasure bonds are issued by government, municipal bonds by self-local government

entities, enterprise bonds by corporations[1]. It is worth to mention that the local communities can issue a revenue bonds which are a special type of municipal bonds. These bonds are issued to finance the investment, which generate revenue and the revenue is used for the service these bonds. The issuer indicates precisely the revenue or asset, which is a collateral of these bonds. Responsibility of issuer is limited only to the value of collateral and revenues from assets resulted from investments.

The maturity is the other popular criterion. It allows to classify the bonds as short term – one year maturity, medium term – one to three (five) years maturity, and long term – over three (five) years maturity. The municipal bonds are generally long term securities.

The way of the estimation of the interest rate divides bonds into three groups: floating rate bonds, fixed rate bonds and zero coupon bonds.

As a tool of getting the financial means, the municipal bond is an alternative to bank credit. The problem arises what features of this instrument are advantageous for issuers compared with the bank credit, and what can be treated as drawback. From the perspective of issuers the most important factors are:

– more advantageous terms of debt compared with terms on bank credits in respect to interest rate, collateral, grace period, frequency of payment [Główka 2010, Financial... 2010],
– possibility of non-pecuniary repayment,
– lack of risk of immediate repayment request.

The main weakness, which issuers have to take into account is a possibility of insufficient demand, and in the case of public issues – longer, more complicated and costly way of getting financial means.

Buyers of municipal bond are drown to this instrument by:

– higher interest rate (in Poland because of higher risk, the municipal bond interest rate is about one percentage point higher than interest rate on government bonds [Dębski 2007],
– possibility to gain the capital profit (compared with bank deposits),
– additional benefits offered by issuers, for example: tax exemptions, reductions in rents on municipal real estates. In Poland, the local governments of Międzyrzecze and Braniewo offered reduction in prices of municipal flats in the case of their selling [Dębski 2007].

However, the municipal bond holders ought to remember that there is a risk of insolvency higher compared with government bond. Although, the municipal bond is seen as safe security this kind of risk exists and for that the example of New York which in 1975 stated moratorium on reimbursement is often given [Fearber 1996]. In the case of bonds nominated in other than domestic currency, there is a risk of change of exchange rate.

The issues of municipal bonds in Poland is regulated by some acts of the Parliament. The most important are: act on bond, act on public finances and acts which regulate capital market[2].

[1] Including banks.

[2] Act of Parliament June 29th 1995 on Bonds. Dz.U. of 1995. No 83 item 420. unified text Dz.U. of 2001. No 120. item 1300; Act of Parliament July 29th 2005 on Trading in Financial Instruments Dz.U. of 2005. No 183. item 1538; Act of Parliament August 27th 2009 on Public Finance. Dz.U. of 2009. No 157. item 1240.

The law on public finances states, that local governments can take credits or loans or issue securities to cover the budget deficit, to repay the debt and to prefinance the undertakings financed from the European Union budget. The maximum level of local government debt is established at 60% of budget incoming revenues in a year. The service of debt due to bonds and loans cannot be higher than15% of incoming revenues in budget year[3]. In the case of credits and bonds for financing local governments' shares in investment co financed by European Union these limits are not used

THE MUNICIPAL BOND MARKET – DEVELOPMENT AND CHARACTERISTIC FEATURES

The municipal bond market has developed since the mid of 90ties of the XX century. The rate of dynamics year to year differed noticeably during examined period from extremely high level like in 2001 to 8 percentage in 2007 (Table 1). Only in two years for analysed period, the rate was one digital in others two digital, and in the case of seven years it crossed over 20%. This segment of market of non-government debt securities developed more quickly than others segments so in result, the share of this market was rising gradually however, with some disturbances, and got 16.3% in 2010.

The steady increase in the number of municipal bonds issuers is the other positive features of the market. In 1997, there were only 28 issuers while at the end of 2010 – 458 (16 times more). It shows that nearly 16% of the local government entities of different kind in Poland was in debt due to bonds at the end of 2010 so at least such percentage of local government entities used this tool for gaining financial means so far. As data indicates, the financial crisis has not affected this market. The rates of the growth of the debt due to municipal bonds in 2009 and 2010 were very high. During these two years the debt increased more than two times. It stemmed from stable financial situation of self-local governments connected with the positive rate of growth of the Polish economy and increase in awareness of the advantages of this financial tool. The possibility of co-financing infrastructural investment projects, very advantageous because of involvement of EU funds after accession, seems to be an important reason as well. The local governments have to look for different sources of financing the growing investments and issue of the bonds is one way among the range of possibilities like bank credit, credits from multilateral financial institutions, own means or leasing.

The municipal bond market in Poland has some distinct features. The bonds are of floating rate securities with interest rate based mainly on profitability 52-week government bills, interest is paid once a year, maturity is 5–10 years. The average value of issue is low, for example in 2005 and 2007 is was at 2 millions PLN [Rozwój... 2008]. The values of issues are very differentiated, for example, in 2009 the smallest issue value was 100 thousand PLN whereas, the highest – 2l millions PLN [Rozwój... 2010]. The issues are mainly of non-public character. Banks play very important role in the municipal bond market. The issues of these securities are organized mostly by banks.

[3]The rules about the level of debt and level of debt service are valid only to 2014.

Table 1. The characteristic of municipal bond market development in 1997–2010 in Poland
Tabela 1. Charakterystyka rozwoju rynku obligacji komunalnych w latach 1997–2010 w Polsce

Year	Value of municipal bond market* (mln PLN)	Rate of dynamics (year to year, %)	Debt due to municipal bonds/debt due to non-government debt securities (%)	Number of municipal bond issuers**
1997	296.9	–	8.7	28
1998	526.1	77.2	7.0	40
1999	653.6	24.2	7.1	53
2000	859.6	31.5	6.0	89
2001	1 628.6	89.5	9.4	144
2002	2 218.8	36.2	11.2	192
2003	2 639.1	18.9	12.1	201
2004	2 954.5	12.0	12.7	227
2005	3 295.2	11.5	13.1	264
2006	3 830.4	16.2	12.1	322
2007	4 132.2	7.9	9.7	337
2008	4 461.2	8.0	10.0	373
2009	6 906.1	54.8	14.4	415
2010	10 854.8	57.2	16.3	458

*debt due to bonds at the end of a year
**the number of local governments in debt due to municipal bonds at the end of a year

Source: Market of non-government debt securities. Summary for years: 1999–2010. Fitch Polska S.A. www.fitchpolska.com.pl
Źródło: Rynek pozaskarbowych papierów dłużnych. Podsumowanie dla lat 1999–2010. Fitch Polska S.A. www.fitchpolska.com.pl

Two big banks with the well developed network of offices and long history of activity play the leading role as the organisers of municipal bond issues. They are Bank PKO BP and Bank Pekao S.A. Their share in market decreased slowly from 68% in 2004 to 46.2% in 2009 but remains still noticeably [Rozwój... 2005, 2010]. The role of banks is much more important, because they are very often bond depositors, service agents and investors.

The scope of bank involvement makes the bond issue similar to the bank credit in many cases. So the question arises, why the bond is used instead of bank credit. The answer lies partly in law regulations. When the local government takes the credit this action has to undergo the rules of the act on public orders[4], which requires organization of auction. In the case of issue of bonds the local government can choose any bank it wants without any restrictions. Moreover, the issue of bonds and selling them to banks allows to overcome restrictions on bank credit involvement with one client.

What a great role banks play in the municipal bond market as investors the data in Table 2 shows. In the beginning, the share of banks in this market was very high – in

[4] Ustawa z 29 stycznia 2004 r. Prawo zamówień publicznych. Tekst ujednolicony Dz.U. z 2007 r. Nr 223 poz. 1655.

Table 2. The municipal bond debt structure by type of investors (%)
Tabela 2. Struktura zadłużenia z tytułu obligacji komunalnych według inwestorów (%)

Investors	2003	2004	2005	2006	2007	2008	2009
Commercial banks	90.8	72.4	75.6	77.7	83.9	86.2	81.8
Insurance companies	x	1.2	2.0	1.4	1.2	0.9	0.7
Retirement funds	x	0.0	0.0	0.0	0.0	0.0	5.8
Enterprises	x	2.9	3.0	1.5	0.2	0.0	0.0
Foreign investors	x	9.3	13.6	15.3	12.7	11.4	9.6
Investment funds	x	12.6	4.4	2.4	1.5	1.2	2.1
Others	x	1.6	1.4	1.7	0.4	0.3	0.0
Total	x	100.0	100.0	100.0	100.0	100.0	100.0

x – lack of data

Source: Financial Market Development. 2004–2009. National Bank of Poland 2005–2010.
Źródło: Rozwój system finansowego w Polsce w latach: 2002–2003, 2004, 2005, 2006, 2007, 2008, 2009. NBP 2004–2010.

2003 was higher than 90%. In the following three years their role diminished noticeably as well as the share of other financial institutions mainly on behalf of foreign investors. In 2007, banks again increased noticeably their market share but in 2009 the share fell again. What remarkably, the insurance companies and enterprises were low interested in municipal bonds and pension funds expressed interest in them only in 2009.

CHARACTERISTICS OF THE INDEBTNESS OF THE LOCAL GOVERNMENTS IN RURAL AREAS

During 2005–2009 the debt of local government entities in Poland increased rather quickly (Table 3) however, the dynamic differed noticeably year to year. The very low dynamic – 103.7 was in 2007 whereas, two years later, the indicator grew to 140. It resulted from some reasons as economic fluctuations, changes in law and beginning of new financial perspectives 2007–2013 in EU. The importance of the last factor is illustrated by data for 2009. In this year the number of agreements on investment with EU support underwritten by local governments increased comparing 2008 at 20 000 (to 27.2 thousands together) and the value of these agreements rose at 65 billion PLN (to 72.8 bln PLN) [Cieślak 2010].

The cities on poviat status has the highest share in total debt. It was amounted at 46–50% in the examined period. The share of gminas were about 10 percentage point lower [Sprawozdanie 2006–2010].

The relative debt level calculated as the relation of the debt to incoming revenues was not high especially taking into consideration aforementioned regulation this issue. The indicator was amounted at about 20% in 2005–2008 but in 2009 increased markedly thanks to the reasons explained above. Nevertheless, the relative level was still low and very far from maximal one. In the structure of debt the credits and loans prevailed. The share of securities after noticeably fall in 2008, increased in the next year and was about 13%.

Table 3. Debt of local governments in absolute and relative scope and its dynamics in the 2005–2009

Tabela 3. Zadłużenie jednostek samorządu terytorialnego w ujęciu bezwzględnymi i względnym oraz jego dynamika w latach 2005–2009

Year	Total debt (mln PLN)	Debt dynamics (previous year = 100)	Debt/ /Incoming revenues (%)	Structure by source (%)		
				Securities	Credits and loans	Others
2005	21 180.976	110.9	20.6	15.5	83.3	1.2
2006	24 949.122	117.8	21.3	15.1	83.9	0.9
2007	25 876.097	103.7	19.7	15.7	83.6	0.7
2008	28 774.694	111.2	20.2	9.8	89.6	0.6
2009	40 294.344	140.0	26.0	12.9	86.7	0.5

Source: Own calculation based on "*Report on realisation of state budget. Information on realisation of budgets of local governments in: 2005, 2006, 2007, 2008, 2009*". The Council of Ministers. Warsaw 2006, 2007, 2008, 2009, 2010. www.mf.gov.pl

Źródło: Obliczenia własne na podstawie *Sprawozdanie z wykonania budżetu państwa. Informacja z wykonania budżetów jednostek samorządu terytorialnego w latach: 2005, 2006, 2007, 2008, 2009*. Rada Ministrów. Warszawa 2006, 2007, 2008, 2009, 2010. www.mf.gov.pl

Table 4. Debt of rural gminas – level, dynamics and structure

Tabela 4. Poziom, dynamika i struktura zadłużenia gmin wiejskich

Year	Total debt (mln PLN)	Debt dynamics (previous year = 100)	Debt/ /Incoming revenues (%)	Long term debt/ /total debt (%)	Structure by source (%)		
					Securities	Credits and loans	Others
2005	2 910.53	100.9	14.6	92.2	2.3	95.4	2.3
2006	3 485.26	119.7	15.4	93.2	3.6	94.8	1.6
2007	3 626.20	104.0	14.7	94.9	4.6	94.4	1.0
2008	3 919.40	108.1	14.5	98.3	5.1	94.1	0.8
2009	5 197.83	132.6	18.3	93.8	5.3	93.9	0.8

Source: As in table 3.

Źródło: Jak w tabeli 3.

The share of rural gminas in total debt of local governments was at 13–15% (Table 4). The indicator of debt dynamics changed noticeably in examined period. The highest dynamic was observed in 2009 as in the case of the other kind entities. The structure of debt by maturity shows its long term character. It can indicate its connections with investments that were carried out by these gminas.

The credits and loans were the main sources of debt of rural gminas the same as for the other kinds of local government entities but they were much more important for rural gminas (Table 3). It is a result of rather easy access of them to bank credits [Ankieta 2009]. The share of securities in debt was very low but during examined period was rising quickly, and in result the level in 2009 was more than two times higher compared to 2005. It is worth to mention that this level was much lower than in the case of the other kinds of local governments.

THE ROLE OF BONDS IN FINANCING THE INVESTMENTS OF RURAL GMINAS

In the period of 2005–2009 rural gminas increased investment activity distinctly. The investment expenditures nearly doubled (Table 5). The dynamics of the expenditures ranged year to year, in 2007 was negative, but in the other years were positive and even two-digital. The nearly 30% rate was in 2009. The share of investment expenditures in total expenditures was constant during 2005–2008 and was at about 20%. In 2009 it increased markedly by some percentage points. It was connected with the possibility of realisation of investments with the financial support from EU funds in the frame of the new financial perspectives 2007–2013.

Table 5. Rural gminas' investment activity
Tabela 5. Aktywność inwestycyjna gmin wiejskich

Year	Investment expenditures (mln PLN)	Investment rate of growth (%)	Investment expenditures/ /total expenditures (%)	Credits and loans (mln PLN)	Credits and loans/ /Investment expenditures (%)	Credits and loans for investment cofinaced from EU funds/credits and loans (%)
2005	3 764.1	–	19.05	1 235.2	32.8.	20.2
2006	4 789.9	27.3	20.63	1 670.4	34.9	29.1
2007	4 595.6	–4.1	18.92	1 332.7	29.0	16.2
2008	5 403.6	17.6	19.99	1 329.3	24.6	4.5
2009	6 956.8	28.7	24.43	2 230.4	32.1	6.7

Source: As in the table 3.
Źródło: Jak w tabeli 3.

The infrastructural investments are costly and many local government entities cannot afford for them relying only on current budget incoming revenues. In this case, they can take credits and loans or issue municipal bonds. These sources of financial means are elements of budget revenues. Budget revenues can finance repayment the debt and the budget deficit, which resulted from investment activity. The relation of credits and loans to investment expenditures was relatively stable and it can be said that they covered one third of investment expenditures every year. The shares of credits and loans for investment co-financed from EU funds was the highest in 2006 which was the last year of the former financial perspective 2004–2006. At the beginning of new financial perspective investment activity supported by EU funds was very low so the credits and loans for them were low too.

As data in Table 5 shows, credits and loans were very important part of budget revenues. In some years of examined period their share was amounted even at 30%. They were partly taken for investment realised with the support from EU funds. The share of credits for this purpose varied year to year and was the highest in 2006, and the lowest in 2008. The issue of bonds was for gmina revenues much lower important compared to loans and credits (Table 6). The share of revenues due to bonds in rural gminas' revenues were

Table 6. Scope of issue and role of bonds for rural gminas in 2005–2009
Tabela 6. Zakres emisji obligacji i ich rola dla gmin wiejskich w latach 2005–2009

Year	2005	2006	2007	2008	2009
Rural gminas* revenues due to issue of bonds (mln PLN)	11.8	62.6	42.7	104.6	166.6
Dynamics of bond issue value (previous year = 100)	–	531	68.2	244.9	159.3
Average for rural gmina value of issued bonds (PLN thousand)	5.4	28.8	19.7	48.2	76.7
Bond issue value/budget revenues (%)	0.46	1.85	1.38	2.80	3.30
Rural gminas* revenues due to issue of bonds destined for investment co-financed from EU funds (mln PLN)	0	8.85	0.77	0.09	16.40
Rural gminas* revenues due to issue of bonds for investments co-financed from EU funds/bond issue value (%)	0	14.1	1.8	0.1	9.8
Rural gminas* revenues due to issue of bonds/all gminas' bond revenue (%)	4.7	16.0	15.6	24.1	17.3
Rural gminas* revenues due to issue of bonds/all local self-governments' bond revenue (%)	1.82	6.36	5.69	12.27	3.80
Bond issue value/investment expenditures (%)	0.06	0.27	0.18	0.39	0.60

* and their unions

Sources: As in table 3.
Źródło: Jak w tabeli 3.

very low – one digital. However, it was rising quickly, what is a positive feature of this phenomena. It is worth to mention that bonds were issued by rural gminas and their unions. The absolute value of every year issue was small taking into consideration that there is 1576 rural gminas in Poland. It means that the average value of bond issue was in 2005 at 7 500 PLN and four years later at 105 000 PLN. The relation of value of issued in each year rural gminas' bonds to value of all gminas' bonds was not high. It is quite understandable taking into account that the rural gminas are generally small units and the scope of investment activity is rather limited. Of course, the needs of rural local societies are not met at the same extent as the urban ones and there is a pressure on the municipal investment improving standard of life of citizens and conditions of enterprises' activity. The role of bonds in financing the investment evaluated by the relation of their value to investment expenditures was very little. Although the relation rose quickly it remained less than 1%. The issue of bond for financing investments co financed from EU funds was nearly unused.

CONCLUSIONS

1. The municipal bond market in Poland has developed very quickly especially in 2009 and 2010. It shows that local governments noticed the advantages of this instrument for gaining financial means for investment mainly in infrastructure. The non-public character of bond issues, rather small value of an average bond issue and the significant role of banks as organiser agents and investors are the characteristic features of this market.

2. The debt of rural gminas as well as the other kinds of the local governments entities grew quickly in examined years. It shows the great scope of the investment activity what requires steady stream of financial means. The debt was rising mainly thanks to credit and loans. The share of bonds in debt was small, however, it increased noticeably during five examined years .
3. The role of bonds in financing rural gminas' investment was very low. It is indicated by low relation of value of bond issue to investment expenditures. The big dynamics of issue values in 2008 and 2009 was a positive signal and suggested that the situation can change in future.
4. It seems that the tighter cooperation between rural gminas in the area of infrastructural investments and common applying for the financial means from different sources would be important factors for the more broad using the municipal bonds. The issue of bonds can help the rural gminas to overcome the burden of bank involvement in financing one client what can be important in the case of cooperative banks with relative low funds and avoid the procedure resulted from act on public orders.

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OBLIGACJE KOMUNALNE JAKO NARZĘDZIE FINANSOWANIA INWESTYCJI SAMORZĄDÓW LOKALNYCH NA OBSZARACH WIEJSKICH W POLSCE

Streszczenie. Celem opracowania jest ocena roli obligacji komunalnych w finansowaniu wydatków inwestycyjnych gminnych samorządów lokalnych na obszarach wiejskich w Polsce. W artykule zostały zaprezentowane aspekty teoretyczne obligacji komunalnej oraz wyniki analizy danych empirycznych. Przeprowadzone badanie wykazało, że rynek obligacji komunalnych w Polsce rozwija się bardzo szybko, a szczególnie wysoki wzrost odnotowano w 2009 i 2010 roku. Cechami charakterystycznymi emisji obligacji komunalnych w Polsce są: ich niepubliczny charakter, niska przeciętna wartość emisji i znacząca rola banków jako organizatorów emisji i ich nabywców. W latach 2005–2009 gminy wiejskie stosowały emisje obligacji jako źródło finansowania inwestycji, ale ich rola była bardzo mała w porównaniu z innymi jednostkami samorządu terytorialnego. Wysoka dynamika wartości emisji obligacji jest pozytywnym sygnałem. Ściślejsza współpraca między gminami wiejskimi w zakresie inwestycji infrastrukturalnych i wspólne emisje obligacji pozwoliłyby na wykorzystanie zalet tego narzędzia szczególnie wobec możliwości wykorzystania funduszy unijnych.

Słowa kluczowe: emisja obligacji, gmina wiejska, wydatki samorządu terytorialnego, infrastruktura

Accepted for print – Zaakceptowano do druku 19.04.2011

ACTA SCIENTIARUM POLONORUM *Oeconomia 10 (2) 2011, 41–53*

INTEGRATION WITH THE EUROPEAN FINANCIAL SYSTEM AND CHANGES OF THE NON-LIFE INSURANCE SECTOR CONCENTRATION IN POLAND

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Abstract. Integration of the Polish financial system with European financial markets was not limited solely to the increase of foreign capital, but influenced the manner of its operations, in particular, market structure and level of competition prevailing on it. In the case of non-life insurance sector, at that time, the share of foreign investors in the sector's primary equity, and their total market share increased. This contributed to lower of the market concentration, and improvement of conditions of the competition. Tests conducted on panel data from 35 companies, including data from non-life insurance and macroeconomic sectors from years 2002 to 2009, indicate that the decrease in market concentration was affected by, among others, the increase in foreign investment in the insurance companies' equity, increase of the market share of medium-sized firms, the growth in sales through the establishment of banks and other financial institutions and reduction of direct sales by the companies' establishment. Furthermore, it was found that such changes of concentration were positively impacted by the favorable state of the economy and especially low inflation level.

Key words: financial system, non-life insurance, market concentration, financial integration, UE

INTRODUCTION

The appropriate level of market concentration has a significant impact on the functioning of the financial institutions as it provides the right conditions for the competition and contributes to raising the quality of service delivery and profitability of companies. As a result, firms become more competitive and able to obtain better financial results while their customers can get higher quality products and services, including the insurance coverage. The idea of integration of Polish financial institutions, including the insurance,

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with the European financial system was to allow the unhindered transfer of investment capital into the Polish market, and transfer of new technologies and management systems. Domestic firms, by including them among institutions of higher technological level and more extensive product range, have been subjected to competition from foreign institutions, but on the other hand, have won the chance to improve their efficiency and profitability of the operations.

During the financial integration, the non-life insurance sector[1] in Poland underwent a strong transition. For many years the sector was dominated by a single state-owned entity, i.e. the Powszechny Zakład Ubezpieczen (PZU). In recent times a group of medium sized foreign-owned companies emerged covering about half of the insurance market. The weakening of PZU dominance improved conditions for the competition mainly due to the entrance of new firms, both of the domestic and foreign ownership. The integration of the insurance sector was also carried out by an influx of new capital investments. At that time, the share of foreign capital rose in the primary capital of the sector, as well as the participation of foreign-owned companies in the total premium of the non-life insurance sector.

Processes, initiated by the integration with the EU financial markets are not limited to the inflow of investment capital. At that time, there was a substantial change in the scope of offered products and the way of their distribution. In the case of non-life insurance, there was a reduction in the share of the communication insurance with a simultaneous increase in the share of financial insurance. In terms of the distribution of insurance products, the share of direct sales conducted in companies' facilities was significantly reduced, while the share of sales through bank network increased, and more recently in the direct system, i.e. via Internet and telephone. Financial integration was accompanied by changes in Poland's economic situation. In the initial phase, it was a period of strong economic growth. However the economy development during the period of 2008–2009 was subjected to the effects of the global financial crisis, which had a significant impact on the functioning of the insurance sector by reducing its financial results.

The purpose of this study was to identify the degree of concentration of the non-life insurance sector in Poland during the period of its integration into the European financial system; it means the time of harmonization of regulation and next direct accession into the single financial market. The next stage was to determine factors, which significantly affected the level of the sector's concentration. The study used the method of regression for panel data of 35 companies operating in Poland in the years 2002–2009. The results indicate that during analyzing period the level of concentration of the non-life insurance sector has substantially decreased, and the favorable factors are: increase of foreign investment in the sector's primary capital, increase of the market share of medium-sized firms, the growth in sales through the establishment of banks and other financial institutions and reduction of direct sales by the companies' establishment. Furthermore, such changes of concentration were positively impacted by the economic environment with

[1] As the non-life insurance it is understood classes of insurance indicated in the Section II – Other personal insurance and property insurance of the act of 22 May 2003 on insurance activity (Dz.U. No 124, item 1151).

lower inflation influenced by the favorable state of the economy and especially low inflation level.

The rest of the article is structured as follows. The first part presents the results of previously published studies dealing with changes of concentration and competition due to financial integration and consolidation in the European Union and other countries. The second part presents methodology of the study, the third the course of changes undergone by the non-life insurance industry in the years 2002–2009, and in the fourth data and results of the research are discussed. The whole analysis is summarized in the conclusion.

LITERATURE REVIEW

Issues of concentration and competition in the insurance sector, according to the author's knowledge, are not frequent subject of literature analysis. The study usually includes companies operating in the U.S. market and, to a much lesser extent, in Europe. Cummins et al. [1999] observe that the consolidation process, as well as economic growth, improves the financial performance of insurance companies in the U.S. In turn, Cummins and Rubio-Mises [2003], based on analysis of data from life and non-life insurance companies state that consolidation brings only a minimal improvement in the efficiency and competitiveness. They emphasize, however, that the process reduces the operating costs of companies and prices for insurance products.

While examining the effects of integration of insurance industry in the EU during first half of 1990s, on the functioning and performance of national and multinational companies, Cummins and Weiss [2004] claim that freedom to conduct activities in all EU member states contributes to improvement in efficiency of the insurance companies. They stress that this is particularly important for countries that have the ability to acquire foreign capital for further development. In turn, Bikker and Leuvensteijn [2008], by analyzing the results of life insurance in the Netherlands, point out that the process of financial integration in the EU has contributed to the increase of competition, which mainly reflected on the market entry of new small businesses. Ennsfellner, Lewis and Anderson [2004] come to similar conclusions on the basis of analysis of Austrian life and non-life insurance during the financial integration in the EU. They state that this process positively affects the efficiency and competitiveness of Austrian companies and could have similar effects on insurance entities in new member countries of Central-Eastern Europe.

The first assessment of efficiency and competition of the Polish insurance sector carried out by Pawlowska and Kozak [2009], indicate that full integration of the insurance sector at the time of Poland's accession to the euro area should not introduce risk of reduction in its financial results since the level of competition in the sector is comparable to the other EU countries. Kozak [2010], analyzing the processes of consolidation in the non-life insurance sector, notes that during that time insurance companies have decreased the level of effectiveness, which may result from increased operating costs during this period. Also Kozak [2011] based on data on 25 non-life insurance companies for the period of 2002–2009 notes that reduction in the share of motor insurance in the portfolio, with simultaneous increase of other types of insurance, has a positive impact on profitability

and cost-efficiency of insurance companies. However, offering too broad spectrum of classes of insurance negatively impacts its profitability and cost efficiency. Additionally increases of the GDP growth and the market share of foreign-owned companies positively impact profitability of non-life insurance companies during the integration period.

METHODOLOGY

To estimate the degree of dependence of sectoral and macroeconomic factors on the market concentration, the method of regression with fixed effects for panel data was applied. Using this method makes it possible not only to assess dependence in time, it would also take into account the specifics of every insurance company (refer to [Hsiao 1986] and [Greene, 2003]).

Regression equations for panel data as follows:

$$Y_t = F\{X_{it}, Z_t\} + \varepsilon_{it}$$

where: Y_t is the degree of concentration of the sector in year t, X_{it} is a vector of parameters characterizing the insurance company i in year t, Z_t is the vector of variables explaining the structure of non-life insurance sector and the macroeconomic situation in year t, ε_{it} is the random component.

In order to confirm the correctness of the obtained results estimation was carried out in two versions, i.e. for the concentration indices of CR_3 and CR_5.

Definitions of variables are given in Table 1.

Table 1. Definitions of dependent and independent variables
Tabela 1. Definicje zmiennych objaśniających i objaśnianych

Variable	Definition
	Degree of the sector concentration
CR_5 and CR_3	Participation of top five (three) insurance companies in premiums of the non-life insurance sector
	Insurance companies parameters
COMMM	Share of communication insurance in the total premiums
GRPRM	Total gross written premiums
INVESTMENT	Financial investments of insurance company
CLASSES	Number of classes of insurance offered by the company
	Non-life insurance sector and the macroeconomic parameters
DIRECTSALES	The Share of sales through its own outlets in the total non-life insurance premiums
BANK	The share of sales through branches of banks in the total non-life insurance premiums
FOREIGN	The share of foreign capital in the capital of the primary life insurance sector
CPI(-1)	The annual rate of CPI inflation delayed by one year

Source: Own elaboration.
Źródło: Opracowanie własne.

POLISH NON-LIFE INSURANCE SECTOR

The non-life insurance sector in Poland has undergone a strong transition during the period of integration with the European Union's financial system. One of the most important aspects of this process is the change in concentration levels of the sector. Maintaining an adequate level of competition and market concentration has a significant impact on the functioning of financial institutions because it creates proper conditions for development and provision of higher quality services. The process of integration of institutions and financial systems is one of the final stages of creating a common economic area that is based on the principle of free movement of capital between entities registered in all participated countries.

During the integration of European financial system in Poland, the structure of the non-life insurance sector has evolved due to be carried out consolidation and market entry of new players. During this time, involvement of foreign investors in the sector increased, which contributed to the growth of the industry premiums from 13 billion PLN in year 2002 to 21 billion PLN in year 2009. Despite the growth of penetration rate, which measures the importance of the insurance sector in the national economy, it reached 1.9% in Poland in year 2009, which is one of the lowest in Europe (Figure 1). The low level

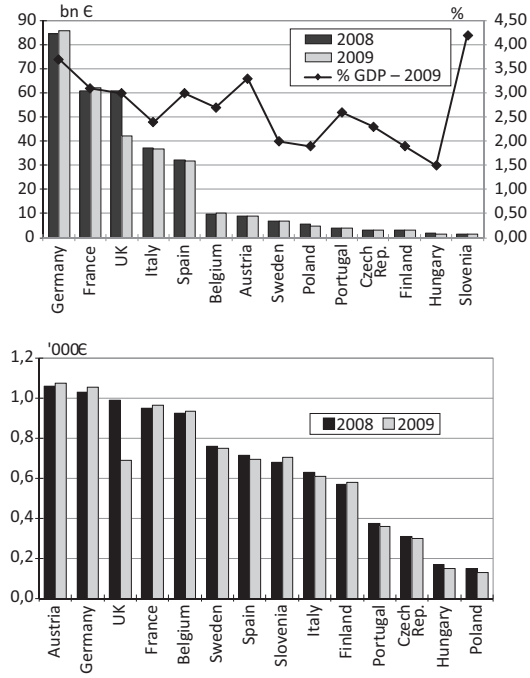

Fig. 1. Gross premiums of the non-life insurance sector: in relation to GDP (upper) and *per capita* (lower panel)

Rys. 1. Składka przypisana brutto w sektorze ubezpieczeń majątkowych: w relacji do PKB (górny panel) oraz na jednego mieszkańca (dolny panel)

Source: CEA, Swiss Re.

Źródło: CEA, Swiss Re.

of development of the Polish non-life insurance sector indicates low values of density coefficient, which measures the development of the insurance sector. In 2009, the average Pole dedicated 128 euros for the purchase of insurance policies, while Hungarian and Czech spent 147 euros and 298 euros, respectively. An average person, living the Western European countries, spent around one thousand euros on the purchase of life insurance policies, this includes countries like Austria – 1,075 euros, Germany – 1,052 euros and France – 964 euros.

Acquisitions, liquidations and entry of new plants have contributed to changes in the population of sector, which in 2002 consisted of 36, and in 2009 of 35 companies (Figure 2). Most of the operating entities during this period took the form of joint stock companies, whereas the mutual insurance societies accounted for only a small group of insurers. The changes in the number of establishments were reflected on the level of concentration of the sector. The rate of participation of top five companies in the sector,

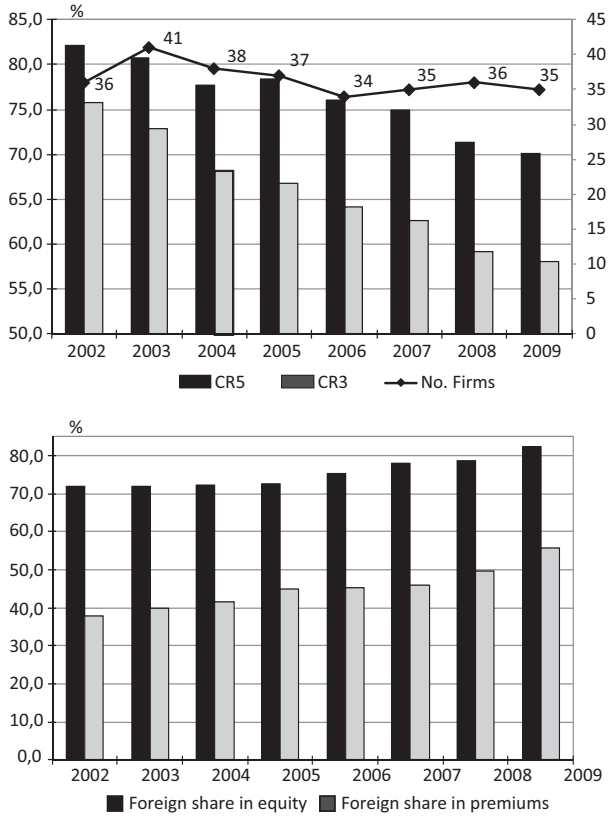

Fig. 2. Market structure (upper panel) and ownership structure (lower panel) of the non-life insurance sector in Poland for the period 2002–2009

Rys. 2. Struktura rynku (górny panel) i struktura własnościowa (dolny panel) sektora ubezpieczeń majątkowych w Polsce w latach 2002–2009

Source: Own calculations based on PFA and PCI data.

Źródło: Obliczenia własne na podstawie danych KNF oraz PIU.

CR_5, declined between years 2002–2009 from 82% to 70%, and the rate calculated for top three companies, CR_3, decreased during the same time period from 76% to 58%. This mainly resulted from the rapid development of medium sized businesses, mostly controlled by foreign investors and weakened the long domination of the biggest insurer PZU. Its market share fell from 56% in 2002 to 38% in 2009. It should be noted that, despite such a high market concentration, market entry of several new insurance companies, both of domestic and foreign capital, as well as a public company and mutual insurance societies, provides a low entry barriers to the market and behaves highly competitive on it.

Integration of the EU financial markets was favorable to the increase of the involvement of foreign capital in non-life insurance companies. This trend was particularly noticeable during the period after Poland joined into the EU. The share of foreign capital in total primary capital of the sector increased from 72% in 2004 to 82% in 2009. The process was conducted through the capitalization of companies that were not yet in operation and the introduction of new entities on the market. The increase was accompanied by the involvement of foreign investors to improve the market position of their control of insurance companies. Their share in total gross written premiums increased from 38% in 2002 to 56% in 2009.

During the financial integration, the non-life insurance companies changed the method of their products distribution. The most common way of selling policies was still sale by private agents (Figure 3). The share of this form of distribution remained relatively stable, slightly exceeding 40%. However, the importance of direct sales at the offices of insurance companies significantly decreased for the benefit of distribution through brokers, and above all by bank networks. The share of sales through banking facilities rose from 0.04% in 2002 to 6% in 2009 and was related, among others, to the development of European financial conglomerates in Poland and the spread of *bancassurance* system, which is a simultaneous sale of banking and insurance services.

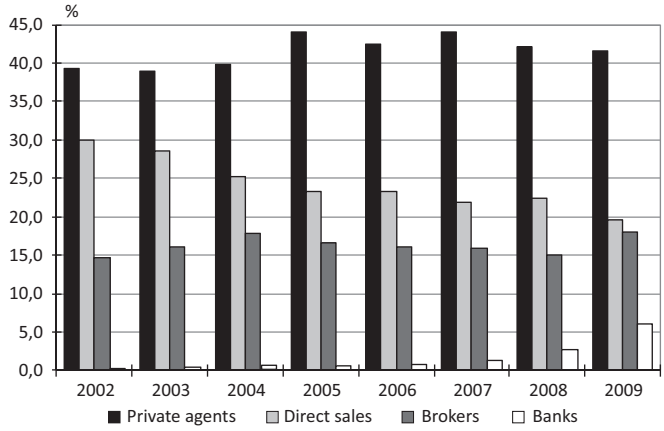

Fig. 3. Channels of non-life insurance distribution in Poland for the period 2002–2009
Rys. 3. Kanały dystrybucji ubezpieczeń majątkowych w Polsce w latach 2002–2009

Source: Own calculations based on PFS and PCI data.
Źródło: Obliczenia własne na podstawie danych KNF oraz PIU.

Another feature of the non-life insurance sector in Poland, characteristic for the period of European integration, is a change of its products' structure. Although communication insurance, with about 60-percent share, is still the most dominant product group, its position noticeably weakened (Figure 4). At the same time, the importance of financial risk protection products has increased. In the period between years 2002 and 2009, the share of financial insurance has increased from 3% to 8%.

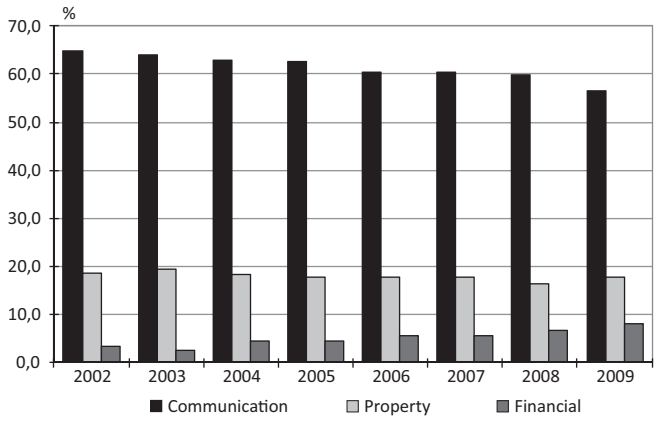

Fig. 4. Product structure of the non-life insurance sector in Poland for the period 2002–2009
Rys. 4. Struktura rodzajowa ubezpieczeń sektora ubezpieczeń majątkowych w Polsce w latach 2002–2009

Source: Own calculations based on PFS and PIU data.
Źródło: Obliczenia własne na podstawie danych KNF oraz PIU.

Functioning and ability to generate profits from the insurance operations during the integration of EU financial system, was highly affected by the country's macroeconomic situation. Preparations for the EU integration were carried out in an economic environment characterized by a low dynamics of GDP growth, which amounted to around 1.3% in year 2002. In turn, during the years 2004–2008, which are the time after joining to the EU, the economy grew at a rapid pace, with an average annual GDP growth of around 5.4%. Again, in 2009 as a result of the impact of the global financial crisis, economic growth slowed to 1.8% per year[2]. Variation of the economic environment is reflected in the values of the technical results on insurance operations, which, both in 2002 and in 2009 reached a negative value, while the highest in the period 2006–2007 (Figure 5). The size of the profit sector was significantly influenced by the share of operating costs. Throughout the analyzed period operating expenses ratio to gross written premiums stood at about 25%, with the largest value of around 28%, reached in 2009, which was the consequence of the global financial crisis.

[2] More on the impact of the financial crisis on the insurance sector in: Kozak S., 2008. Oddziaływanie kryzysu sub-prime na dochodowość zakładów ubezpieczeń [Impact of the sub-prime crisis on profitability of insurance companies], Acta Scientiarum Polonorum – Oeconomia 7 (4), p. 97–106 [in Polish].

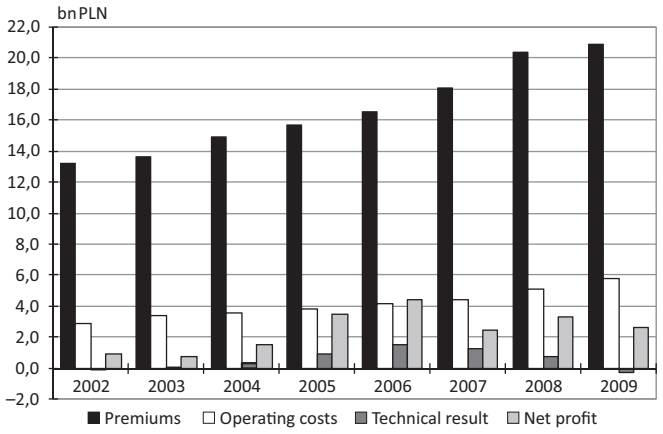

Fig. 5. Financial performance of the non-life insurance sector in Poland for the period 2002–2009

Rys. 5. Wyniki finansowe sektora ubezpieczeń majątkowych w Polsce w latach 2002–2009

Source: Own calculations based on PFA and PIU data.
Źródło: Obliczenia własne na podstawie danych KNF oraz PIU.

DATA AND RESULTS

To examine levels of the non-life insurance market concentration and its determinants, during the period of integration of the Polish insurance sector with the European Union financial system, there were used the data on individual companies published by the Polish Financial Authorities (PFA) and the Polish Chamber of Insurance (PIU)[3]. The source of macroeconomic data reports are posted on the Central Statistical Office. The study included 35 insurance companies operating between years 2002 and 2009.

To eliminate the impact of inflation on gross written premiums and investments, discount to the price level in 2009 was done using the CPI inflation rate. In turn, due to the fact that usually the macroeconomic conditions influence the operation of enterprises with a certain time delay, the explanatory variable, the CPI inflation rate delayed by one year was used. The range of variables and the ratio of variability are characterized by descriptive statistics in Table 2.

In order to ensure the correctness of the results, estimations for two concentration ratios (CR_5 and CR_3) were performed. In both cases, the regression coefficients describing the directions of the impact of variables on the explanatory variable had a similar character. Values of regression coefficients are included in Table 3.

[3] The data available on websites, respectively: www.knf.gov.pl/opracowania/rynek_ubezpieczen/index.html and www.piu.org.pl/analizy-i-raporty.

Table 2. Descriptive statistics of the regression equation variables
Tabela 2. Statystyki opisowe zmiennych równania regresji

Variable	Units	Average Value	Standard Deviation	Minimum	Maximum
CR_5	%	76.24457	3.894965	70.1	82.16956
CR_3	%	65.63011	5.643491	58.1	75.73058
COMMM	%	61.36104	2.467019	56.6	64.8
GRPRM	PLN '000	5.82×10^7	1.52×10^8	13214.4	8.82×10^8
INVESTMENT	PLN '000	1.15×10^8	4.37×10^8	213290.4	3.15×10^9
CLASSES	–	10.78715	5.098117	0	18
DIRECTSALES	%	24.10133	3.155651	19.55	30.03
BANK	%	1.615622	1.854023	0.04	6.02
FOREIGN	%	75.41165	3.6329	71.9	82.2
CPI(-1)	%	102.6356	1.458434	100.8	105.5

Source: Own elaboration.
Źródło: Opracowanie własne.

Table 3. Regression coefficients of the econometric model
Tabela 3. Współczynniki regresji modelu ekonometrycznego

	CR_5	CR_3
COMMM	0.2221421 (1.50)	0.3079912 * (1.74)
GRPRM	$-1.03\text{x}10^{-8}$ * (–1.76)	$-1.27\text{x}10^{-08}$ * (–1.83)
INVESTMENT	$-8.76\text{x}10^{-10}$ (–1.16)	$-1.19\text{x}10^{-09}$ (–1.32)
CLASSES	–0.0409517 (–0.77)	–0.0418282 (–0.66)
DIRECTSALES	0.293151 *** (4.70)	0.9773602 *** (13.17)
BANK	–0.376965 *** (–3.47)	0.3248651 *** (2.51)
FOREIGN	–0.455499 *** (–6.11)	–0.6115748 *** (–6.89)
CPI(-1)	0.3244255 *** (5.58)	0.3009821 *** (4.35)
Constant	58.351 *** (4.43)	39.2078 *** (2.51)
F-statistics	348.97	530.01
Number of observations	249	249
R-square	0.7198	0.7858

Notes: ***, **, * – level of significance, respectively, 1%, 5%, 10%; t-statistics in brackets.
Uwaga: ***, **, * – poziom istotności, odpowiednio, 1%, 5%, 10%; w nawiasach wartości statystyki t.

Source: Author's calculation using STATA statistical software.
Źródło: Obliczenia własne przy użyciu programu STATA.

The obtained results show the following dependency:

- **the share of the communication insurance in gross premium** – a positive value of regression coefficient indicates that high level of communication insurance raises the of the market concentration, while the decline in this share, and broadening of the insurance product portfolio and the rise of insurance classes offered by the companies', including financial insurance, may favor reducing the non-life insurance market concentration,
- **the value of gross written premiums** – a negative value of the regression coefficient suggests that the growth of premiums of medium size insurance companies, mainly controlled by foreign capital, lowers the market concentration, which typically leads to increasing competition in the market,
- **the channels of distribution** – the share of sales by companies own facilities and the share of sales by bank networks affect the level of concentration in the sector in opposite directions. The sales of insurance policies through the establishment of banks and other financial institutions may be particularly beneficial for smaller companies that do not have an extensive network of its own, enabling them to increase sales growth and increase market share and thereby reduce the concentration of the sector,
- **the participation of foreign capital in the core capital of insurance companies** – a negative value of regression coefficient for this variable indicates that an increase in activity of foreign investors, which means the increase in the market foreign owned companies, can contribute to lowering the concentration of non-life insurance sector,
- **the annual inflation rate** – a positive value of the regression coefficient for the level of inflation may suggest that in periods of higher inflation and worsened macroeconomic conditions, enterprises and households may concentrate their interest in larger entities in the sector, expecting that they are safer in during time of crisis. This may lead to the development of primarily large corporations and increasing of concentration of the market.

CONCLUSIONS

1. The integration process of non-life insurance sector with the EU financial system significantly changed the market structure and the functioning of insurance companies.
2. The financial integration is not restricted only to increase of the share of foreign capital in the sector's equity, but also influenced the manner of its operation, in particular, the structure of the market and its level of competition.
3. Integration has helped to reduce the concentration of the non-life insurance sector, which was impacted, among others, by: increased foreign investment in the primary equity of insurance companies, the increase in the share of medium sized companies, as well as a decline in the share of communication insurance and increase in other classes of insurance, mainly the financial insurance.
4. Lowering the sector concentration was favored by the change in the sale systems which restricted the participation of direct sales by the firms' facilities, and simultaneously increase of the share of sales through the establishment of banks and other financial institutions.

5. Economic environment characterized by a lower level of inflation is conducive to lowering the concentration of non-life insurance.

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INTEGRACJA Z EUROPEJSKIM SYSTEMEM FINANSOWYM A ZMIANY KONCENTRACJI SEKTORA UBEZPIECZEŃ MAJĄTKOWYCH W POLSCE

Streszczenie. Integracja polskiego systemu finansowego z europejskimi rynkami finansowymi nie ograniczała się wyłącznie do zwiększania zaangażowanego kapitału zagranicznego, ale oddziaływała na sposób jego funkcjonowania, w szczególności na strukturę rynku i poziom panującej na nim konkurencji. W przypadku sektora ubezpieczeń majątkowych[4],

[4] Przez ubezpieczenia majątkowe rozumie się ubezpieczenia wymienione w dziale II ustawy o z dnia 22 maja 2003 r. o działalności ubezpieczeniowej (Dz.U. z 2003 r. Nr 124, poz. 1151).

w tym czasie zwiększył się udział inwestorów zagranicznych w kapitałach podstawowych firm ubezpieczeniowych, a także ich całkowity udział kontrolowanych przez nich zakładów w składce sektora. Przyczyniło się to do obniżenia koncentracji rynku ubezpieczeniowego, co sprzyja poprawie konkurencji. Badania prowadzone na danych panelowych z 35 firm oraz danych z sektora ubezpieczeń majątkowych i makroekonomicznych za lata 2002–2009 wskazują, że na obniżenie się koncentracji rynku wpływ miały m.in. wzrost inwestycji zagranicznych w kapitały firm ubezpieczeniowych, wzrost średniej wielkości firm, wzrost udziału sprzedaży poprzez placówki banków i innych instytucji finansowych oraz zmiana systemu sprzedaży polegająca na ograniczeniu udziału bezpośredniej sprzedaży przez placówki własne zakładów. Ponadto stwierdzono, że na taki kierunek zmian koncentracji pozytywny wpływ ma otoczenie gospodarcze charakteryzujące się niższym poziomem inflacji.

Słowa kluczowe: system finansowy, ubezpieczenia majątkowe, koncentracja rynku, integracja finansowa, UE

Accepted for print – Zaakceptowano do druku 21.03.2011

ACTA SCIENTIARUM POLONORUM *Oeconomia 10 (2) 2011, 55–64*

EXPORT DIVERSIFICATION AND ECONOMIC GROWTH IN EUROPEAN UNION MEMBER STATES

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Abstract. The main aim of the paper is to analyze the relationship between the export diversification and the economic growth in the European Union in the period 1995–2009. This article consists of two parts. The first part concerns the theoretical analysis of the relationships between the degree of exports diversification (concentration) and the economic growth taking into account main determinants of these relationships. The next section examines the relationship between the degree of exports concentration and the economic growth in European Union member countries using a vector autoregression model (VAR). There have been estimated elasticity coefficients of GDP per capita to changes in the exports concentration on the basis of impulse response functions. This was followed by the decomposition of GDP per capita in order to estimate the impact of changes in GDP per capita and the degree of exports concentration on the variability of GDP per capita in the EU.

Keywords: exports diversification, exports concentration, economic growth

INTRODUCTION

There are two basic diversification types of export goods, i.e. horizontal diversification and vertical diversification. Horizontal diversification refers to diversification of production and exports among different industries, but vertical diversification includes diversification of production and exports within the same industry. Both types of diversification have a positive impact on the economic growth [Kenji, Mengistu 2009]. Commonly used indicator measuring the degree of export diversification is a standardized index of exports concentration proposed by Hirschmann and calculated in accordance with the following expression:

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$$H_{jt} = \frac{\sqrt{\sum_{i=1}^{n}\left(\frac{x_{it}}{X_{jt}}\right)^2} - \sqrt{\frac{1}{n}}}{1 - \sqrt{\frac{1}{n}}} \quad (1)$$

where: x_{it} – value of exports of product i in period t; X_{jt} – the value of total exports of the country in period t, n – number of products (SITC Revision 3 at 3-digit group level).

Hirschmann index is a measure of the degree of market concentration. It has been normalized to obtain values ranking from 0 (maximum diversification) to 1 (maximum concentration) [Parteka, Tamberi 2008].

From a theoretical point of view, there are three main channels through which export diversification contributes to the economic growth. Firstly, the export diversification leads to higher productivity of production factors through the transfer of knowledge. The authors of new models of economic growth argue that any export diversification is innovation through the inclusion of new goods, which is preceded by a creative effort and requires knowledge concerning a production process of goods. This causes externalities, which economists often refer to knowledge spillovers. This situation helps in the accumulation of the technology. With reference to classical Solow growth model, technology and innovation cause Solow residual and determine the increase in factor productivity.

Secondly, the export diversification in new industries leads to faster economic growth by supporting the production in other industries. With existing and potential links of production, more diversified structure of exports can give an incentive to create new industries and expansion in existing industries within the economy. This situation occurs particularly when the export diversification takes place by incorporating new commodity groups into the existing structure of commodity exports.

Thirdly, the export diversification can lead to greater stability in export incomes. The relationship between a greater degree of diversification and greater stability of income in this case is analogous to that which the portfolio theory indicates. Prices of basic commodities are characterized by a relatively high volatility in short run, hence the countries dependent on exports of these goods may be exposed to high volatility of export incomes. This situation may discourage companies to invest in these countries due to the limited propensity for a risk, it can also cause an increase in macroeconomic uncertainty and be harmful to long-run economic growth [Bleaney, Greenaway 2001].

In the economic literature there are relatively few empirical studies on the relationship between the degree of export diversification and the dynamics of economic growth. Al-Marhubi [2000] conducted a regression analysis between the economic growth and the degree of exports concentration in selected countries and obtained results that confirmed the positive impact of exports diversification on the economic growth. Moreover, the study did by Agosin [2007] suggested that export diversification has a positive impact on the growth in income per capita. Similarly, Lederman and Maloney [2007] conducting panel research found evidence supporting the hypothesis of economic growth led by exports diversification. Related results were obtained by Herzer and Nowak-Lehmann [2006] examining the relationship between

export diversification and the economic growth in Chile. Their analysis results suggested that Chile has benefited substantially from the exports diversification. In turn, Imbs and Wacziarg [2003] studied the impact of changes in export concentration on the level of income per capita using nonparametric methods. Their results showed that the relationship between the degree of exports concentration and the level of economic development takes the shape of a letter "U". At the initial stage of economic development countries are diversifying their exports and then reaching a certain level of economic development are beginning to specialize. Thus, the degree of exports specialization depends on the level of national income per capita. Furthermore, results of a study conducted by Hesse [2008] pointed to the existence of non-linear relationship between the degree of export diversification and the dynamics of economic growth per capita in the period 1962–2000. The research revealed also that developing countries achieve benefits from diversification of their exports, while developed countries achieve higher economic growth rate per capita as a result of export specialization.

A MODEL APPROACH TO EXPORTS DIVERSIFICATION AND ECONOMIC GROWTH IN THE EU

In order to analyze the causal relationship between the degree of exports concentration and GDP per capita in EU member states in the period 1995–2009 were used vector autoregression model (VAR) representing by the following expressions:

$$GDP_{i,t} = \sum_{k=1}^{p} \alpha_k GDP_{i,t-k} + \sum_{k=1}^{p} \beta_k H_{i,t-k} + \mu_{i,t} \tag{2}$$

$$H_{i,t} = \sum_{k=1}^{p} \chi_k H_{i,t-k} + \sum_{k=1}^{p} \delta_k GDP_{i,t-k} + \upsilon_{i,t} \tag{3}$$

where: GDP – gross domestic product per capita in constant prices in USD, H – Hirschmann export concentration index, μ, υ – residual components, t – the period of analysis, k – the number of delay variables.

All the above mentioned time series had annual frequency and cover the period from 1995 to 2009.

Before the model estimation it was necessary to specify stationarity of the analyzed time series. To this purpose the Augmented Dickey-Fuller Test (ADF) was used. Among the analyzed data used in the study were time series of integration row 0 and 1. The lack of stationarity of time series has forced a modification of the functional model, which was to replace the size of the analyzed variables by their first differences. The choice of the lag lengths for stationarity testing (two years) was made on the basis of results of the Akaike, Schwartz-Bayesian and Hannan-Quinn information criteria.

Analyzing changes in the average degree of exports concentration in EU member states it can be seen that the highest indices of the exports concentration in 1995 and 2009 were in Malta, Ireland, Cyprus and Lithuania, while the smallest indices had Austria, the

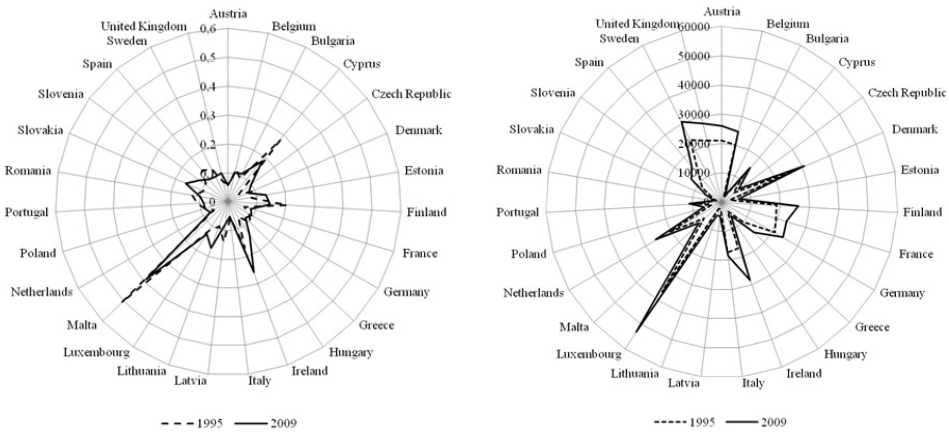

Fig. 1. Indices of exports concentration and GDP per capita in the EU in years 1995 and 2009
Rys. 1. Wskaźniki koncentracji eksportu i PKB per capita w UE w latach 1995 i 2009

Source: Own calculations based on UNCTAD Handbook of Statistics [2010].
Źródło: Obliczenia własne na podstawie UNCTAD Handbook of Statistics [2010].

Netherlands and Italy. The highest levels of GDP per capita characterized such countries as Luxembourg, Denmark and Sweden, while the smallest GDP per capita were in Bulgaria, Romania and Lithuania (Figure 1).

From a theoretical point of view, due to the relatively larger share of standardized goods in exports in developing countries they should have generally a higher degree of specialization than the developed countries. Analyzing data on the degree of exports concentration in EU member states it can be obtained confirmation of the hypothesis, suggesting the presence of higher degrees of exports concentration in the relatively less-developed EU members. However, it was found that the correlation between the degree of exports concentration and GDP per capita is not linear (Figure 2).

In accordance with the Figure 2 it can be identified two threshold levels of GDP per capita beyond which examined countries increased the level of exports concentration (specialization). The first threshold level of GDP per capita for the poorest UE countries amounted to about 6 thousand USD, while the second threshold level of GDP per capita for the richest EU countries amounted to about 20 thousand USD. Thus, the relationship between the degree of exports concentration and GDP per capita in EU member states took on the shape of the letter "W" but not the letter "U" as it was suggested by Imbs, Wacziarg [2003] and Hesse [2008].

In order to define a causal link between changes in the degree of exports diversification and GDP per capita in the EU in the period 1995–2009 it was necessary to estimate the structural parameters of the VAR model. The results of model estimation were shown in the table below (Table 1).

On the basis of estimation results of the equation (GDP) it can be concluded that a factor which significantly determined the size of GDP per capita in the EU in the period 1995–2009 was the degree of exports concentration. Namely, the increase in the exports concentration by 1% led to an increase in GDP per capita on average by 0.33%. On the

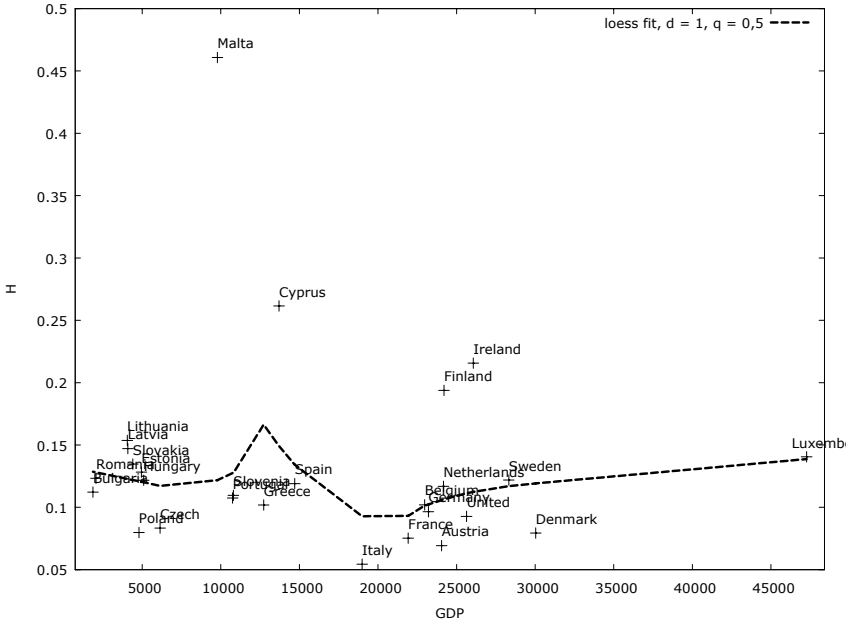

Fig. 2. The degree of exports concentration and GDP per capita in the EU in the period 1995–2009

Rys. 2. Stopień koncentracji eksportu i poziom PKB per capita w UE w okresie 1995–2009

Source: Own calculations based on UNCTAD Handbook of Statistics [2010].
Źródło: Obliczenia własne na podstawie UNCTAD Handbook of Statistics [2010].

Table 1. The results of structural parameters estimation of VAR model
Tabela 1. Wyniki estymacji parametrów strukturalnych modelu VAR

Equation: GDP					
	Współczynnik	*Błąd stand.*	*t-Studenta*	*wartość p*	
const	0,0406721	0,0292802	1,3891	0,20740	
GDP_1	1,15027	0,442425	2,5999	0,03543	**
GDP_2	–1,87001	0,754928	–2,4771	0,04239	**
H_1	–0,0396517	0,0986773	–0,4018	0,69979	
H_2	0,333858	0,110924	3,0098	0,01967	**
Mean dependent var	0,019317		S.D. dependent var	0,026230	
Sum squared resid	0,001629		S.E. of regression	0,015254	
R-squared	0,784800		Adjusted R-squared	0,661829	
F(4, 7)	6,358478		P-value(F)	0,017489	
rho	–0,277785		Durbin-Watson	2,349247	
Equation: H					
	Współczynnik	*Błąd stand.*	*t-Studenta*	*wartość p*	
const	–0,0151619	0,0692687	–0,2189	0,83298	
GDP_1	1,4436	1,83334	0,7874	0,45687	
GDP_2	–0,952595	1,45027	–0,6568	0,53228	
H_1	–0,170472	0,285043	–0,5981	0,56864	
H_2	0,136756	0,451301	0,3030	0,77068	
Mean dependent var	–0,003715		S.D. dependent var	0,052404	
Sum squared resid	0,026092		S.E. of regression	0,061053	
R-squared	0,136248		Adjusted R-squared	–0,357324	
F(4, 7)	1,109617		P-value(F)	0,422784	
rho	–0,061787		Durbin-Watson	2,089666	

Source: Own calculations.
Źródło: Obliczenia własne.

other hand, on the basis of estimation results of the equation (H) it can be concluded that GDP per capita was not statistically significant determinant of the degree of exports concentration in the EU in the period 1995–2009.

The next step in the analysis was to measure the impact of the degree of exports concentration on the size of GDP per capita in the EU. It was made using so-called impulse response function, which is the reaction function of GDP per capita to an impulse in the form of a unit change of exports concentration and GDP per capita (Figure 3).

The final stage of analysis was the variance decomposition of residual component of GDP per capita in order to estimate the impact of changes in GDP per capita and the degree of exports concentration on the variability of GDP per capita in the EU (Table 2).

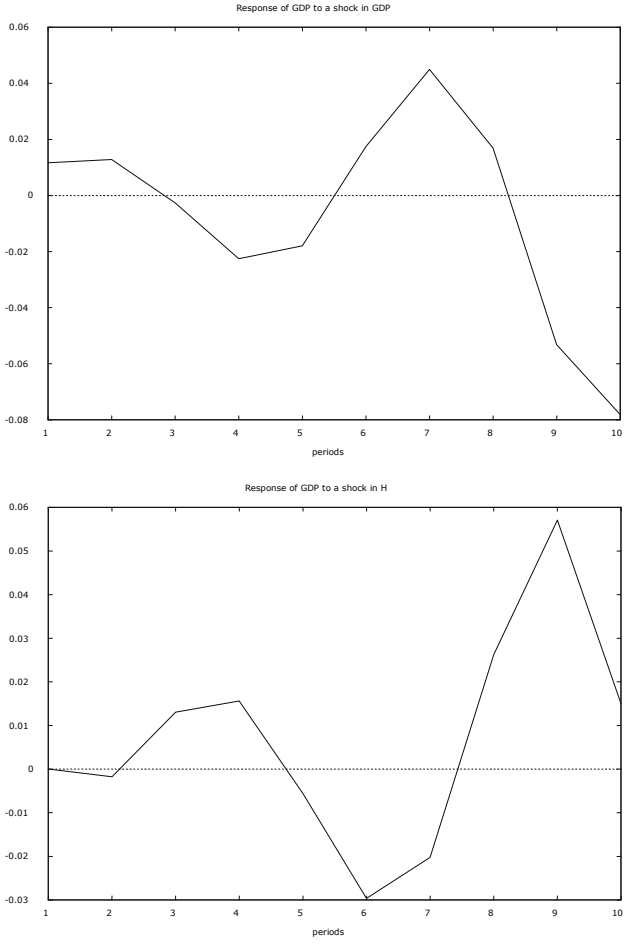

Fig. 3. Impulse response functions
Rys. 3. Funkcje odpowiedzi impulsowych

Source: Own calculations.
Źródło: Obliczenia własne.

Table 2. The error variance decomposition for variable GDP
Tabela 2. Dekompozycja wariancji dla zmiennej GDP

The number of quarter after shock	GDP	H
2	99,0	1,0
4	66,2	33,8
6	52,1	47,9
8	60,7	39,3
10	68,2	31,8

Source: Own calculations.
Źródło: Obliczenia własne.

In accordance with data in above table it should be noted that the changes in GDP per capita explained about 66% of the variation of GDP per capita in the EU in four years after the shock and more than 68% of the variability of GDP per capita after ten years. In turn, changes in the degree of exports concentration in the EU accounted for about 34% of the variability of GDP per capita after four years and almost 32% of the variability of GDP per capita after ten years.

Influence of exports concentration on GDP per capita was significantly varied in a size among the individual EU member countries. Namely, the largest impact coefficients of the exports concentration to GDP per capita were affirmed in Romania and Lithuania. However, in the case of the six countries were found negative values of these coefficients (Table 3).

Table 3. Elasticity coefficients of GDP per capita to changes in the exports concentration in the EU in the period 1995–2009
Tabela 3. Współczynniki elastyczności PKB per capita na zmiany wskaźnika koncentracji eksportu w UE w okresie 1995–2009

Countries	H → GDP
Austria	0,08
Belgium	0,07
Bulgaria	0,01
Cyprus	–0,02
Czech Republic	–0,02
Denmark	0,03
Estonia	0,04
Finland	0,15
France	0,10
Germany	0,06
Greece	–0,02
Hungary	–0,04
Ireland	0,06
Italy	–0,10
Latvia	0,12
Lithuania	0,20
Luxemburg	–0,08

Table 3, cont.
Tabela 3, cd.

Malta	–0,08
Netherlands	0,06
Poland	0,11
Portugal	0,04
Romania	0,69
Slovakia	0,10
Slovenia	0,17
Spain	0,12
Sweden	–0,14
United Kingdom	0,08

Source: Own calculations.
Źródło: Obliczenia własne.

Analyzing the calculated elasticity of GDP per capita to changes in the concentration of exports compared to the average degree of concentration of exports in the various EU member states it can be detected certain regularity in this respect. Namely, in general, the largest positive impact of concentration of exports to changes in GDP per capita are found in those EU countries where the degree of exports concentration was at a level close to 0.15 (Figure 4).

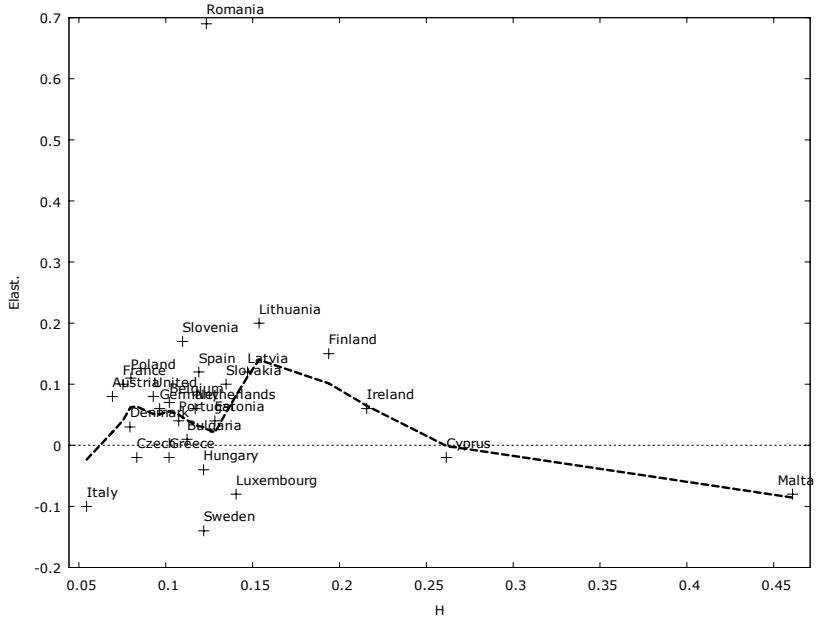

Fig. 4. Elasticity coefficients of GDP per capita to changes in the exports concentration and the average degree of exports concentration in the EU during 1995–2009
Rys. 4. Współczynniki elastyczności PKB per capita na zmiany koncentracji eksportu a średni stopień koncentracji eksportu w UE w okresie 1995–2009

Source: Own calculations based on UNCTAD Handbook of Statistics [2010].
Źródło: Obliczenia własne na podstawie UNCTAD Handbook of Statistics [2010].

Thus, the degree of export concentration close to 0.15 was found to be optimal from the positive impact of the exports concentration on GDP per capita point of view. Countries in which the degree of exports concentration was higher than optimal level recorded a relatively smaller and positive impact of changes in the exports concentration on GDP per capita.

CONCLUSIONS

Based on the analysis concerning the relationship between the degree of exports diversification and GDP per capita in EU member states during the years 1995–2009 it was found that exports diversification (concentration) was one of the most important factors that determined the level of GDP per capita in the EU. Namely, the impact of the exports concentration on changes in GDP per capita amounted to 0.33. It was also calculated that changes in the degree of exports concentration in the EU explained on average over 30% of the variability of GDP per capita in the EU. At the same time it was revealed a nonlinear relationship between the degree of exports concentration and GDP per capita in the EU. The relationship between the degree of exports concentration and GDP per capita took the shape of the letter "W". It meant that the exports diversification increased in countries with relatively low GDP per capita, while the exports concentration increased in countries with relatively high GDP per capita. Results of this study have significant macroeconomic implications for individual EU member states. Depending on the critical level of export diversification it should be taken appropriate actions to achieve the desired structure of exports in the country and thereby to intensify the pro-growth impact of exports.

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DYWERSYFIKACJA EKSPORTU A WZROST GOSPODARCZY W KRAJACH CZŁONKOWSKICH UNII EUROPEJSKIEJ

Streszczenie. Podstawowym celem artykułu jest analiza związków między dywersyfikacją eksportu i wzrostem gospodarczym w Unii Europejskiej w okresie 1995–2009. Artykuł składa się z dwóch części. Pierwsza część dotyczy analizy teoretycznej w zakresie współzależności między stopniem dywersyfikacji (koncentracji) eksportu i wzrostem gospodarczym z uwzględnieniem głównych czynników determinujących te zależności. W następnej części artykułu zbadano związek między stopniem koncentracji eksportu i wzrostem gospodarczym w krajach członkowskich Unii Europejskiej za pomocą modelu wektorowej autoregresji (VAR). Dokonano oszacowania współczynników elastyczności PKB per capita na zmiany koncentracji eksportu na podstawie funkcji odpowiedzi impulsowych. Następnie przeprowadzono dekompozycję wariancji w celu oszacowania wpływu zmian PKB per capita i stopnia koncentracji eksportu na zmienność PKB na mieszkańca w UE.

Słowa kluczowe: dywersyfikacja eksportu, koncentracja eksportu, wzrost gospodarczy

Accepted for print – Zaakceptowano do druku 01.04.2011

ACTA SCIENTIARUM POLONORUM *Oeconomia 10 (2) 2011, 65–74*

FUNCTIONS OF RETAIL TRADE IN THE BORDERLANDS OF POLAND – A THEORETICAL PERSPECTIVE

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Abstract. The functioning of retail trade in the borderland areas of Poland in the 1990s and in the first decade of the 21st century was largely determined by shopping done in Poland by citizens of the neighbouring countries. Using the multifunctional model of the functions of retail trade and the service and functional trade theories, the author pointed out that the basic functions of retail trade in borderland areas are activities of economic character. Social functions of trade are also of high importance, e.g. the function of an integrator of social life, whose aim is to equalise culture differences, and create the atmosphere of co-operation in diversified territories. The functions of local development are very important in borderland areas, because they contribute to greater competitiveness of border towns, to the creation of new jobs, and to improvement in the living conditions and in the standard of living of the inhabitants.

Key words: functions of retail trade in borderland areas, retail trade, service trade theory, functional trade theory

INTRODUCTION

Retail trade in the borderlands of Poland in the 1990s and in the first decade of the 21st century was characterised by a high percentage of consumers coming from the neighbouring countries. Frequent shopping trips to the neighbouring country were caused by differences in prices of goods used for similar purposes and by disproportions between the inhabitants' incomes and standard of living. Cross-border shopping occurred mainly in places near border crossings and along communication routes leading to these crossings. Marketplaces played an important role in cross-border trade: the sales area became larger, the number of retail units increased, and so did the proceeds from marketplace fees [Powęska 2002]. The phenomenon differed depending on the stretch of border, and

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was conditioned by economic, social, formal, legal, and organizational factors [Powęska 2008a].

This article constitutes an attempt to look at the functioning of the retail trade in the borderlands of Poland during the last 20 years from perspective of the services and the functional trade theories. It also aims to define the functions of borderland retail trade. From various theories concerning the functioning of trade [Grzesiuk 2010], the following were chosen as the basis for the analysis: the service trade theory and the functional trade theory. This was mainly due to the fact that they both refer to market economies.

RESEARCH METHODOLOGY

The analysis was based on literature, statistical information published by the Central Statistical Office, and the author's own research. On the basis of theoretical concepts described in literature, it was defined the usefulness of the service and the functional theories for the description of the functioning of retail trade in the borderland areas. Next, using statistical data, literature of an empirical character, and own field observations, the functions of retail trade in the borderlands were defined. The basic assumptions of empirical research are in keeping with the economic trade theory, according to which trade is the link between the person who possesses something and the person who needs it, between the sphere of production and consumption, with the use of a medium of exchange [Szulce 1998].

THE FUNCTIONING OF RETAIL TRADE IN THE BORDERLANDS FROM THE PRESPECTIVE OF SERVICE TRADE THEORY

In the service trade theory the fundamental premise is that the aim of trade is to create services [Grzesiuk 2010], and that the functioning of retail units as far as spatial organisation, time, choice of goods, and information are concerned, is subject to the requirements of the buyer. By describing trade as "the producer of services", the authors (A. Wakar) and proponents (W. Jastrzębowski, J. Kurnal) of this theoretical concept distinguished trade from the sphere of material production. In this theory, the main role is played by the customer, who is the recipient and consumer of the services "produced" by trade. These services can be divided into the following groups [Szulce 1998]:

- connected services, i.e. services inextricably linked with the act of purchasing goods (e.g. the access to the shop, complementarity of shopping). The cost of these services is included in the price of merchandise;
- optional services, which do not depend on the purchase of the merchandise; these services are often free of charge (e.g. alterations made to a piece of clothing purchased in the given shop);
- full range services which consist in ensuring a full and constant supply of goods in terms of volume of supply and the assortment structure;
- common services, which means that retail units stock goods so that customers can shop at a time convenient to them.

In Polish local government units situated in close proximity to border crossings and along communication routes leading to border crossings, during the last 20 years, a considerable percentage of all customers were citizens of the neighbouring countries [Powęska 2008b; *Ruch graniczny* (*Cross-border traffic*…) 2010]. For that reason the functioning of retail trade in the borderlands was subject to the expectations and requirements of the foreign customers living in the neighbouring countries. This fact was confirmed by research done between 1995 and 2002 by the Central Statistical Office concerning the amounts of money spent on shopping by foreigners in Poland and by Poles abroad [*Ruch graniczny i wydatki cudzoziemców w Polsce i Polaków za granicą* (*Cross-border traffic and the expenditures of foreigners in Poland and of Poles abroad)*, Central Statistical Office 1996, 1997, 1998, 1999, 2000, 2001, 2002]. The research shows that from the economic point of view Polish borderlands were the beneficiary of this phenomenon. The same is underlined by local government officials from the borderland communes, who (if it is possible) seek to open border crossings in their local government units.

Retailers in the borderlands of Poland adapted the scope of their activity to a considerable extent to the requirements of foreign customers, and enabled them to buy (sometimes sell) goods in the most favourable conditions as regards time and space. Domestic customers (Polish citizens living in the border zone) did not constitute the main target group for retail trade in the zones in the immediate neighbourhood of border crossings, because domestic customers were less numerous, and often had limited financial means. Consequently, their needs were treated as less important by many retailers.

Therefore, the service trade theory can be verified in some respects in the analysis of the functioning of retail trade in the borderlands of Poland during the period of transformation. However, the functions performed by retail trade in relation to Polish and to foreign customers must be distinguished. As far as foreign customers are concerned, the assumption that retail trade provides connected services and often adapts the time and place of the activity, and the assortment of goods to the requirements of customers, proved to be true. Some retail units offered also optional services: the goods purchased in the shop could be adjusted to the needs of customer, which fact was seen as an additional advantage of shopping in Poland. The structure of shopping done in Poland, resulting mainly from differences in prices and quality, did not include all the essential household items. Therefore, full range and common pantry services were not prepared or realized for foreign customers by Polish retail trade in the borderlands. Due to substantial financial benefits derived from trade targeted at foreign customers, most of the retailers in the border zone oriented their activity towards the needs of consumers from the neighbouring countries, and often treated Polish citizens as second-class customers. Hence, the range of services offered to domestic customers was not full.

THE FUNCTIONING OF RETAIL TRADE IN THE BORDERLANDS FROM THE PRESPECTIVE OF FUNCTIONAL TRADE THEORY

The differences between the supply and demand for goods and services are the essence of the functional trade theory. H. Szulce expressed it as "the existence of two systems of the volume of goods: the initial and the final" [1998]. Trade develops and

fulfils its various functions between these systems. There are many differences (of a temporal, spatial, and quantitative character, and in assortment) between the initial system of the volume of goods, shaped by producers, and the final system of the volume of goods, shaped by consumers' present needs. Trade is to mediate between the initial and the final stage. According to A. Grzesiuk, the main function of trade is „to equalize these divergences and to turn production assortment into retail assortment in sufficient quantity, and in a place and at a time convenient for the consumers" [Grzesiuk 2010]. The functional trade theory was created by Z. Zakrzewski; J. Dietl and A. Grzesiuk is among his followers. Zakrzewski saw the basic function of trade as the coordination of the generic structure of goods. According to this author, complementary functions of trade were as follows: management of the movement of goods in time, management of the movement of goods in space, shaping a single part of goods, shaping the assortment structure of goods. According to Dietl, the basic function of trade was the distributional function, and auxiliary functions were as follows: creating various services for intermediate and final recipients and for suppliers, maintaining and controlling stock, the informational function, the function of stimulating demand by exerting an impact on the market, the function of the redistribution of the national income, especially the household income, the function of creating growth, and the civilisational and cultural function. Having taken into consideration both the above-mentioned concepts, A. Grzesiuk proposed a multidisciplinary model of the functions of retail trade [Grzesiuk 2010]. The researcher took into account the dynamic changes that occurred in the economy in the last 20 years and the close relationship between trade and space, and in her model she distinguished economic functions, social functions, and the functions of trade in the process of local development. Among economic functions she enumerated: the function of mediating the exchange of goods, the function of creating value for the customer, and the share of trade in gross domestic product. In Grzesiuk's model, the social functions were included: the cultural function, and the function of an integrator of social life. The group of trade functions trade in the process of local development comprises functions connected with the business environment, the function of the employer, the urban development function, and the function of shaping the quality of life of the inhabitants.

Various actions are undertaken to fulfil each of the above-mentioned functions. For the purposes of this article, it was defined which of these actions (and to what extent) are undertaken by retail trade in the borderland areas (Table 1). Mediating the exchange of goods is a function which underwent changes in parallel with the transformation of the socio-economic systems. Today, it is said to be the last link in the chain connecting the producer and the consumer. Within this function, retail units undertake a number of actions aimed at introducing various improvements and changes in order to make trade more customer friendly [Grzesiuk 2010].

An analysis of the sale and purchase markets involves constant and systematic observations made by retailers. On the one hand these observations concern the possibilities and conditions of purchasing new goods and their sale, and on the other, they are connected with customers and their preferences and needs. In this sense, trade has an important informational function informing the producer about customers, and customers about new products. Such actions were observed in retail units functioning in marketplaces situated mainly in close proximity to border crossings. There, the assortment structure was

Table 1. Functions of retail trade and actions corresponding to them
Tabela 1. Funkcje handlu detalicznego oraz właściwe im czynności i działania

Functions	Actions
ECONOMIC FUNCTIONS	
The function of mediating the exchange of goods	analysing purchase markets
	taking over the risk taken by other participants of the process of the exchange of goods
	shaping the range of goods on offer
	distribution of goods
	handling sale and purchase transactions
The function of creating value for the customer	creating value and benefits for the customer in retail trade
	creating value for the customer within the service offer
The share of trade in gross domestic product	creating gross domestic product by trade
	the volume and structure of sales
	trade investments
SOCIAL FUNCTIONS	
The cultural function	equalizing cultural differences
	creating a bridge between cultures
	creating the atmosphere of cooperation in culturally diversified territories
The function of an integrator of social life	a way of spending ones free time in a shopping centre
	a commercial service: a shopping and service centre
The function of an integrator of the life of cross-border communities	accepting the cross-border cultural and political differences
	establishing cross-border contacts at the local level
FUNCTIONS OF TRADE IN THE PROCESS OF LOCAL DEVELOPMENT	
Functions connected with the business environment	planning the retail unit
	building (modernizing) the retail unit
	target activity
The function of the employer	creating new relationships in distribution channels
	local market activation
	creating new jobs
	increase in qualification levels and skills
The urban development function	endogenous activity of retail trade
	exogenous activity of retail trade
The function of shaping the quality of life of the inhabitants	trade as the object of interest and activities of the local government
	tasks financed from the receipts from retail trade
	creating new shopping needs and preferences

Source: Own research on the basis of: Grzesiuk 2010.
Źródło: Opracowanie własne na podstawie: Grzesiuk 2010.

adapted to the customers' preferences. The degree to which retail trade takes over the risk taken by other participants of the process of the exchange of goods is closely connected with way of trading and with the assortment on offer in a given shop. The risk is higher when the retailer buys goods from the producer or the middleman. When the transfer of ownership does not occur, the risk is smaller.

Activity aimed at shaping the range of goods on offer, namely preparing such a structure of goods in a retail unit which would correspond with the customers' needs, has been undertaken in the borderland areas. In the neighbourhood of border crossings the range of goods on offer was subordinated to the needs of foreign customers, and in the remaining areas it resulted from the needs of domestic customers. The following activities connected with physical distribution of goods: activities connected with the transfer of goods from the point of origin to the point of sale, stocking goods, storage, transportation, and other activities, both in the borderlands and in other areas are being taken over by more and more specialized logistics centres and companies from the trading environment. However, more and more often, retail units, especially large chain stores, establish direct contact with producers, and consequently logistic and informational functions are realized by trade. Such activities are noted chiefly in places where large-area shopping centres and chain stores are becoming increasingly important. As far as handling sale and purchase transactions in the borderland areas is concerned, a considerable spatial differentiation can be noted.

The function of creating value for the customer is a domain of modern retail trade, which undergoes constant modifications in order to find new ways of building competitive advantage. To find new ways of creating value for the customer, retail trade uses the following means: additional services, positioning of the retail unit (chain), own-brand products, new forms of shops, loyalty programmes. These are used within the area of creating value and benefits for the customer in retail trade and in services. The interpretation of the product from a marketing point of view, according to which the customer buys not only a "product", but a "benefit" and a "service", served as the basis for distinguishing the function of creating value and benefits for the customer in retail trade. Taking into consideration creating benefits for the customer, the most important are values attained though innovative trade activities and through establishing long-lasting privileged relations between the seller and the buyer. Retail trade in zones where most of the buyers are foreign tourists consists in shopping in which individual approach is not a key feature, and thus this function is rarely fulfilled. Creating value for the customer within the scope of the service offer consists of a number of services which can be bought before or after purchasing the goods, or as additional services. Such activities are done in borderland areas in supermarkets.

Trade as a domain of economic activity fulfils the function of creating gross domestic product. The share of trade in GDP in Poland in 2000 amounted to 17.3%, and to 16.2% in 2009. In the borderlands of Poland retail trade has a positive impact on GDP thanks to: (1) non-classified/unrecorded current revenues from cross-border trade, which in the 1990s amounted to a few percent of Poland's GDP; (2) investments, especially in supermarkets; (3) a significant percentage of people working in retail sector.

In borderland areas, the functions of trade in the process of local development become especially important. The business environment of retail trade creates benefits for the local development at every stage of the development of the company: from the phase of planning the retail unit, through the construction (modernisation) of the retail unit, to the stage of the target activity. The range of these benefits is diversified spatially. The greatest benefits occur in towns and units of local government situated in close proximity to border crossings, and along communication routes leading to border crossings. In the

phase of planning the retail unit the greatest beneficiaries are the landowners. The local companies are the beneficiaries of the development of retail trade at the stage of the construction of the retail unit, however, the greatest benefits are noted at the local level when the target activity of the retail unit is being conducted. Companies providing services for the retail unit (e.g. cleaning, security, conservation, promotion) increase in number, local suppliers and producers develop their activity, especially when it comes to short shelf life goods. The development of retail trade is advantageous to transportation companies, waterworks, gasworks, power stations, sewage works, etc. On territories situated further from border crossings and communication routes leading to these crossings, the range of benefits derived from the development of the functions connected with the business environment of trade is smaller and comprises some business environment services: design, geodetic, cartographic, and legal services. At the stage of construction or modernization of the retail unit, benefits are reaped by the suppliers of building materials and companies providing furniture and equipment for retail units. However, there is fierce competition between companies from the whole territory of Poland and from abroad. Benefits at the stage of the activity of the retail unit are gained mainly by transportation companies.

The function of trade as the employer is crucial to the local development in borderland areas. The development of cross-border trade results in dynamic changes in retail trade. The development of entrepreneurship and job creation contribute to the improvement of living conditions and to the increase in the level of socio-economic development. The increasingly demanding trade contributes to a new perspective on the issues of education and improving skills of the local community. Satisfying educational needs is possible with an increase in earnings in retail jobs. People living outside the zone of direct impact of the border can also find retail jobs, jobs with suppliers, jobs in companies providing services for or next to retail units. From the point of view of the functioning of borderland areas, the function of trade as the employer is very important, because the possibility of getting a job curbs emigration, especially of young people. It also opens up the possibility of employing people from outside the region, which fact has a positive impact on the competitiveness of the region.

The trade function, among many other socio-economic functions such as: service, tourist, health resort, transport, administrative, port, university, and industrial functions, has always been an important factor of urban development. When the effects of trading activity are concentrated within the town limits, we deal with endogenous functions, which cater for the needs of the town. When these activities are directed outwards, i.e. when the recipients are outside the town, these functions are treated as exogenous. In towns such as Słubice, Przemyśl, Cieszyn, situated on the border, or in towns situated in the zone of direct impact of the border, e.g. Nowy Targ, Białystok, Zamość, retail trade became an important exogenous function, strongly influencing the standard of living of the inhabitants and the town's potential.

The function of shaping the quality of life of the inhabitants, distinguished by A. Grzesiuk [2010] within the group of functions of trade in the process of local development, is analysed from the angle of: (1) the attitude of the local government towards trade; (2) the importance of the receipts from trade to the local budgets for the realisation of the local government tasks; and (3) creating new shopping needs and preferences. In relation to the aims and tasks of the local government, the function of shaping the

quality of life of the inhabitants concerns mainly: (1) shaping the spatial access to retail units; (2) the responsibility to ensure a suitable trade infrastructure, which would meet the requirements and needs of customers living in the given unit of local government and of those living outside this unit; (3) formulating the rules for the functioning of trade, bearing in mind the development goals at the local level.

The author distinguished three groups of attitudes of local governments towards trade: consultative, protective of the small and medium enterprises, and localisational. The receipts from trade are in the form of: (1) taxes and local charges, and redistributed income tax; (2) property tax paid e.g. by suppliers or transportation companies; (3) concessions paid by shops to the local government units. These receipts constitute one of the sources of financing investments and tasks of the local government. Creating new needs and preferences in the field of shopping done by inhabitants is perceived as an element of civilisational progress of the given local community. In the case of borderland areas, the role of trade in shaping the quality of life of the inhabitants is extremely important. In numerous units of local government situated in close proximity to border crossings, trade is treated by the local communities as the basic source of income, which is why the local authorities take into account all opinions of the local communities concerning trade. Therefore, this constitutes the realisation of the consultative attitude. The attitude protective of the small and medium enterprises means restricting the development of large stores and favouring the local medium-sized and small trading companies. This situation can be observed in small towns and in rural areas; in medium-sized towns (Przemyśl, Biała Podlaska) alongside small trading companies also large stores can be noted. In local government units which are not directly connected with border crossings, a localisational attitude can be observed. It consists in creating favourable conditions for the development of trade and in indicating specific tools and solutions which will contribute to the shaping of the local trading network.

The group of social functions consists of: the cultural function, the function of an integrator of social life, and the function of an integrator of the life of cross-border communities. The cultural function and the function of an integrator of social life are seen from the angle of the importance of trade in the process of integration of social groups and local communities. It was pointed out that the integration process was influenced by extending the range of functions of retail units, especially shopping centres [Grzesiuk 2010]. However, in borderland areas we deal with an additional function of retail trade, which can be defined as the function of an integrator of the life of cross-border communities. This function was identified on the basis of the present author's (Halina Powęska) field observations conducted in the western and eastern borderlands of Poland. It was noted that together with an increase in the intensity of cross-border trade, the social distance between the neighbouring cross-border communities, resulting from linguistic and cultural differences, decreased. In places along the Polish-German border with the largest concentration of cross-border trade (Zgorzelec, Gubin, Słubice), various actions were undertaken within the function of an integrator of the life of cross-border communities, e.g.: common cross-border cultural events, language courses (learning the language of your neighbour), schools open to children from both sides of the border. In the north-east borderlands the function of retail trade as an integrator of the life of cross-border communities resulted in a change in the treatment of citizens of the neighbouring

countries: the transition from treating the neighbour from across the border as a "foreigner" to perceiving him/her as "one of us", in noticing and appreciating common historical and cultural heritage, and in accepting religious diversity. It will not be an exaggeration to say that the growing number of contacts established within the framework of trade play a major role in the process of getting to know each other between cross-border communities and accepting each other's differences.

CONCLUSIONS

In explaining the functioning of retail trade in borderland areas, the functional theory has fundamental importance, and the multifunctional model of the functions of retail trade seems especially useful. It was pointed out in the article that activities proper to the function of mediating the exchange of goods are realised in the borderland areas. Social functions of trade are of high importance in the borderland areas. Such activities as: equalising culture differences, creating a bridge between cultures, and creating the atmosphere of cooperation in culturally diversified territories, realized within the cultural function, contributed to the improvement of social relations between the neighbouring communities. Having taken into account the specific nature of the functioning of borderland areas, the author proposed a new function of retail trade, proper to borderlands, which would enter the group of social functions. This function was described as the function of an integrator of the life of cross-border communities. In borderland areas, the functions of local development are very important. They contributed to greater competitiveness of some towns, to the emergence of local business elites, to the creation of a large number of new jobs, and to a general improvement in the living conditions and in the standard of living of the inhabitants of borderland areas.

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FUNKCJE HANDLU DETALICZNEGO W OBSZARACH PRZYGRANICZNYCH POLSKI – ASPEKTY TEORETYCZNE

Streszczenie. Funkcjonowanie handlu detalicznego w obszarach przygranicznych Polski w latach 90. XX wieku i w pierwszej dekadzie XXI wieku było w znacznej mierze zdeterminowane przez przyjazdy do Polski obywateli sąsiadujących krajów w celu dokonania zakupów. Wykorzystując multifunkcjonalny model funkcji handlu detalicznego oraz usługową i funkcjonalną teorię handlu, wskazano, że do podstawowych funkcji pełnionych przez handel detaliczny w obszarach przygranicznych należą działania o charakterze ekonomicznym. Bardzo ważne znaczenie mają także funkcje społeczne handlu, w tym funkcja integratora życia społeczności transgranicznych, której efektem jest niwelowanie różnic kulturowych oraz tworzenie atmosfery współpracy w zróżnicowanych kulturowo obszarach. Istotne dla obszarów przygranicznych są funkcje rozwoju lokalnego, które przyczyniają się do wzrostu konkurencyjności miast przygranicznych, powstania nowych miejsc pracy i poprawy warunków i poziomu życia mieszkańców.

Słowa kluczowe: funkcje handlu detalicznego w obszarach przygranicznych, handel detaliczny, usługowa teoria handlu, funkcjonalna teoria handlu

Accepted for print – Zaakceptowano do druku 12.05.2011

ACTA SCIENTIARUM POLONORUM *Oeconomia 10 (2) 2011, 75–81*

EVALUATION OF THE EFFECTIVENESS OF THE FINANCIAL LIQUIDITY STRATEGY IN THE FOOD ECONOMY ENTERPRISES

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Abstract. The paper presents results of analysis of strategies of liquidity in two food companies. There were used for this purpose two methods – ratio analysis and calculation of the residual profit. The study refers to five-year period 2005–2009. Analyzed companies differed because of two different liquidity strategies. Calculated residual profit of both companies was positive, what proves that their liquidity management strategies enhance the value of these companies.

Key words: liquidity, effectiveness, residual profit

INTRODUCTION

Financial liquidity means the ability of an enterprise to achieve money flows which enable the payment of the exacting liabilities and the coverage of the unexpected cash expenditures [Wędzki 2003]. Each manager of a firm functioning in the market economy should know that one of the most important task of the firm is a maintenance of the financial liquidity. This frequently decides about the firm destiny. The experiences of the entirely developed market economies indicate that the main cause of bankruptcies is not the bearing of losses but the deprivation of financial liquidity [Czekaj, Dresler 2002]. The type of the applied strategy of the financial liquidity influences an increase and/or a decrease of the enterprise value both in a short and a long period. The ascertainment of its effectiveness should be an important task of the financial manager of each enterprise. The flow of time, and more precisely the change of the existing economical conditions within and around the enterprise makes the financial strategy applied by the firm management becomes less effective in the accomplishment of its aims. This causes the necessity of

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the evaluation to what degree the strategy has become obsolete and what correction it demands [Wędzki 2003].

This work aims at the analysis of the strategy of financial liquidity and attempts to evaluate its effectiveness on the basis of two enterprises of food economy. The goal was accomplished with the use of both less laborious methods and decidedly more complex ones.

DATA SOURCES AND METHODOLOGY

The source data derived from the balances, accounts of incomes and losses, as well as the additional information from the companies, the organizational-legal form of which is the joint stock company. The analysis comprised two meat-processing enterprises: Duda Co. and Indykpol Co., in the period between 2005–2009.

The analysis of the effectiveness of the strategy of financial liquidity can be performed by two methods of a various degree of complexity. The simpler methods, easier in practice, are also less expensive, however they do not secure an entire information about what ceased to be effective in the adopted strategy. More developed methods supply such information, yet they are more laborious [Wędzki 2003].

The work uses two methods, i.e. the index analysis and the calculation of the residual income.

The method of the analysis of financial liquidity comprised the analysis of the following indexes: current ratio, quick ratio, cash conversion cycle. The last one consists of several auxiliary indexes creating one measure according to the formula [Wędzki 2003]:

$$\textit{Cash conversion cycle} = \textit{reserves cycle} + \textit{amount due cycle} - \textit{current liabilities cycle.}$$

The analysis was deepened by the index of the net liquid balance due to the formula:

$$\textit{Index of net liquid balance} = \frac{\textit{short term investments} - \textit{credits and loans} - \textit{other liabilities claim to debt securities}}{\textit{assets}}$$

The index analysis is not sufficient for the detailed evaluation of the effectiveness of the financial strategy, therefore necessary is the calculation of the residual income which may be achieved by the enterprise applying the given strategy of the financial liquidity. The simplified formula of the residual income has the form [Wędzki 2003]:

$$RI = [ZS \times (1 - Tx) + A] - WACC \times (AOP + OKN) \geq 0,$$

where:

RI – residual income at the end of year,
ZS – income from sale achieved due to given strategy,
Tx – rate of income tax,
A – yearly amortization,
$WACC$ – yearly rate of weighted average cost of capital,
AOP – operational assets at the end of year,
OKN – operational working capital at the end of year.

The weighted average cost of the capital is the sum of the way of the weighted financing of its share in the liabilities of the enterprise [Wędzki 2003]:

$$WACC = k_E \times u_E + k_d \times u_d,$$

where:
k_E – cost of own capital,
u_E – share of own capital in liabilities of the enterprise,
k_d – cost of borrowed capital,
u_d – share of borrowed capital in liabilities.

The cost of own capital was estimated with the CAPM method due to the formula [Dynus, Kołosowska, Prewysz-Kwinto 2002]:

$$R = R_f + \beta \times (R_m - R_f),$$

where:
R_f – rate of return of the free-risk investment,
R_m – rate of return from the market assets,
$(R_m - R_f)$ – average bonus for risk,
β – beta index for own capital of given enterprise.

The rate of the risk-free return was estimated on the basis of the average rate of profitability of 52 week treasury bonds. The beta index was calculated according to the formula [Mayo 1997]:

$$\beta = \frac{\sum_{i=1}^{n} \left(R_{it} - R_i\right)\left(R_{mt} - R_m\right)}{\sum_{i=1}^{n} \left(R_{mt} - R_m\right)^2},$$

where:
n – number of periods supplying information,
R_{it} – rate of return of i-stock in t-period,
R_{mt} – rate of return of market index in t-period,
R_i – arithmetic average of return rates of i-stock,
R_m – arithmetic average of return rates of market index.

The beta coefficient expresses the relation between the change of the stock price of a given firm and the change of the value of main stock index. If the index $\beta > 1$, it means that the stock price of a given company increases (decreases) faster than the increase (decrease) of the stock index and henceforth the stocks are encumbered with a higher risk than the average risk on the stock market. If the index $\beta < 1$, than the change of the stock price of a given company is weaker than the change of the stock index, and therefore the risk is lower. The third, i.e. utmost case, occurs when $\beta = 1$. In such situation the stock price of a given firm changes at the same rate as the stock index, and the investment risk in the stocks of that firm equals the average risk occurring on the stock market [Dynus, Kołosowska, Prewysz-Kwinto 2002].

RESULTS

The evaluation of the effectiveness of the strategy of financial liquidity in the studied companies was begun with the analysis of the ratio indexes: current and quick (Table 1). In Duda Co. in 2005 PLN 2,10 of working assets fell on PLN 1 of short-term liabilities. A similar situation occurred in 2006. However the index of current ratio was decreasing in the following years to achieve the level 0,47 in 2009. This denotes that the company has had problems with paying current liabilities in the recent period. This is also confirmed by the calculated index of quick liquidity.

Table 1. Indexes of liquidity and turnover of Duda Co. and Indykpol Co. in 2005–2009
Tabela 1. Wskaźniki płynności i obrotowości spółek: Duda oraz Indykpol w latach 2005–2009

Specification	Years				
	2005	2006	2007	2008	2009
	Duda Co.				
Current ratio (multiple)	2,10	2,17	1,04	0,72	0,47
Quick ratio (multiple)	1,64	1,76	0,87	0,65	0,41
Cycle of resources (days)	31,02	32,33	26,04	16,33	8,17
Cycle of amount due (days)	60,45	68,87	95,25	105,36	31,42
Cycle of current liabilities (days)	26,30	30,36	71,38	107,53	13,62
Cycle of cash conversion (days)	65,17	70,84	49,91	14,16	25,97
Rate of net liquid balance	–0,03	–0,01	–0,13	–0,19	–0,34
	Indykpol Co.				
Current ratio (multiple)	2,35	1,39	1,71	1,43	1,16
Quick ratio (multiple)	2,05	1,25	1,41	1,09	0,76
Cycle of resources (days)	9,30	7,91	12,94	20,62	27,22
Cycle of amount due (days)	34,26	41,82	37,92	41,39	46,98
Cycle of current liabilities (days)	31,24	36,46	37,35	52,55	38,15
Cycle of cash conversion (days)	12,32	13,27	13,51	9,46	36,06
Rate of net liquid balance	–0,19	–0,19	–0,14	–0,20	–0,28

Source: Author's own on the data from the companies.
Źródło: Opracowanie własne na podstawie danych spółek.

The index of the current ratio in Indykpol Co. also indicated the decreasing tendency in the analyzed period, however in 2009, PLN 1,16 of working assets fell on PLN 1 of current liabilities. Solely in 2009 this company was not able to pay its claimed liabilities (quick ratio below 1).

The indexes of the resources turnover, the amounts due and the current liabilities were calculated in order to denote the cycle of cash conversion in the analyzed companies (Table 1). The cycle fluctuated in Duda Co. in the analyzed period. The longest one, equaling 71 days, was noted in 2006, whereas the shortest one, i.e. 15 days, occurred in 2008. This means that the time span between the moment of the cash expenditure on raw and other

materials and the sale, therefore the achievement of the amounts due equaled merely two weeks. The longest cycle of cash conversion in Indykpol Co. equaled 37 days (in 2009), i.e. slightly over a month.

On the basis of the calculated indexes and the data included in the Table 2, it can be stated that the shortening of the cycle of cash conversion in Duda Co. in the analyzed period indicates an increase of the conservative tendencies in the strategy of financial liquidity in the firm. On the other hand, the aggressive-conservative strategy in Indykpol Co. slightly moves in the direction of the aggressive one.

Table 2. Cycle of cash conversion
Tabela 2. Cykl konwersji gotówki

Cycle	Type of strategy			
	Conservative	Aggressive	Aggressive--conservative	Conservative--aggressive
Cycle of resources	long	short	short	long
Cycle of amounts due	short	long	long	short
Cycle of current liabilities	long	short	long	short
Cycle of cash conversion	short	long	relatively long and/or short	relatively long and/or short

Source: Wędzki D.: Strategie płynności finansowej przedsiębiorstwa. Oficyna Ekonomiczna Kraków 2003, s. 273.
Źródło: Wędzki D.: Strategie płynności finansowej przedsiębiorstwa. Oficyna Ekonomiczna Kraków 2003, s. 273.

The index of the net liquid balance informs how the surplus of the most liquid assets relates to the non-operational sources of its financing as the share of the assets [Wędzki 2003]. In both analyzed companies in the entire period, the index of the net liquid balance was negative what means that the cash and its equivalents do not ensure payments of the claimed operational liabilities. Therefore the threat of losing the financial liquidity in those firms increases.

The considered strategy of the financial liquidity is acceptable for the enterprise (i.e. profitable, or loss-free at least), if the residual income is not negative [Wędzki 2003]. The residual income was estimated solely for the last analyzed year, i.e. 2009. All the data and the partial calculations are included in Table 3.

Had the estimations on the formulas presented in the above description of the method been applied it was assumed that the cost of the own capital of Duda Co. equals 3,1%, whereas that of Indykpol Co. amounts to 6,1%. The average weighed cost of the capital of the analyzed companies was then estimated to amount 5% (Duda Co.) and 6,6% (Indykpol Co.), respectively.

That enabled the assumption of the value of the residual income for the particular companies, which amount to PLN 39678700 for Duda Co., and PLN 1591800 for Indykpol Co. The residual income for both companies was not negative, and therefore the strategies of financial liquidity applied by those enterprises can be stated as proper.

Table 3. Stages of residual income estimation for Duda Co. and Indykpol Co. in 2009
Tabela 3. Etapy ustalenia zysku rezydualnego dla spółek Duda oraz Indykpol w 2009 roku

Specification	Duda Co.	Indykpol Co.
Beta index for the own capital of given firm β	0,52	0,48
R_f (average rate of profitability of 52-week treasury bonds in 2009)	4,654%	4,654%
R_m (average rate of turnover from food market in 2009)	1,665%	1,665%
Cost of own capital $R = k_E$	3,1%	6,1%
Share of own capital in liabilities u_E	50,7%	42,4%
Cost of borrowed capital k_d (average WIBOR 3m in 2009 +2,5)	6,91%	6,91%
Share of borrowed capital in liabilities of the firm u_d	49,3%	57,6%
Weighed average cost of capital *WACC*	4,98%	6,57%
Income from sale (thousands PLN) *ZS*	35908	19387
Rate of income tax T_x	19%	19%
Yearly amortization (thousands PLN) *A*	13398	12411
Operational assets for the end of 2009 (thousands PLN) *AOP*	158914	304827
Operational working capital for the end of 2009 (thousands PLN) *OKN*	–102593	98867
Residual income (thousands PLN) *RI*	39678,69	1591,78

Source: Own calculations.
Źródło: Obliczenia własne.

CONCLUSIONS

Systematic evaluation of the efficiency of the strategy of financial liquidity applied by the management and the rectification of it, if necessary, should ensure the survival of the enterprise in competitive and changing surroundings. The analyzed enterprises noted a drop of the indexes of the financial liquidity by the end of the studied period what indicates problems in performing various current liabilities. This is also confirmed by the analysis of the index of the net liquid balance. However, positively valued was the calculated positive residual income for both enterprises in 2009. It can indicate that the corrected strategy of the financial liquidity will contribute to the increase of the value of those companies in the future.

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OCENA EFEKTYWNOŚCI STRATEGII PŁYNNOŚCI FINANSOWEJ PRZEDSIĘBIORSTW GOSPODARKI ŻYWNOŚCIOWEJ

Streszczenie. W opracowaniu zaprezentowano wyniki analizy strategii płynności finansowej dwóch przedsiębiorstw gospodarki żywnościowej. Wykorzystano w tym celu metodę analizy wskaźnikowej oraz kalkulację zysku rezydualnego. Badania obejmowały okres pięciu lat 2005–2009. Analizowane przedsiębiorstwa różniły się między sobą ze względu na stosowaną strategię płynności finansowej. Skalkulowany zysk rezydualny obu przedsiębiorstw był nieujemny, co świadczy, że stosowane przez zarządzających strategie płynności poprawiają wartość tych przedsiębiorstw.

Słowa kluczowe: płynność finansowa, efektywność, zysk rezydualny

Accepted for print — Zaakceptowano do druku 19.04.2011

ACTA SCIENTIARUM POLONORUM *Oeconomia 10 (2) 2011, 83–94*

APPROACHES TO RESEARCH IN SUPPORT TO AGRICULTURAL POLICY: THE EXPERIENCE OF THE CAP-IRE PROJECT

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Abstract. The Common Agricultural Policy is the main agricultural policy in Europe and one the main chapters of the European Union's budget. It has been subject of several studies, also due to its continuous reform process. The objective of the paper is to present and discuss the approach of the project CAP-IRE and to derive insights from such experience in view of the present perspectives for agricultural policy.
After outlining the present trends and perspectives in the CAP and reviewing the main methods used in the literature to provide policy support, it turns to an illustration of the contents of the project CAP-IRE, its methods and organization.
Some selected results of the project are illustrated, by considering two overarching issues, i.e. the exit mechanisms and farm-household innovativeness. The paper closes with a discussion of the strengths and weaknesses of the approach and an account of the main research needs identified for the future.

Key words: Common agricultural policy, policy evaluation, CAP-IRE

INTRODUCTION AND OBJECTIVES

The Common Agricultural Policy (CAP) is the main agricultural policy in Europe and the main chapter of the European Union's budget. Since its implementation started at the beginning of the 1960s, it has been subject to continuous reforms. In view of the end of the present programming period (2007–2013) a further reform process has been activated to design the new instruments that will cover the post-2013 period. The issues at stake in this reform have been outlined by the recent communication by the EU Commission (672/2010 "The CAP towards 2020: meeting the food, natural resources and territorial challenges of the future").

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Due also to this continuous reform process, as well as for the relevance for EU agriculture and rural economy, the CAP has been widely studied. In particular, a recent wave of research has been stimulated by the perspective of this upcoming reform.

The project CAP-IRE is a project funded under the 7th Framework program of the EU Commission. The objective of CAP-IRE is to develop concepts and tools to support future CAP design, based on an improved understanding of the long-term socio-economic mechanisms of change in rural areas.

The reaction of farm households to CAP reforms is analysed under the lens of six thematic, and one cross-thematic, viewpoints: 1) farm structural adjustment, investment and innovation; 2) chain interactions between agriculture and related economic sectors; 3) environmental sustainability; 4) social sustainability; 5) interactions between rural communities and the rest of the world; 6) farm and rural governance issues; 7) the interplay between the previous aspects.

The objective of this paper is to describe the approach adopted in the CAP-IRE project, present selected results from the project and, based on this, outline some evaluation of the pros and cons of the approach and highlight relevant issues for future research.

This paper relies heavily on project deliverables, available on the project website www.cap-ire.eu, and, in particular, on Viaggi et al. [2010], that provides a summary of project contents, settings and results.

ISSUES AND METHODS IN THE EVALUATION OF AGRICULTURAL POLICIES

Rural areas represent 93% of the territory in EU-27. Twenty per cent (20%) of the EU-27 population live in predominantly rural areas and 38% live in significantly rural areas [European Commission 2006]. Thinly populated areas have a higher ratio of retired to working population (30%) compared to densely populated (24%), a lower percentage of highly educated people (18% against 28%). However, the employment rate does no differ remarkably on average (Eurostat 2007). Despite the "recent" emphasis on diversification and rurality as opposed to "agricultural", agriculture is still one the characterising components of rural areas. Households are traditionally a major component of agriculture and rural areas. In the EU, the family labour force is about 16 million workers, contributing with about 76% of the total agricultural workforce.

The CAP is the main policy addressing agriculture and rural areas in the EU. According to the Treaty of Rome (art. 33), the objectives of the CAP are: (a) to increase agricultural productivity by promoting technical progress and by ensuring the rational development of agricultural production and the optimum utilisation of the factors of production, in particular labour; (b) thus to ensure a fair standard of living for the agricultural community, in particular by increasing the individual earnings of persons engaged in agriculture; (c) to stabilise markets; (d) to assure the availability of supplies; (e) to ensure that supplies reach consumers at reasonable prices.

The Lisbon Strategy emphasises the objectives of growth and jobs. It also focuses on territorial cohesion objectives and the relevance of the territorial approach. "The guiding principles for the contribution of the Common Agricultural Policy (CAP) to the Lisbon

Strategy were set by the European Council in Göteborg in 2001 and confirmed in the Lisbon Strategy Conclusions in Thessaloniki in June 2003: 'Strong economic performance' that goes hand in hand with 'the sustainable use of natural resources'. These principles have shaped recent CAP reforms." (from DG AGRI website http://ec.europa.eu/agriculture/lisbon/index_en.htm)

The CAP also has a clearly stated role in the EU territorial cohesion policy. In particular: "The first pillar of the Common Agriculture Policy and the support it provides to farmers also has important territorial impacts through the activities and incomes it maintains in rural areas and through the promotion of sound land management" [European Commission 2008].

The CAP is now the main chapter of EU expenditure and represents a major driver in rural areas. In addition, since the beginning of the 1990s, the CAP has directly addressed rural development through specific measures now aggregated under the so-called second pillar. The last decade has witnessed two major reforms of the CAP (Agenda 2000 and 2003 reforms). In addition, at the end of 2007, the European Commission undertook the Health Check process. This has reinforced the route already taken with the 2003 reform, with a further move towards the transfer of payments from the first to the second pillar, and the reinforcement/rationalisation of cross compliance in view of the increasingly recognised threats due to climate change [European Commission 2008a, b].

The most recent view about the future CAP is given by the Communication form the European Commission COM 672/2010 ([European Commission 2010] "The CAP towards 2020: meeting the food, natural resources and territorial challenges of the future" (November 2010).

The document evaluates that the current debate agrees on the need of a strong Common Agricultural Policy, structured around three main strategic aims: a) Preserve food production in Europe in times of increasing food needs and recently experienced food crisis; b) Support farming communities that guarantee quality and diversity of food, produced sustainably; c) Maintain viable rural communities in which farming is a core economic activity creating local employment.

According to the Commission, a budgetary decrease of EU agricultural support would have negative effects in terms of overall economy, employment and environmental management.

Three main policy options are envisaged for the post-2013 CAP: a) enhanced status quo; b) more balanced, targeted and sustainable support; c) abolition of market and income support.

The second option would include a focused restructuring of the first pillar payment around four main components (income support, horizontal environmental measures, less favoured areas and coupled support to locally relevant products). The latest option would include a re-focusing of the CAP on the provision of public goods by agriculture.

A number of different methods and approach are used to evaluate agricultural policies. A review of the main approaches is provided by Viaggi et al. [2011], that also describe how different methods fit different evaluation issues. Among the available methods, modelling tools and survey based analyses of stated intentions are gaining a growing space in the literature and show particularly suitable to assess new policy instruments and radical changes. Modelling methods are now widely used and differentiated in terms of scale of

application and approach used. A review of models used at large (e.g. EU) scale is provided in Gohin [2006], while Janssen and van Ittersum [2007] provide a review of farm to regional scale models. The main issues with modelling are connected to the number of behavioural assumptions needed and often to the inability to calibrate the model in a convincing way against the observed behaviour. Stated intentions are also widely used in the literature on economic and social phenomena and form the basis for the widely adopted techniques used to detect preferences in economics and marketing (i.e. choice experiments). Fujii and Gärling [2003] discuss the essence of attitude theory, namely that it is possible to predict actual behavior from stated intentions, and review the conditions which enable one to judge the robustness of such predictions. According to attitude theory, and empirical data, behavioural intention is a better predictor of behaviour than any other measures [Fishbein and Ajzen 1975; Ajzen 1991]. Bougherara and Latruffe [2010] provide a short review of the literature concerning the use of stated intentions in studying farmers' reactions to policy changes. This study generally corroborates the idea that stated intentions reveal the actual behaviour in a relevant share of cases, though they also discuss studies in which the stated intentions correctly predict the actual behaviour in less than half of the cases.

THE APPROACH OF THE PROJECT CAP-IRE

The project CAP-IRE addresses the wide issue of the role of the CAP in rural economies. In order to do that, the project's approach develops from the policy background and from the available literature, in which a variety of methods are proposed to assess policy effects, adopting the explicit strategy of using a mixed-methods approach aimed at exploiting complementarities of different tools. The CAP-IRE methodological approach is illustrated in Figure 1.

As the main idea of the project is to study future tendencies in rural areas and how the CAP affects such tendencies, the project relies mainly on surveys using stated intentions approaches. The main component of the project following such approach is survey A, using a common questionnaire in 11 Case Study Areas (CSA) in 9 countries and finally providing 2363 usable observations (farm-household interviews). This survey was prepared through a smaller but more detailed survey (survey B) aimed at scoping and selecting key questions and issue, which provided 55 interviews with the same coverage of countries and CSAs. Results of survey A are then submitted to statistic and econometric analysis to explain key behaviours in a thematic perspective related to individual WPs in the project, hence separately addressing: 1) farm structural adjustment, investment and innovation; 2) chain interactions between agriculture and related economic sectors; 3) environmental sustainability; 4) social sustainability; 5) interactions between rural communities and the rest of the world; 6) farm resilience and rural governance issues.

In parallel to this analysis, also more specific exercises have been carried out under the label of "in-depth analyses". These are differentiated by thematic area, each using different methods to be applied in different CSAs, in order to provide specific insights on a selection of locally relevant issues. This includes simulation tools, such as mathematical programming, as well as additional surveys examining specific behaviours and attitudes on more focused topics (e.g. input provision).

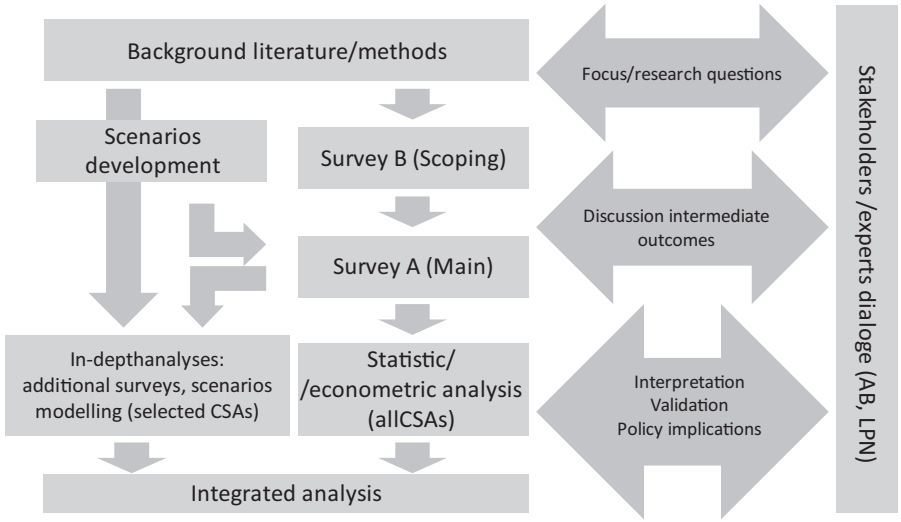

Fig. 1. CAP-IRE methodological approach
Rys. 1. Schemat metodologiczny projektu CAP-IRE

Source: CAP-IRE project.
Źródło: Projekt CAP-IRE.

As the project looks at the future, a scenario exercise was needed to build a background to both survey and modelling exercises. Rather simplified scenarios were used in the surveys to collect reactions to different future by farmers, while more elaborated scenarios were used in the in-depth analysis as an input to modelling.

In parallel to this workflow, the project benefited of a continuous interaction with stakeholders, providing inputs to focusing research questions, on-going reactions on intermediate results, interpretation and validation of final results, and support to the discussion of policy implications.

In the following paragraphs, three main components of the methods used are further discussed: a) scenario analysis; b) Survey A; c) in-depth analyses.

The scenario analysis was developed on two levels.

For the purposes of the survey A, in which scenarios supported the collection of stated intentions, two simple and extreme scenarios were developed:

- A baseline scenario based on the CAP as it was implemented in 2009 (time of the survey).
- A NO-CAP scenario assuming the complete removal of the CAP starting in 2013.

For the purposes of the simulations exercises in the in-depth analysis, four main scenarios were considered:

A. Baseline scenario: CAP continues in the current form.
B. Liberalisation scenario: The CAP is completely abolished starting in 2013.
C. Regionalisation scenario: after 2013 the CAP budget is reduced by 50% from current levels, while the relative importance of pillar1 and pillar 2 remains as in baseline.
D. Environment scenario: after 2013 the CAP budget is reduced by 50% from current levels, while the relative importance of pillar1 and pillar 2 is reversed.

Two of the scenarios – Baseline and No Cap – can be considered as the same as those used in the Survey A of the project. Details of scenarios, background documents and motivations are available in Cristoiu et al. [2009].

The main survey ("Survey A") contained questions concerning farm/household characteristics, patterns of change in a baseline scenario (present CAP) and reactions to an extreme "NO-CAP scenario" [Majewski et al. 2011]. The main sampling features of survey A are summarised in Table 1.

Table 1. Survey A – Sample features
Tabela 1. Sposób gromadzenia danych w Survey A

CSA	Number of interviews (farm-households)	Way	Response rate
1. Emilia-Romagna (Italy)	300	Telephone	62%
2. Noord-Holland (Netherlands)	300	Postal	21%
3. Macedonia and Thrace (Greece)	300	Telephone/Face to face	55%
4. Podlaskie (Poland)	249	Face to face	95%
5. North East of Scotland (UK)	168	Telephone	68%
6. Andalusia (Spain)	201	Face to face	75%
7. South-East Planning Region (Bulgaria)	273	Face to face	92%
8. Centre (France)	140	Face to face	35%
9. Midi-Pyrénées (France)	155	Face to face	31%
10. Lahn-Dill-District (Germany)	117	Postal	20%
11/1 Ostprignitz-Ruppin/ /North-East Brandenburg (Germany)	160	Postal	15%
Total	2363		

Source: CAP-IRE project.
Źródło: Projekt CAP-IRE.

The sample was selected by random methods from the list of beneficiaries of CAP payments in each CSA, with appropriate stratification according to the features of each area. The survey was carried out mostly between April and June 2009, with some latest interviews up to September 2009. More details about sample characteristics and descriptive outcomes are given in Raggi et al. [2010] (D2.13-23). Further information about the individual CSAs is available from Deliverables D2.1-12 of the project.

Analyses of survey A included statistical and econometric analyses to explain the determinants of the current direction of change and the impact of the CAP concerning: a) exits form farming; b) farm size and structural change; c) innovation; d) chain connections; e) labour use; f) input use; g) resilience, networking and governance structures.

In depth analysis were carried out using different methods in different areas to address specific complementary issues compared to survey A. In particular, in-depth analyses included:

- Real option models simulating technology adoption in Emilia Romagna (IT), Midi-Pyrénées (France), Podlaskie (Poland), Noord-Holland (Netherlands), South-East Planning Region (Bulgaria).
- Spatial tracking analysis to explore the linkages between farm households and their immediate local economy in North East Scotland (United Kingdom), Podlaskie (Poland).
- SAM-based analysis to capture linkages between farm households and the regional economy in North East Scotland (United Kingdom).
- Indicator-based analysis (Driving forces-Pressures-State-Impact-responses – DPSIR) in Andalusia (Spain).
- Scenario analysis based on multi-criteria decision making in order to assess the impacts of different policies on social indicators in Macedonia and Thrace (Greece), Andalusia (Spain), South East Planning Region (Bulgaria).
- New institutional economics to represent connections between different households and different issues in North East Scotland (United Kingdom), Noord-Holland (Netherlands), South-East Planning Region (Bulgaria), and Centre (France).

KEY RESULTS AND INSIGHTS

We now turn to discuss some of the main results of the project considering three main components of such results: a) the straight results of the main survey; b) the identificaiotn of determinants of future behavior through econometric analyses; c) the results of scenario simulation through mathematical modeling.

The main outcome of the project are the results generated in survey A; a summary of such results under baseline and no-CAP scenario is provided in Table 2.

The main figures show a relevant trend towards households exiting from the farming activity in the baseline (–25%). Against such tendency, the removal of the CAP would bring an exit of further 30% of the farms, showing the importance of such policy for the continuation of farming activities. In addition, while the farms exiting in the baseline represent a negligible share of the sample in terms of land (7%) and labour, the farms that would leave if the CAP was removed would account for about 30% of both land and labour. Land reallocation would occur mainly through selling (growing in the no CAP scenario) and renting out.

As for the other parameters, the majority of farms that would continue would have no change (50 to 80% in most cases). However, a relevant share would show increases of resource endowment, with a rather higher amount in the baseline. The cases for which increases are most frequent are machinery endowment and land renting-in, letting alone increase in animal reared, which tendency to increase is however emphasised by the fact that the total is represented by livestock farms only. On the contrary, innovation adoption and the legal status of the farm show the lower changes in the baseline.

The removal of the CAP would have most frequently a negative effect on the willingness of increasing the selected parameter by those staying in farming. The most relevant effects (drop of intended increase) are related to machinery endowment and animal rearing. On the contrary, “increase in the use of credit”, “involvement in other activities”

Table 2. Summary of survey A results under Baseline and no-CAP scenario
Tabela 2. Podsumowanie wyników dla Survey A w scenariuszu „baseline" i „no-CAP"

Variable	Baseline	No-CAP	Difference (No-CAP--Baseline)
Percentage of farm households that would continue farming	76%	45%	–30%
Share of land operated by those exiting farming	7%	31%	23%
Percentage of those exiting that would sell the farm	31%	40%	8%
Percentage of those continuing that…			
…would increase household labour on farm	22%	19%	–4%
…would increase non-household labour on farm	21%	15%	–5%
…would increase owned land	27%	19%	–8%
…would increase land rent in	29%	19%	–9%
…would increase the number of animal (only farms with animals)	44%	31%	–13%
…would increase other activities	15%	18%	3%
…would increase the use of fertilisers and pesticides	12%	10%	–2%
…wold increase farm endowment of machinery	32%	15%	–17%
…would increase the use of credit	16%	25%	10%
…would change who they sell their product to	14%	14%	0%
…would increase the production under contract	17%	14%	–4%
…change the legal status of the farm	9%	8%	–1%
…adopt robotization/precision farming innovation	14%	9%	–4%
…adopt energy/energy crop innovation	22%	19%	–3%
…adopt e-commerce innovation	8%	10%	2%

Source: Raggi et al. 2010, based on Survey A (2363 observations, all CSAs).
Źródło: Raggi i in. 2010 na podstawie Survey A (2363 obserwacji, wszystkie regiony badań).

and "adoption of e-commerce" would apply to a higher share of remaining farms if the CAP was removed.

Altogether, the contribution to avoid exists seems to be the main role of the CAP; however, it also reveals non-neutral with respect with farm selection and changes.

An analysis of determinants of different farm reactions is provided in Table 3, with reference to two key elements of the future of f farm-households: decision to exit the farming activity and attitude to innovation.

The table shows that a number of classical variables (age, farm size, etc.) remain key determinants of the studied behaviour. Age and farm size are particularly important for exits, while structural adaptation and organisational variables seem to be more affected by a variety of determinants. It is relevant to note that location, particularly with reference to Eastern Europe has a major role in structural change and innovation.

Selected results from scenario simulation are summarised in Table 4.

Table 3. Analysis of determinants from thematic WPs
Tabela 3. Analiza determinantów z poszczególnych obszarów roboczych

Dependent variable	Model type	Baseline		No-CAP	
		Positive effect	Negative effect	Positive effect	Negative effect
Decision to Exit (1)	Logit	Age Land rent out	Advisory services Selling products to private Land owned Live on farm Number of Household members Part time worker	Age Land rent out SFP per farm Sell to other farms	Land owned Land rent-in Live on farm Number of household members Percent of household income from farming
Number of innovations (2)	Zero inflated multinomial logit	Location in Plain Location in Hill Number of full time equivalents More than 50 ha UAA Unemployed SFP payment higher than 1000 euro Mediterranean High level of education Rent in land form relatives Part time worker Age	Less 10 ha UAA Specialisation cows Specialisation grazing livestock Age Location in Eastern EU More than 50% of income from farming	Number of full time equivalent Total land operated North Location in northern EU Household activities Use of advisory system Contracts for selling products Part time worker Age Low level of education	Less than 10 ha UAA Specialisation grazing livestock Specialisation mixed crop and livestock Specialisation mixed livestock Age Location in eastern EU More than 50% of income from farming

Sources: Mishra et al., 2010; Bartolini et al., 2010.
Źródło: Mishra i in.2010, Bartolini i in. 2010.

Table 4. Summary of scenarios simulations (% of farm adopting the innovation)
Tabela 4. Podsumowanie scenariuszy symulacji

Case	Baseline	No-CAP	Subsidiarity (regionalisation)	Environment
Real option models simulating adoption of Methane digester in Emilia Romagna (IT)	0%	0%	0%	2009–2013: 0% 2014–2020: 4%
Concentration in livestock and robotisation in dairy farm Podlaskie (Poland)	0%	0%	2009–2013: 0% 2014–2020: 1%	2009–2013: 0% 2014–2020: 12%

Sources: Bartolini et al., 2010.
Źródło: Bartolini i in. 2010.

The results are derived from real options models simulating selected innovations in Italy and Poland under different policy scenarios. The models allow to generate information about the farm-household behavior under changing external conditions, and, in particular, under policy change. The selected results reported here show that neither the baseline, nor the No-CAP scenario would stimulate technology adoption, compared to the intermediate scenario. The main advantage of intermediate scenarios is that they provide for an increase of funds addressing investment on farm, of which farm-household can benefit. They also show the relevance of taking into account timing, as the selected innovation (in the case studies reported) would be likely adopted after 2013, when the new policy setting would become clear to the farmers.

DISCUSSION AND CONCLUSIONS

The main strength and weaknesses of the project are directly connected to the methods used. In particular, surveys of stated intentions about the future have the strength of bringing direct perceptions elicited by the concerned actors, but rely on the ability of the methods to collect realistic perception, avoiding misunderstandings about future policy options and strategic behavior. The combined use of survey and models allow however a cross-checking of the main results, bringing strength to the overall messages arising from the project.

The main policy conclusions arising from the results of the project CAP-IRE highlight the relevance of the CAP, and, as a consequence, corroborate political perception of a need to maintain a strong policy in agriculture. At the same time, they highlight the complexity of policy effects and somehow encourage to review the policy currently in place in the direction of a higher finalization of its instruments.

In terms of needs for further scientific research, that are the main focus of this discussion, the project suggests a variety of future avenues, due also to the large number of thematic fields addressed. Some of the main topics emerged are discussed below.

First, the project has shown once again how difficult it is to understand the links between farms and rural areas, in particular due to the lack of available data regarding the economic environment of farms, and the difficulties in modeling such links, even when data are collected through surveys. Accordingly, the study of the interplay between farms, farm-households and rural areas through their multiple social and economic connections remains a key issue in supporting evidence-based policy for agriculture and rural areas.

A key topic here is the process of farm exit, which is itself a complex issue which needs to be understood beyond the mere reduction in the number of farms, and requires a more focused analysis. For example, a key issue is how land is reallocated and if land re-allocation is virtuous (e.g. in terms of farm size and innovation) or rather a vicious process (e.g. in terms of land abandonment)? Also, the new perspectives encourage in going beyond the historical issue of exits and to look rather to the mechanisms of entry into the sector and entrepreneurship.

A second key topic concerns the complex and evolving modes of farm governance, including ownership and leasing, but also taking into account all sorts of contractual and ownership connections with the networks in which farm-households are more or less embedded.

A third issue, in connection with the previous one but also related to the growing market volatility concerns the way the resilience of farm households and rural areas to changes in the social and business environment can be improved.

The research also highlights data needs and their limitations. The results suggest that there is a case for extending the existing FADN (Farm Accountancy Data Network, the EU-wide network collecting accounting information on farming) survey by adding additional questions on farm household purchasing and sales decisions, similar to those included in the USDA ARMS (the Agricultural Resource Management Survey carried out regularly in the USA).

Finally, in terms of research directly related to policy evaluation and design, there is a need for a better understanding of the interplay between the different components of the CAP with respect to farm behavior but also environment and social output expected. For example, as the environmental issue is concerned there seem to be a contrast between the positive effect of the CAP in supporting environmentally friendly practices and the negative effect of stimulating the use of polluting inputs; the unit reduction of pollution vs. production increases due to support; the interaction between cross-compliance and agri-environmental schemes.

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BADANIE WSPARCIA POLITYKI ROLNEJ – DOŚWIADCZENIA Z REALIZACJI PROJEKTU CAP-IRE

Streszczenie. Wspólna polityka rolna jest jedną z głównych polityk UE i dominującą pozycją we wspólnotowym budżecie. Z powodu swojego znaczenia jak też zachodzących zmian jest ona od pewnego czasu obszarem zainteresowań licznych badań ekonomicznych. Głównym celem opracowania jest prezentacja wybranych wyników projektu CAP-IRE w zakresie perspektyw wspólnej polityki rolnej. Po przedstawieniu aktualnych trendów i możliwych kierunków rozwoju wspólnej polityki rolnej zaprezentowano strukturę, metody i organizację projektu CAP-IRE. Wybrane wyniki zostały przedstawione przez odniesienie się do dwóch najistotniejszych kwestii, tj. obecnie istniejących mechanizmów i możliwych do wdrożenia innowacji. Opracowanie kończy się dyskusją nad silnymi i słabymi stronami zastosowanego podejścia i identyfikacją głównych potrzeb badawczych na przyszłość.

Słowa kluczowe: wspólna polityka rolna, ocena wspólnej polityki rolnej, projekt CAP-IRE

Accepted for print – Zaakceptowano do druku 06.04.2011

ACTA SCIENTIARUM POLONORUM *Oeconomia 10 (2) 2011, 95–106*

METHODS OF CLASSIFICATION MODELS FOR ENTERPRISES INSOLVENCY PREDICTION

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Abstract. The thesis attempts to create models of standard classification which would enable to predict a bankruptcy of enterprises. Economic aspects of bankruptcy have been presented as well as causes of it. The attention has been devoted to the methods of bankruptcy prediction with emphasis on the discriminant analysis and logit models. The thesis contains a review of literature concerning existing models of early warning. Description and the estimation's results of own models of bankruptcy have been included in the chapter based on research. It has also presented results of the verification of obtained functional models based on a sample validation.

Key words: bankruptcy prediction, classification models, discriminant analysis, logit model

INTRODUCTION

The theory of company life cycle presents the stages in the development of individuals, which include growth, relative stability and the end-stage phase which may lead to a bankruptcy. Duration as well as a course of the various stages are features typical for a single unit in economy, dependent on many factors, formed inside the company (organizational structure, management) and by the macro environment. Although the theory indicates the inevitability of end-stage phase, the bankruptcy may be moved in time, affected its course and prevented accordingly early. Bankruptcy leads to a verification of the effectiveness of the entity in a market economy and a better location of resources "transferring" them from inefficient companies into the thriving ones. On the other hand, the bankruptcy of every individual creates in the economy a rise of additional costs, which are beard by others. The deterioration of the financial situation itself is a slow process and the first of its symptoms can be detected even several years in advance. Warnings about the potential treat of bankruptcy gives the company an opportunity to take action

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to protect it from liquidation. Researches in this area are generally kept in two directions. The first concerns the determination of insolvency symptoms. Literature provides information (cf. Mączyńska, Zawadzki [2006]) that the most important of them are liquidity lowering, profitability reduction and a clear drop in sales. These symptoms can be determined by analyzing financial statements. An important role is played by qualitative factors such as: managerial instability or lack of long-term business plans. The second line of research concerns the design, development and validation of quantitative bankruptcy prediction models. The first of such an attempt was launched in the sixties by Altman [1968]. In Poland in 1990 the occurrence of bankruptcy did not happen. Centrally planned economy did not allow a possible review of the effectiveness of enterprises and the life cycle was based on the non-economic condition, often by the political nature. Only later the period of transformation have affected the allocation of resources, which contributed to a wave of bankruptcies.

OBJECTIVE AND METHOD OF RESEARCH

The aim of the study was to develop a standard classification models that can be used to predict the bankruptcy of enterprises. These models allow the separation from a large population both wealth entities, characterized by the proper financial standing, good organization and efficient management as well as those with no prospect survival. There have been two sets used for models estimation. First are the data from 41 companies-bankrupts collected and complied on the basis of the failed company's acts of the District Court for the Capital City of Warsaw in Warsaw, which in 2008–2009 declared them bankrupt. The second group includes financial ratios of 41 companies in good financial standing, which carried their businesses throughout the whole 2010. This data has been selected from the Notoria site (version 17.70). Obtained data allowed the estimation of classification models for predicting corporate bankruptcy. To validation of the acquired models there were used an expert selected try (different from the standard try) numbering 8 failed companies and 8 healthy from Notoria site. A unique, rather large for Polish standards set of data have been formed in this way, including 82 enterprises.

The study shows that in the current economic situation of Polish market, a combination of financial ratios analysis, discriminant analysis and functional models of dichotomous variables leads to the construction of tools for bankruptcy prediction.

Discriminant analysis makes possibility to design a mathematical formula which indicates appurtenance to the different classes (the bankrupt company, and a company with good financial standing). The appurtenance rule is the linear combination of financial indicators, which can be written this way:

$$LFD = \lambda_0 + \lambda^T \cdot x, \tag{1}$$

where: x is a vector of features (financial ratios describing the enterprise), λ_0 are vectors of discriminant function ratios. The LFD ratio is estimated so as to maximize the quotient of between-group function appurtenance variance to variance of intra-group. Formula's that determinates the estimation of LFD parameters shows A. Maddala [2004].

Verification of ability of the company's classification into groups by any variable which is defined as discriminatory power is based on a statistical analysis of two statistics:

- Partial Wilks' ratio, defined by a formula:

$$\lambda^{cz} = \frac{\lambda^1}{\lambda^0}, \tag{2}$$

where: λ^1 means the value of Wilks' lambda ratio for the model after the introduction of a variable into it, λ^0 means the ratio of Wilks' lambda for the model before the introduction of the highlighted variable.

Ratio corresponds to the statistics F given by the formula:

$$F = \frac{\frac{1-\lambda^{cz}}{K-1}}{\frac{\lambda^{cz}}{N-I-K}}, \tag{3}$$

where: N is the total number of objects in the sample, I – the number of considered population and K – the number of variables

- Tolerance factor T, which is defined as:

$$T = 1 - R_k^2, \tag{4}$$

where: R_k^2 denotes the ratio of multiple correlation between a variable and the other functions occurring in the LFD.

Models which are also used in the bankruptcy forecast are qualitative variables models in which the most popular is the logit model. Their broad overview can be found in the work edited by Gruszczyński [2010]. For the logit model the linear combination of features is transformed by the logistic function. The logit model is as follows:

$$LOG = \frac{1}{1+e^{-z}} = \frac{e^z}{e^z+1}, \tag{5}$$

where: $z = b_0 + b^T x$.

The logit model (LOG) has the advantage over the linear discriminant function (LFD), that the variability range of estimated depended variable is in a range <0,1> which corresponds to the definition of probability and it the basis for interpretation in the category of bankruptcy and the correct financial condition. For a linear discriminant function a range of variability of the endogenous variable can include a whole set of actual numbers.

REVIEW OF ENTERPRISE INSOLVENCY CLASSIFICATION MODELS

Discriminant analysis to predict bankruptcy has been used for the first time by Altman [1968]. He built four versions of the Z-score bankruptcy predictor model, which included data from 33 of 'healthy' enterprises and 33 of those where the bankruptcy were declared. The model was characterized by a highly effective prediction (95% of accurate forecast for the year before announcement of bankruptcy, 72% for two years and 48% for the

three-year time horizon). Tests were then followed by numerous authors developing classification models for the economies of different countries and using more sophisticated methods of multivariate data analysis (review of the literature devoted to this subject is presented in the work of Kisielińska [2008] as well as Kisielińska and Waszkowski [2010]). Changes in the Polish economy in the 90s caused the interest of Polish economists of methods to detect a threat of bankruptcy. Many authors have pointed in their works (Stasiewski [1996], Gasza [1997], Rogowski [1999], Koralun-Bereźnicka [2006]) the impossibility of direct adaption of Altmans' models on the Polish market, which resulted of original ways of early warnings elaboration.

Hołda [2011] analyzed 40 failed enterprises and 40 with a good financial situation. Data concerning the objects came from the years 1993–1996. In the prediction models there were following ratios included:

- PWP (basic liquidity ratio) = current assets / current liabilities,
- SZ (debt Ratio) = total liabilities / total assets,
- ZM (profitability of assets) = net financial result / average total assets,
- WOZ (market rate liabilities) = average condition of short-term liabilities / (operating expenses – other operating expenses),
- RM (assets rotation) = total revenue / average total assets.

The linear discriminant function, which were elaborated looks as following:

$$ZH = 0{,}605 + 0{,}681 \cdot PWP - 0{,}0196 \cdot SZ + 0{,}00969 \cdot ZM + 0{,}000672 \cdot WOZ + 0{,}157 \cdot RM$$

The model yielded an aggregate percentage of correct classification on 92,5% (the 95% of the bankruptcies and 90% of companies in good condition were recognized correctly).

Gajdek and Stosa's [2003] early warning system was developed to assess the financial condition of companies listed on the Warsaw Stock Exchange. This model was estimated on the basis of sample consisting of 17 fallen companies and 17 'healthy' companies with a similar business profile. The share of correct diagnoses in the research sample was equal to 100% and the linear discriminant model adapted to the following form:

$$Z = -0{,}0005 \cdot X1 + 2{,}0552 \cdot X2 + 1{,}7260 \cdot X3 + 0{,}1155 \cdot X4$$

In this model the following ratios has been included:

- X1 = current liabilities / production costs of sold,
- X2 = net outcome / total assets,
- X3 = gross outcome / net revenue from sales,
- X4 = total assets / total liabilities.

Gruszczyński [2003] conducted a study based on 200 financial statements, which were used to select 23 companies in incorrect financial situation and 23 companies of good standing. On their basis the binomial logit models were estimated, the response variable is a dichotomous variable. To the construction of the models there were following ratios used:

- ROA (return on assets) = net profit / assets,
- R1 (gross margin) = gross profit / net revenue from sales,
- A2 (obligations trading) = production costs of sold / current liabilities,
- Z1 (the assets debt ratio) = total liabilities / assets,
- W19 = inventories / net revenue from sales.

The assessments of parameters of chosen models as well as the accuracy of forecast are presented in Table 1.

Table 1. Gruszczyński binomial logit models
Tabela 1. Dwumianowe modele logitowe Gruszczyńskiego

Model	Parameters	Parameter rate	Forecast accuracy ($y_i = 0$) [%]	Forecast accuracy ($y_i = 1$) [%]
MLD1	constant ROA1 Z1	1,3508 7,5153 –6,1903	86,96	86,96
MLD2	constant ROA1 W19	0,3133 8,7592 –8,0069	82,61	86,96
MLD3	constant R1 Z1 W19	4,3515 22,8748 –5,5926 –26,1083	91,30	95,65
MLD4	constant R1 A2	–4,7238 16,1075 0,5761	86,96	86,96

Source: Own work based on Gruszczyński [2003], p. 17–19.
Źródło: Opracowanie własne na podstawie Gruszczyński [2003], s. 17–19.

RESEARCH RESULTS

From the standpoint of classification models construction, argumentsseen as being financial ratios, which will be included in the early warning systems, must meet certain demands. The most important one concerns an absolute lack of mutual correlation between features. Not meeting this demand causes the wrong conditional of variance-correlation matrix, which in consequence unable an estimation of models parameters. An important role is played also by a discriminatory ability of the individual ratios between the classes. The bigger ability is, the better is the classification of the 'healthy' and bankrupt companies. Moreover the features included in the model must have a sufficiently high volatility. The next step in the selection of variables was the elimination of quasi-permanent features that do not increase the cognitive value of the model. For the ratio used to construct models, the distribution of its value in a population of individuals at risk of bankruptcy differs systematically from the distribution of the population of those with proper standing. Therefore for practical reasons it is assumed that the distribution in both populations is the same, the only difference is in parameters describing it. In empirical studies it is assumed a-priori that the analyzed features are normally distributed. At the significance level of 5% there was a hypothesis rejected for the each of the indicators concerning the normality of empirical distribution function, having in mind simultaneously that in many researches the assumption of normality was not fulfilled, and yet the satisfactory results of classification were obtained (i.e. Hadasik [1998]).

Finally for further analyze there was a set of 15 ratios chosen:

- OPZD (load of enterprise by current liabilities) = current liabilities / total liabilities,
- ROA (return on assets) = net profit / total assets,
- RS (return on sales) = net profit / sales income,
- UNAO (share of liabilities in total assets) = receivables / total assets,
- UNSMAO (share of intangible assets in total assets) = intangible assets / total assets,
- URSKAO (share of tangible assets in total assets) = tangible assets / total assets,
- UTSMAO (share of fixed assets in total assets) = fixed assets / total assets,
- WPB (current ratio) = current assets / current liabilities,
- WZD (long term debt ratio) = long term liabilities / equity capital,
- WZKP (employment of working capital funds) = sales income / working capital,
- WZKW (debt equity ratio) = total liabilities / equity,
- WZO (total debt ratio) = total liabilities / total assets,
- WZZO (total involvement liabilities ratio) = sales income / total liabilities,
- UZAO (share of inventories in total assets) = total inventories / total assets,
- ZSZ(ability to repay a debt) = (net income + depreciation) / total liabilities.

Further reduction of independent variables was carried out on the stage of model estimation. For LFD algorithm there were stepwise backward and forward method used. For the construction of changeable qualities methods there was those ratios chosen, which have the highest discriminatory power.

For the construction of linear discriminant function there were following values included:

- Tolerance T factor equals 0,01 indicating which percentage of information about the enterprise (in this case at least 1%) must emend the feature to be able to enter the discriminant function equation,
- Critical value of F statistic as the basis for the introduction of variables at level 1.

By the result of the backward stepwise analysis was obtained an LFD_1 model. Finally in the equal-pared for the linear discriminant function there were 5 variables included: WZZO, UTSMAO, ZSZ, WZKP and RS. The following correlation has been obtained:

$$LFD\_1 = 0{,}327 \cdot WZZO + 3{,}276 \cdot UTSMAO + 0{,}402 \cdot ZSZ - 0{,}001 \cdot WZKP + \\ + 0{,}002 \cdot RS - 1{,}989.$$

Among the ratios, which have occurred to be important in the construction of the above model, four of them (WZZO, UTSMAO, ZSZ and RS) have a positive impact on the value of LFD_1 function. This means that increase of total liabilities concerning with increment of sales revenue, the level of assets, the ability to repay debt, which depends on the net profit and return on salesaffects the proper financial standing of each individual. Such dependence is consistent with the economic *trade off*.

WZKP ratio impact negatively on the LFD_1 value, which is not covered in the theory of economics. To assess the impact of each variable on the LDF discrimination power there can be a model with standardized ratios used. It is presented in the below equitation:

$$LFD(ST)\_1 = 0{,}821 \cdot WZZO + 0{,}769 \cdot UTSMAO + 0{,}349 \cdot ZSZ - 0{,}284 \cdot WZKP + \\ + 0{,}23 \cdot 8RS.$$

The biggest influence for the LFD_1 function creation as well as its ability to distinguish classes has variable WZZO and UTSMAO. An assessment of the classification by the LFD_1 is shown in the matrix in Table 2.

Table 2. Classification matrix for LFD_1
Tabela 2. Macierz klasyfikacji dla LFD_1

Specification	Class 0 from model	Class 1 from model	% of accurate classifications
Actual 0 class	35	6	85,37
Actual 1 class	3	38	92,68
Total	38	44	89,02

Source: Own work.
Źródło: Badanie własne.

The total percentage of proper classified companies is 89,02%, in which the better classified are companies with the well financial condition (38 of proper classifications for 41 objects from the sample). LFD_1 have recognized 6 bankruptcies companies improperly grouping them in the units of correct standing, and 3 'healthy' objects classifying them as bankrupts.

There were also subjected to test a construction of LFD_2 model using algorithm of stepwise backwards analysis. There were build a model with all the variables (financial ratios) and then in successive stages removed variables that affect a small extend on the discriminant function ability. Finally in the equitation there were nine variables included: WPB, WZO, WZD, ROA, WZKP, WZZO, UTSMAO, UZAO and ZSZ).
The equitation of LFD_2 model for original ratios looks like below:

$$LFD\_2 = 0{,}00196 \cdot WPB - 0{,}06 \cdot WZO + 0{,}09 \cdot WZD - 0{,}333 \cdot ROA - 0{,}0013 \cdot \cdot WZKP + 0{,}37 \cdot WZZO + 3{,}596 \cdot UTSMAO + 1{,}726 \cdot UZAO + 0{,}842 \cdot \cdot ZSZ - 2{,}394.$$

For standardized ratios the formula looks like below:

$$LFD(ST)\_2 = 0{,}345 \cdot WPB - 0{,}72 \cdot WZO + 0{,}48 \cdot WZD - 0{,}842 \cdot ROA - 0{,}311 \cdot \cdot WZKP + 0{,}815 \cdot WZZO + 0{,}845 \cdot UTSMAO + 0{,}395 \cdot UZAO + + 0{,}732 \cdot ZSZ$$

which shows that the biggest impact on the model on value of the discriminant function have the UTSMAO ratio. Classification based on LFD_2 received from the stepwise backward method gave the worse results than LFD_1 model. The evaluation of the correctness of classification can be traced in the accuracy array placed in Table 3.

Table 3. Classification matrix fro LFD_2
Tabela 3. Macierz klasyfikacji dla LFD_2

Specification	Class 0 from model	Class 1 from model	% of accurate classifications
Actual 0 class	35	6	85,37
Actual 1 class	4	37	90,24
Total	39	43	87,80

Source: Own work.
Źródło: Badanie własne.

The total percentage of proper classified enterprises is 87,80%, but the recognition of companies with the good financial standing is better with the LFD_2 method as well (4 wrong classifications). In the bankrupts there were 6 wrong classifications.

From the binary variables models group there were made an estimation of binomial logit model. For estimating the notes equation parameters there were used a features obtained from the discriminant analysis, characterized by the high ability to distinguish between classes.

For the LFD_1 model those are the ratios: WZZO, UTSMAO, ZSZ, RS and for LFD_2: WPB, WZO, WZD, ROA, WZKP, WZZO, UTSMAO, UZAO, ZSZ.

On the basis of the variables included in LFD_1 there were a try to build a logit model, however the estimation process in this case did not complete properly – it was not possible to reach the convergence criterion for likelihood function. (plausibility function). It was decided than to remove RS variables and WZKP, because they discriminate the classes of the chosen enterprises on the lowest level (based on LFD_1 estimation). The logit model LOG_1 estimation results for 3 variables: WZZO, UTSMAO and ZSZ are shown in the Table 4.

Table 4. Logit model LOG_1 estimation results for 3 ratios from LFD_1
Tabela 4. Wyniki estymacji modelu logitowego LOG_1 dla 3 wskaźników z LFD_1

Variable	Ratio	Standard error	T–Student statistic	P–Value
const	–2,37876	1,11392	–2,112	0,0347
WZZO	0,29496	0,22269	1,288	0,1979
UTSMAO	4,15609	1,78912	2,318	0,0205
ZSZ	19,22250	6,48012	3,038	0,0024

Source: Own work.
Źródło: Badanie własne.

Statistically significant ratios at 5% are ZSZ and UTSMAO. No statistical significance of parameters is a phenomenon often appears in models, in which the role of interpreter variable is played by binary variable (see Gruszczyński [2003]). A positive estimate of LOG_1 model structural parameters shows that increasing of the value of above features has a beneficial effect on the financial situation of the company. This model classified correctly 76 enterprises, which gives 92,7%: respectively 37 from the bankrupts and 39 with the proper financial condition. The classification matrix for LOG_1 model is shown on Table 5.

Table 5. Classification matrix for the logit model LOG_1
Tabela 5. Macierz klasyfikacji dla modelu logitowego LOG_1

Specification	Class 0 from model	Class 1 from model	% of accurate classifications
Actual 0 class	37	4	90,24
Actual 1 class	2	39	95,12
Total	39	43	92,70

Source: Own work.
Zródło: Badanie własne.

Since the discriminant function LFD_2 was characterized by a worse accuracy and the total percentage of correct classifications than LFD_1, it was decided to resign from building a logit model for the ratios used in its construction.

Accuracy equal 92,70% in the test sample numbering 82 objects for LOG_1 is not satisfactory in the author's opinion, therefore the began to seek for the better set of interpretative variables has started, which would serve for the building of model for dichotomous variables. In this regard there was a modeling strategy *from general to specific* used, testing which set of variables will give the best classification results.

Logit model LOG_2 estimation results for this group of ratios are shown in table 6.

Table 6. Logit model LOG_2 estimation results for 11 ratios
Tabela 6. Wyniki estymacji modelu logitowego LOG_2 dla 11 wskaźników

Variable	Ratio	Standard error	T–Student statistic	P–Value
const	–17,69160	13,9613	–1,267	0,2051
UTSMAO	13,63250	13,6434	0,999	0,3177
WZZO	1,14195	0,7528	1,517	0,1293
URSKAO	10,21780	6,5730	1,555	0,1201
UNAO	2,93368	9,7527	0,300	0,7636
WPB	–0,00509	0,0287	–0,177	0,8591
UNSMAO	36,65000	22,2734	1,645	0,0999
ZSZ	56,65830	24,3495	2,327	0,0200
UZAO	19,83010	16,4282	1,207	0,2274
OPZD	7,57613	4,9297	1,537	0,1243
WZKP	–0,02230	0,0212	–1,047	0,2949
WZKW	0,37348	0,2249	1,660	0,0968

Source: Own work.
Źródło: Badanie własne.

The negative notes of parameters staying on the variables WPB and WZKP indicate that lowering the current liquidity and the level of net current assets engagement should have a negative impact on the company's financial condition. The increase of other ratios included in LOG_2 model will influence positively on the financial standing of enterprise.

In the model above only ZSZ ratio is the ratio significantly different from zero at 5% level. For the above model, the classification matrix is presented in Table 7.

Table 7. Classification matrix for the logit model LOG_2
Tabela 7. Macierz klasyfikacji dla modelu logitowego LOG_2

Specification	Class 0 from model	Class 1 from model	% of accurate classification
Actual class 0	40	1	97,56
Actual class 1	2	39	95,12
Total	42	40	96,34

Source: Own work.
Źródło: Badanie własne.

This model is characterized by a relatively high overall percentage of correct classification (96,34%). Only in the case of one enterprise, which was declared as a bankrupt, there were an incorrect assignment, assigning it a value of 1and for 2 companies from the

sample of enterprises with proper financial standing there were financial problems that could lead into a bankruptcy recognized (for this models there was a 0 class assigned, and actually they belonged to a 1 class).

It was also done a verification of models in validation sample, which was built on the basis of the set of expertly selected 16 enterprises. The group of bankrupt companies include: Techmex S.A., Monnari Trade S.A., Zakłady Naprawcze Taboru Kolejowego Łapy, Krośnieńskie Huty Szkła (for this objects in 2009 the commercial courts had declared bankruptcy), Odlewnie Polskie, Pronox Technology S.A. (bankruptcy with a possibility to an arrangement), Centrozap S.A. (judgment of 2004) and Próchnik S.A. The group of the 'healthy' enterprises includes: Optimus S.A., Lubawa S.A., Optopol Technology S.A., Stalprodukt S.A., Comp S.A., Doradztwo Gospodarcze DGA S.A., Relpol S.A. and Wojas S.A.

Validation was carried out for four models: LFD_1, LFD_2, LOG_1 and LOG_2, and the results of the classification are presented in the table 8. Models estimated on the basis of discriminant analysis in validation sample are characterized by the classification which does not offer a significantly bigger accuracy than the random one (for LFD_1 the total percentage of proper classification is equal to 50% – together 8 properly recognized enterprises, for LFD_2 this ratio stands at 55,56% – 10 properly recognized enterprises). Both linear discriminant functions in a similar manner identify individual companies included to a validation sample, but do not recognize properly defined classes.

Table 8. Classification matrix for models in validation sample
Tabela 8. Macierz klasyfikacji dla model w próbie walidacyjnej

Group	Name of enterprise	LFD_1	LFD_2	LOG_1	LOG_2
Bankrupts	Techmex	0	0	1	1
	Monnari Trade	1	1	0	0
	ZNTK	1	1	0	0
	Krośnieńskie Huty Szkła	0	0	0	0
	Odlewnie Polskie	1	1	0	0
	Pronox Technology	0	0	0	0
	Centrozap	0	0	0	0
	Próchnik	1	1	0	1
'Healthy' enterprises	Optimus	1	0	1	1
	Lubawa	1	1	1	1
	Optopol Technology	0	1	1	1
	Stalprodukt	1	1	1	1
	Comp	1	1	1	1
	DGA	0	0	1	1
	Relpol	1	1	1	1
	Wojas	0	1	0	1

Source: Own work.
Źródło: Opracowanie własne.

In case of logit models verification in the validation sample the obtained results was much better. LOG_1 model recognized improperly two enterprises: Techmex S.A. included into a bankrupts group and Wojas S.A. from the group of enterprises with good financial standing. The total percentage of the accurate classifications of LOG_1 model is 88,89%. LOG_2 model has recognized properly 15 companies, the only wrong classification was made with the Techmex S.A. company – the percentage of the proper classification for LOG_2 is 94,4%. Results of logit models verification met the expectations. Basing on the relevancy of matrix from table 8 it can be said that logit models fared considerably better with the problem of enterprises classification than a linear discriminant function.

SUMMARY

The result of the research was to build the classification models to predict corporate bankruptcy. An accurate forecast could serve as an information function both for managers, executive board and for banks or other financial sector units.

This thesis presents several approaches to the concept of building the classification models. The starting point was an appropriate choice of bankruptcy predictors, which would divide two studied groups of objects: companies 'healthy' and bankrupts. In this study the selection of interpreter variables was based on the features-financial ratios matrix analysis. For the analysis there were 15 exogenous variables used, and their final selection for models was based on the own values of standardized discriminant function estimations.

Based on the research there are better results for use of the classification issue with logit models over the discriminant linear function. This means that the task of companies classification into groups: bankrupts, non-bankrupts is anonlinear issue. LOG_1 model has a high accuracy of the forecasts (92,7% of correct classifications in the base sample). LOG_2 was estimated on the basis of interpreter variables, which were chosen in accordance with the modeling strategy *from general to specific*. For this model counted R-square was 96,34%. It should also be clear that logit models in a very reliable way solves the tasks of bankruptcy prediction in the validation samples – model LOG_1 classified correctly 88,89% of companies, while LOG_2 classified correctly 94,4%.

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MODELE KLASYFIKACJI WZORCOWEJ W PREDYKCJI UPADŁOŚCI PRZEDSIĘBIORSTW

Streszczenie. W pracy dokonano próby stworzenia modeli klasyfikacji wzorcowej, które umożliwiałyby przewidywanie upadłości przedsiębiorstw. Przedstawiono ekonomiczne aspekty bankructwa jednostek gospodarczych oraz jego przyczyny. Uwagę poświęcono metodom predykcji upadłości ze szczególnym uwzględnieniem analizy dyskryminacyjnej oraz modeli logitowych. Dokonano przeglądu literatury w zakresie istniejących modeli wczesnego ostrzegania. Punkt poświęcony badaniom własnym zawiera opis oraz wyniki estymacji oryginalnych modeli predykcji bankructwa. Zweryfikowano również otrzymane systemy wczesnego ostrzegania w próbie walidacyjnej.

Słowa kluczowe: prognozowanie upadłości, modele klasyfikacji, analiza dyskryminacyjna, model logitowy

Accepted for print – Zaakceptowano do druku 24.05.2011

ACTA SCIENTIARUM POLONORUM *Oeconomia 10 (2) 2011, 107–120*

ASSESSMENT OF ECONOMIC EFFECTS OF INNOVATIONS IN AUTOMATIC MILKING SYSTEMS IN PODLASKIE REGION (POLAND) WITH THE USE OF REAL OPTION APPROACH[1]

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Abstract. In the dairy sector of the Podlaskie region, the leader in milk production and processing in Poland, strong concentration processes are observed. Enlargement of herds of dairy cows in a number of farms increases farmers' interest in adoption of innovative, automatic milking systems (AMS). In this paper, the profitability of different timing of investment implementation in milking robots was assessed, focusing on the dairy farm types dominating in the region. The implemented model is based on a real option approach that includes investment irreversibility and stochasticity in direct payments rate, milk and labour prices. Additionally several investment support rates from Rural Development Plan has been considered. The analysis shows that delaying investment in AMS under conditions of the reformed CAP would be a better strategy as compared to investments in the first year of modelling period. However, the benefit form postponing decision on investment is diminishing with increasing farm size and input of hired labour.

Key words: real options, milking robots, dairy farms, uncertainty

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[1] The analysis presented in the paper is based largely on the study that has been conducted in the framework of the 7th EU Framework Programme project CAP-IRE ('Assessing the multiple Impacts of the Common Agricultural Policies (CAP) on Rural Economies') and does not reflect any EU Commission opinion.

Podlaskie region is located in the North-Eastern part of Poland. Agriculture is one of the main industries in the region. Due to favourable natural conditions, milk production is the key activity for about 45% of farms from over 109 thousand in total. In the farming sector of the region, a continuous trend of concentration of land and livestock is observed. It results in the enlargement of herds of dairy cows in farms specialized in milk production and increased needs of investments in land, stands for livestock as well as for labour saving equipment. Automatic milking systems offer a new, labour extensive technology of milking cows that attracts attention of a large number of farmers.

New technology adoption and innovation diffusion represent two central elements for the enterprise and industry development process in all sectors of the economy. Innovation is one of the main drivers of economic growth and an important instrument for improving efficiency and achieving a higher level of farm-business sustainability. Adoption of innovations and re-organization of agri-food chains are two of the Common Agricultural Policy (CAP) Health Check priorities that aim at improving competitiveness of agri-food sectors in the European Union. Competitiveness is one of the axes of the EU Rural Development Programs (RDP). RDP as a whole, and the first axis in particular, are expected to be strengthened in the next years.

However, the effectiveness of even stronger investment support policy is not ensured, as farmers are operating in an increasingly uncertain environment. Such uncertainty is often a cause of delays in the process of farm innovations. Uncertainties can derive primarily from the markets, but are also related to institutional risk created by the upcoming CAP reform process. [Was, Malak 2008; Majewski et al. 2008]. Rodrik [1991], for example, has shown that even a low level of uncertainty regarding a policy reform may withhold farmers from investing.

The objective of the paper is to provide an ex-ante assessment of the effectiveness of delaying decision on investments in milking robots (AMS – automatic milking systems) in selected types of dairy farms.

SELECTION OF FARM TYPES FOR MODELING

Within the CAP-IRE project 250 farmers from Podlaskie region have been interviewed in a farm-households survey conducted in the year 2009 [Majewski et al. 2011]. The farms in the sample represent a range of farm size clusters and different production types. Only commercial farms (approximately larger than 10 hectares of agricultural land) have been selected for the survey.

From the whole sample a subsample of dairy farms was created. With the use of Cluster Analysis[2] three dominating types of dairy farms were identified for modelling. Variables used for cluster analysis were: number of milking cows, milk yield per cow (litres), farm area (ha), share of rented land, farmer's age, number of members of the household, indicator of soil quality, cost of chemical protection per 1 ha, quantity of

[2] A non-hierarchical k-means cluster analysis was applied. In order to avoid arbitrary decision on the number of clusters hierarchical agglomeration method (Ward method, Manhattan distances) was applied in the first phase.

artificial fertilizers in kg per 1 ha, number of family members working full time and part time on the farm, share of income from agricultural activity, value of sales per ha, number of persons in the household younger than 18 years, number of person in the household older than 65 years, value of income from social transfers and off-farm work per household, average age of tractors, average age of buildings, participation in farmers organizations, participation in agro-environmental programs, use of the advisory services. The characteristics of the farms selected for modelling are presented in Table 1.

Table 1. Characteristics of modelled farms
Tabela 1. Charakterystyka gospodarstw modelowych

Specification	Farm cluster		
	C1 – small	C2 – medium	C3 – large
Area [ha agricultural land]	20,20	35,10	90,50
– owned	16,77	24,22	59,73
– leased	3,43	10,88	30,77
Share of permanent grassland [%]	55%	55%	50%
Average cereals yield [t/ha]	3,22	3,96	3,55
Number of dairy cows	15	24	69
Milk yield [kg/head/year]	5634	6708	7112

Source: Own research.
Źródło: Badania własne.

Farms differ in terms of number of cows and area of agricultural land. In the smallest farm (C1) milk yield is noticeably lower than in farms with a larger scale of milk production.

SCENARIOS FOR MODELING

The main investment activity included in the model is installation of Automatic Milking System (AMS). Additional investments in stands for cows allowing to increase the scale of production as well as land lease (up to 1,5 times of currently leased area) were also allowed. Technical and economic coefficients for the innovation in AMS have been collected as secondary data mainly coming from technical papers and interviews with experts.

Different scenarios regarding the level of policy support, labour costs and milk prices were considered in the models.

Policy variable was the RDP support through the on-farm investment measure that intends to provide incentives for innovations adoption. In the models four levels of support have been tested (no support, 25%, 50%, 75% of investment cost). The model covers also uncertainty regarding the rate of direct payments that takes into account potential changes of the CAP to be introduced after 2013 (which are under discussion when writing this paper). Other factors differentiating modelling scenarios were levels of milk prices and hired labour costs (four levels for each variable).

The key milk policy assumption is the abandonment of milk quota in the year 2016. Due to this, after 2016 models are not constrained on the amount of milk produced and in case of increase of quantity of milk there is no cost of milk quota lease, as it could have been calculated for the period 2010–2015.

REAL OPTION MODELING[3]

This paper addresses the decision to adopt an innovation using the Real Options (RO) approach. Such a model typology is able to describe in a better way than capital budgeting tools the investment choice when the decision to adopt an innovation is affected by irreversibility and uncertainty [Dixit and Pindyck 1994; Schwartz and Trigeorgis 2004]. In fact, with the RO approach it is possible to consider in the investment choice the increase of its value as a result of the greater information obtained by the decision maker over time, concerning future decision variables [Mcdonald and Siegel 1986]. Such an increase is the result of the option to delay investment decisions until further information about the state of nature (as well as market and other prices) has been collected [Trigeorgis 1988].

Several authors have developed methodologies based on the RO approach in order to simulate the decision to invest in specific new technologies when are characterised by uncertainty and irreversibility. Some examples in livestock farms are Tauer [2006] concerning the entry/exit and the livestock expansion and Hyde et al. [2003], Engel and Hyde [2003], [Floridi et al. 2010] and Sauer and Zilberman [2010] for an application to the adoption of automatic milking system (AMS).

Under conditions of uncertainty and investment irreversibility, the RO approach enables the quantification of the Net Present Value (NPV) increment due to the option to delay the investment until a following period, when the farmer will have access to more information about the exogenous uncertain variables determining investment profitability [Sauer and Zilberman 2010].

New investment can imply high costs, changes in related farming activities and more complex production management compared to previous farm conditions. In fact, adoption of a new technology implies a reorganisation of the entire farm production system. Therefore, in order to study the investment it is necessary to take into account not only the production operation of a farm, but also the household decisions, given that both play a key role in investment decisions. The decision to invest is also strongly influenced by the uncertainty about many of the decision variables, given the uncertain outcomes. Such variables can be classified with those connected to the farm structure such as household labour availability on-farm, and those connected to market conditions such as shadow prices of household labour allocated off-farm, the prices of the agricultural outputs, and

[3] The chapter is based on Bartolini et al. [2010] section "Conceptual framework".

the cost of the hired labour. Furthermore, they can be associated with variables related to the investment financial management rate of the loan, loan accessibility, and the amount and certainty of obtaining SFP/SAPS and RDP payments.

This approach is presented in Figure 1, with an example in which the choice to invest can be undertaken during two distinct periods.

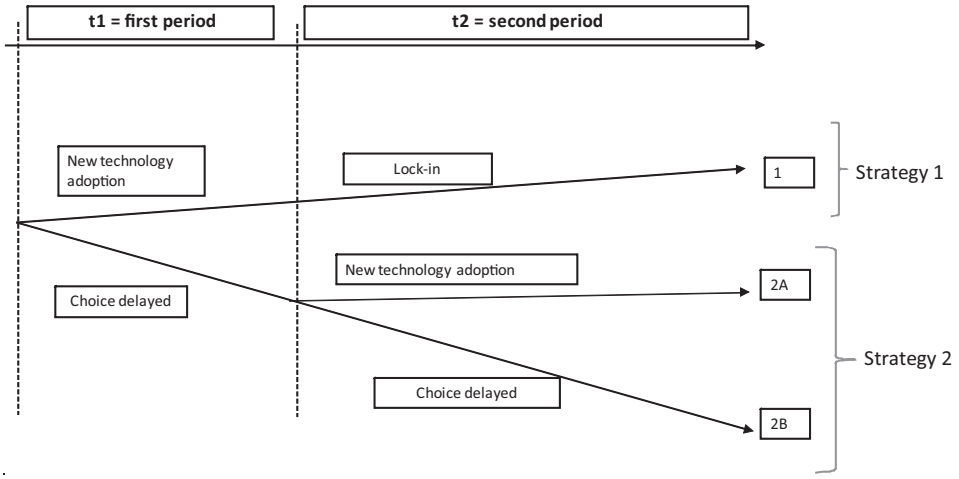

Fig. 1. Process of investment decision in the model in two periods
Rys. 1. Proces podejmowania decyzji inwestycyjnych w modelu w dwóch okresach

Source: Bartolini F., Floridi M. et. al. [2010].
Źródło: Bartolini F., Floridi M. et. al. [2010].

For example, assuming that a decision to adopt an innovation can be undertaken in two separate periods (t1 and t2), the decision process can be interpreted as a discrete choice, which the farmer can carry out in either the first (strategy 1) or the second period (strategy 2). The decision to invest during the first period locks-in the farm with the investment during the second period (strategy 1). Lock-in is determined by high investment and sunk costs and by the irreversibility of the investment [Carruth et al. 2000]. However, the farmer can also delay the investment until he/she obtains more information about the uncertain decision variables, and will then choose to invest or not during the second period. The delay allows the farmer to observe the value of such variables (which were assumed to be stochastic in the first period) and, if such variables are favourable to the adoption of the considered innovation, then the farmer will undertake the investment in period t2 (strategy 2A). Otherwise, if the value of the uncertain variables is not favourable to the profitability of the innovation investment, then the farmer will neither choose to invest in the second period (strategy 2B).

The optimal strategy will be the one that determines a higher net present value (NPV) of the cash flow over both periods: $NPV = \max(NPV_1, NPV_2)$; where NPV_1, referring to Figure 1, is the net present value of the cash flow in strategy1 and NPV_2 is the net present value of the cash flow in strategy2. Expressions of NPV_1 and NPV_2 are given in equations 1 and 2.

$$NPV_1 = -k + \sum_{0}^{t1} \frac{cf_{inn}^{t1}}{(1+i)^t} + \sum_{t1+1}^{t2} \frac{\gamma\ \overline{cf_{inn}^{t2}} + (1-\gamma)\ \underline{cf_{inn}^{t2}}}{(1+i)^{t1+t}} \tag{1}$$

$$NPV_2 = \sum_{0}^{t1} \frac{cf^{t1}}{(1+i)^t} + \\ + \left(\gamma \left(\frac{-k}{(1+i)^{t1+t}} + \sum_{t1+1}^{t2} \frac{\overline{cf_{inn}^{t2}}}{(1+i)^{t1+t}} \right) + (1-\gamma) \left(\frac{-k}{(1+i)^{t1+t}} + \sum_{t1+1}^{t2} \frac{\underline{cf^{t2}}}{(1+i)^{t1+t}} \right) \right) \tag{2}$$

Where:
cf^t = cash flows of a generic year t, with $t = t1$ if years belong to the first period and $t = t2$ if years belong to the second period; k = cost of investments; i = discount rate; γ = probability of having a state of the nature favourable to innovation adoption; $\overline{cf_{inn}^{t2}}, \overline{cf^{t2}}$ = cash flow of a generic year t when $t = t2$ and stochastic variable values are favourable to innovation adoption; $\underline{cf_{inn}^{t2}}, \underline{cf^{t2}}$ = cash flow of a generic year t when $t = t2$ and stochastic variable values are unfavourable to innovation adoption; *inn* = subscript, means new technology adoption.

The innovation adoption is subject to uncertainty in the second period. This assumption implies stochastic cash flow values during this period. Following Dixit and Pyndick [1994] we assumed that the annual cash flows follow a Brownian Motion with drift, so that $dcf^t = \mu cf^t\, dt + \sigma cf^t\, dz$, where dcf^t is the instantaneous value of the cash flow; $\mu^t cf^t\, dt$ is the expected cash flow value; μ is drift (percentage); σ is the volatility (percentage); and dz is a Wiener process with a mean of zero and independent increments. Under such approach it is possible to differentiate two values of cash flows: one favourable to the new technology investment $\left(\overline{cf^t}\right)$, and the other unfavourable $\left(\underline{cf^t}\right)$. These two values are generated assuming that the random variable generated from the Wiener process can have positive or negative values in order to allow for adding or removing the same amount from the expected value at any time in the period $t2$. This approach enables to maintain a constant expected value, and to change only the amount of uncertainty in the second period.

CONSTRUCTION OF THE HOUSEHOLD MODEL

The empirical analysis was conducted with the use of the Dynamic Farm Household Model with the objective to maximise the NPV of the cash flow over the next 20 years. The model was hypothesised to be structured in two time periods; the first period ($t1$) includes the years 2010–2013, and the second ($t2$) includes the years 2014–2030, coherently with the actual policy framework. Farm household models enable the maximisation of the utility function generated by the household income, the household leisure time and the household consumption [Taylor and Adelman 2003].

The investment has been simulated considering the connections between the various activities of the farm: livestock activity, crop cultivation and labour allocations among such activities. Number of cows in the model solution is linked with the land available for production of fodder. The model allows to increase area of agricultural land. Cropping structure is determined by availability of land, requirements of animal sector and rotational constraints reflecting crop management systems in model farms. Milk production has been linked with crop production through the fodder balance, taking into account requirement of cows for assumed yield of milk.

The household has been assumed to maximise the whole household NPV, subject to consumption and leisure constraints.

MODELING UNCERTAINTY IN EXOGENOUS VARIABLES

The model has three stochastic parameters: the amount of direct payments received by the farm, milk and labour prices. Formally, uncertainty can be expressed by: $S^t = S^e dt \pm \sigma dz$, where S^t is the expected value for a generic year of each stochastic parameter; S^e is the forecasted or known value during the first period; σ is the oscillation (known during the first period) and dz is a random variable uniformly distributed with a minimum value of 0 and a maximum value of 1. Through a Monte Carlo Approach, dz has been simulated as an $N \times M$ matrix of random values, where M represents the times at which each stochastic parameter changes during the second period (years for prices, EU programming period for payments), and N represents the number of samples generated by the Monte Carlo simulation.

For every sample value generated by Monte Carlo simulation the model has been solved in iterative way. The final results is set of outcome values for N iterations. It was assumed, coherently with the current policy framework that during time $t1$ (first period) the farmer knows the average amount of direct payments (SAPS – single area payment scheme) received by the farm, the average level of agricultural prices, the average cost of labour and the oscillation for each of the stochastic parameters. Following this way the uncertainty in milk and labour process has been calculated, assuming that prices are known for the year 2010, while for remaining years are stochastic. Expected values and oscillation for milk price and labour has been estimated based on Scenar 2020 Study [ECNC, LEI, ZALF 2009].

RESULTS

The number of cows and occurrence of investments in Automatic Milking Systems are the basic outcomes of the model (Table 2). Results presented in Table 2 were achieved for different levels of RDP support (expressed as a percentage of investment costs covered, within the range 0–75%) and for parameters derived as stochastic values – direct payments (SAPS), milk and labour prices. Three investment strategies were considered in the model:

1 – investing in AMS in the year 2010;

2 – postponing decision till 2014 when more information will be available and then:

2A – investing in AMS in 2014,

2B – continuation of farming without investing in AMS.

For the strategy 1 the period 2010–2030 has been divided into two sub-periods: 2010–2017 and 2018–2030. It is assumed that in the strategy 1 the model invests in AMS in the year 2010, regardless of herd's size or conditions for milk production. At the beginning of the second period (2018) the model chooses to continue with investment or not to invest. In case of investment, based on the assumption that milking robot is depreciated in 8 years, continuation requires replacing the existing AMS with a new one.

For strategies 2A and 2 B, investments are allowed in the entire 2014–2030 period.

The number of cows in each farm is increasing in the period 2010–2030 in almost all situations considered, however the scale of growth is different. In the smallest farm (C1) the model adds about 2 cows to the initial herd of 16 cows. In the farm C2 number of cows is increased by about 50% (initially 31 cows) and in the largest farm (C3) the number of cows is doubled in the most progressive solutions.

The milk price was the main factor influencing the scale of production in the model solutions. The greatest differences are observed between strategies 2A and 2B in case of uncertainty of milk price. In unfavourable conditions, the model for the smallest farm cluster shows a slight decrease in the animal number. The medium size cluster (C2) seems to be the least vulnerable to uncertainties considered, and maintain the tendency to grow irrespective of milk price and labour costs. In the C3 cluster, under the most pessimistic assumptions (low milk price, low RDP support), the number of cows remains on the base year level, while in favourable conditions (high milk price, high RDP support) it is more than doubled.

The adoption of AMS in the smallest farm (C1) is not an option in any scenario.

In farms with a larger herd of cows investment decisions are strongly influenced by two factors mainly: rate of RDP support for farm investments and milk prices.

In medium size farms (C2) in case of favourable milk prices and 50% of investment support AMS is adopted in 92% of iterations (strategy 2A). In case of uncertainty in SAPS or labour prices (less favourite conditions) and RDP support below 50% the adoption rate is negligible. At the highest investment support rate (75%) the adoption rate reaches over 90% in case of investment delayed until 2014 (strategy 2A, 2B: 2014–2030) or 2018 (strategy 1: 2018–2030).

A similar pattern is observed in the largest farm (C3). However, differently than in the C2, even at the 25% investment support rate the model adopts the new technology in case of high milk price. In general – the higher support rate is, the stronger is the model encouraged to invest in AMS.

Over 90% of farms are investing in AMS in the second period after delaying the decision (strategy 2), while all farms that installed one AMS in 2010 are increasing the number of units[4] after 2014 to cover the whole herd.

The average values of NPV and the Option Value due to the choice to delay the decision in the second period are presented in Table 3.

[4] It is assumed that maximum capacity of one AMS is 50 dairy cows. In case of farms with herds above 50 dairy cows investment in two or more AMS might be considered.

Table 2. Changes of herd size and AMS adoption rate in the farm clusters considered
Tabela 2. Zmiany w wielkości stada krów i stopa adopcji inwestycji w AMS w modelowych gospodarstwach

Farm cluster	Uncertainty	RDP investment support [%]	Number of cows [heads./farm]				Share of AMS [%]			
			Strategy				Strategy			
			1	1	2A	2B	1	1	2A	2B
	Period		2010–17	2018–30	2014–30	2014–30	2010–17	2018–30	2014–30	2014–30
C1	labour	0	16,3	18,0	18,0	18,0	100	–	–	–
		25	16,3	18,0	18,0	18,0	100	–	–	–
		50	16,3	18,0	18,0	18,0	100	–	–	–
		75	16,3	18,0	18,0	18,0	100	–	–	–
	milk	0	16,3	18,0	18,0	13,1	100	–	–	–
		25	16,3	18,0	18,0	13,2	100	–	–	–
		50	16,3	18,0	18,0	13,2	100	–	–	–
		75	16,3	18,0	18,0	13,2	100	–	–	–
	saps	0	16,3	18,0	18,0	18,0	100	–	–	–
		25	16,3	18,0	18,0	18,0	100	–	–	–
		50	16,3	18,0	18,0	18,0	100	–	–	–
		75	16,3	18,0	18,0	18,0	100	–	–	–
C2	labour	0	31,4	41,1	39,8	39,8	100	–	–	–
		25	31,4	41,1	39,8	39,8	100	–	–	–
		50	31,5	41,4	40,2	40,1	100	–	6	4
		75	31,6	45,5	44,3	44,3	100	100	92	92
	milk	0	31,4	41,1	43,0	37,8	100	–	–	–
		25	31,4	41,1	42,9	37,8	100	–	–	–
		50	31,5	41,3	46,7	38,0	100	–	92	–
		75	31,6	45,5	46,8	39,8	100	100	93	89
	saps	0	31,4	41,1	39,9	39,9	100	–	–	–
		25	31,4	41,1	39,8	39,8	100	–	–	–
		50	31,5	41,4	40,2	40,0	100	–	6	2
		75	31,6	45,5	44,3	44,2	100	100	92	93
C3	Labour	0	77,5	93,5	93,9	86,0	64	–	–	–
		25	77,4	93,5	93,8	86,1	65	–	–	–
		50	77,4	100,0	140,5	96,5	81	100	94	91
		75	89,9	149,3	140,5	97,8	83	100	94	92
	milk	0	77,4	93,5	96,9	69,6	65	–	–	–
		25	77,4	93,5	141,0	69,6	65	–	94	–
		50	77,4	100,0	141,0	78,1	81	100	94	32
		75	90,0	149,3	141,1	96,1	83	100	94	91
	saps	0	77,4	93,5	94,5	87,0	65	–	–	–
		25	77,4	93,5	94,5	87,0	65	–	–	–
		50	77,4	100,0	140,5	96,5	81	100	94	91
		75	89,9	149,3	140,5	96,5	83	100	94	91

Source: Own research.
Źródło: Badanie własne.

Table 3. NPV and Real Option Value for different strategies of investing in AMS
Tabela 3. NPV i wartości Real Option różnych strategii inwestycji w AMS

Farm cluster	Uncertainty	RDP investment support [%]	Financial results			
			Strategy			
			1 Investment in 2010	2 (2A&2B) Decision in 2014	Real Option Value	
			NPV [EUR]	NPV [EUR]	S2-S1 [EUR]	RO/NPV(S2) [%]
C1	labour	0	–72 364	34 761	107125	308%
		25	–48 134	34 778	82912	238%
		50	–23 880	34 772	58652	169%
		75	273	34 778	34505	99%
	milk	0	–72 310	35 187	107496	306%
		25	–48 155	35 185	83341	237%
		50	–23 880	35 187	59067	168%
		75	273	35 187	34915	99%
	saps	0	–72 310	34 776	107086	308%
		25	–48 157	34 773	82930	238%
		50	–23 880	34 768	58648	169%
		75	273	34 778	34505	99%
C2	labour	0	177 833	266 712	88879	33%
		25	202 004	266 752	64749	24%
		50	226 208	266 683	40474	15%
		75	269 861	291 168	21308	7%
	milk	0	177 851	267 810	89959	34%
		25	202 004	267 783	65779	25%
		50	226 202	273 944	47742	17%
		75	269 690	294 064	24375	8%
	saps	0	177 851	266 728	88878	33%
		25	202 004	266 756	64752	24%
		50	226 209	266 750	40541	15%
		75	269 841	291 021	21180	7%
C3	labour	0	1 417 048	1 531 406	114358	7%
		25	1 441 510	1 531 683	90173	6%
		50	1 489 846	1 559 373	69527	4%
		75	1 590 684	1 634 957	44274	3%
	milk	0	1 417 337	1 546 868	129531	8%
		25	1 441 507	1 563 652	122145	8%
		50	1 489 816	1 610 287	120471	7%
		75	1 590 671	1 676 188	85518	5%
	saps	0	1 417 311	1 531 554	114242	7%
		25	1 441 511	1 531 566	90054	6%
		50	1 489 846	1 558 655	68809	4%
		75	1 590 697	1 634 233	43537	3%

Source: Own research.
Źródło: Badanie własne.

The modelling results indicate that the optimal strategy for Podlaskie dairy farmers is to delay investment decision until the second period since the Real Option Value is positive under all types of conditions for milk production considered – delaying investment in AMS gives better financial results.

More information on milk, labour prices and the amount of direct payments to be received after 2014 before making a decision regarding concentration in livestock and the modernisation of milking systems reduces risk of wrong decisions. In farms C2 and specifically C3, however, the Real Option Value is relatively small (the ratio RO/NPV below 10% in a number of cases). This suggests, that individual decisions of large scale farmers to invest in 2010, can be justified.

The number of adoptions increases with higher RDP support. For the largest farms (cluster C3) in case of higher rates of RDP support the real option value in relation to NPV value is relatively low. However, pointing out that models have been designed for an average farm within the cluster, it might be worth to consider investment in 2010 for farms from the C3 group with the largest numbers of cows.

In all model solutions, farm size is increased mainly because an additional land for producing fodder in models enlarging herds of cows is required (Table 4). Because differences in the farm size under different levels in uncertainty of milk prices, labour costs and financial support were insignificant the are of agricultural land is presented as an average for respective model solutions.

Table 4. Changes of agricultural land area in model solutions
Tabela 4. Zmiany w powierzchni użytków rolnych w rozwiązaniach modelowych

Farm cluster	Uncertainty	Agricultural land [ha]			Agricultural land [2009 = 100%]		
		Strategy			Strategy		
		1	2A	2B	1	2A	2B
C1	labour	25,35	25,36	25,36	126%	126%	126%
	milk	25,36	25,36	23,85	126%	126%	118%
	saps	25,35	25,36	25,36	126%	126%	126%
C2	labour	51,42	51,41	51,41	146%	146%	146%
	milk	51,42	51,42	51,41	146%	146%	146%
	saps	51,42	51,41	51,41	146%	146%	146%
C3	labour	136,49	136,17	136,66	151%	150%	151%
	milk	136,49	135,84	136,67	151%	150%	151%
	saps	136,48	136,18	136,66	151%	150%	151%

Source: Own research.
Źródło: Badanie własne.

Generally all farms tend to increase the area through additional lease of land up to the maximum allowed by the model constraints (150% of currently leased area) despite the relatively high land lease price assumed (400 EUR/ha). Only in case of the smallest farm cluster and low milk prices the maximum area allowed to the model has not been reached. This shows that unfavourable conditions are limiting the growth of small farms to a greater extent.

CONCLUSIONS

Modelling results allow to emphasize that decisions to adopt the new technology for milking cows and the timing of such decisions, depend on the direction of the policy reform and availability of information. In particular, they highlight the importance of "predictability" as a major policy feature and component of policy design facing a strongly uncertain context. This confirms the existing literature pointing out the negative effect of (policy) uncertainty on private investment (e.g. Rodrik 1991, Feng 2001, see also Gallerani et al. 2009), but brings a new light on the consequences of introducing different, possible CAP measures in the specific context of the Podlaskie region.

The main limitation of the model is its simplification compared with reality, as it is the case of all bio-economic models. This applies at least to the timing of investment processes and the way uncertainty is treated in the model for an average farm from a cluster, despite heterogeneity of farms within the cluster. In particular, the fact that some farms in the groups analysed show interest in investment in new technologies even at lower co-funding rates than shown by the simulation, may reveal that the heterogeneity within the cluster would require higher consideration in the model design strategy.

This suggests a number of potential developments in the direction of adding more point in time for investment decisions, of including uncertainty in other decision variables (investment costs, technological development, prices of factors and products) and of allowing for the simulation of uncertainty to use different combinations of uncertainty parameters with an explicit correlation between each other. Another option could be the use of scenarios to model changes in CAP payments following the upcoming proposals for regulations for the post-2013 CAP.

Coming to more detailed findings it could be pointed out that AMS should be recommended only for herds of 50 cows or greater. The greatest positive economic effect is observed in large farms with hired labour. High milk prices and stronger investment support highly increases adoption rate of the new technology, while SAPS payments and labour cost have relatively small effects on the investment decisions.

Removal of milk quotas creates space for growth of dairy farms in Podlaskie region, especially under highly favourable economic and market conditions (greater policy support for investments and high milk price). The modelling results suggest that larger farms may tend to increase size of the herds and area of agricultural land as well as to adopt the new technology for milking cows.

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OSZACOWANIE EKONOMICZNYCH EFEKTÓW INNOWACJI W AUTOMATYCZNE SYSTEMY DOJU W REGIONIE PODLASKIM (POLSKA) Z ZASTOSOWANIEM PODEJŚCIA REAL OPTION

Streszczenie. W sektorze mlecznym w regionie podlaskim, które jest liderem w produkcji i w przetwórstwie mleka w Polsce, obserwuje się silne procesy koncentracji. Powiększanie stad krów mlecznych w wielu gospodarstwach wywołuje wśród rolników zainteresowanie wprowadzeniem innowacyjnych, automatycznych systemów doju krów (AMS). W artykule przedstawiono wyniki oszacowania korzyści finansowych z tytułu zróżnicowania decyzji inwestycyjnych w czasie. Do rozważań wybrano dominujące w regionie typy gospodarstw mlecznych. Zastosowany model gospodarstwa jest oparty na podejściu real option. W modelu przyjęto nieodwracalność inwestycji, stochastyczne kształtowanie się płatności bezpośrednich, cen mleka i kosztów robocizny. W badaniach założono różne poziomy wsparcia inwestycji z Planu Rozwoju Obszarów Wiejskich. Analiza wyników prowadzi do konkluzji, że odłożenie inwestycji w AMS w czasie, w warunkach reformowanej WPR, byłoby korzystniejszą strategią w porównaniu do inwestycji w 1. roku okresu modelowania. Jednakże korzyści z przesunięcia inwestycji na bardziej odległy termin maleją wraz ze wzrostem wielkości gospodarstw i zwiększaniem nakładów pracy najemnej.

Słowa kluczowe: real options, roboty do doju krów, gospodarstwa mleczne, niepewność

Accepted for print – Zaakceptowano do druku 06.04.2011

ACTA SCIENTIARUM POLONORUM *Oeconomia 10 (2) 2011, 121–129*

VOCATIONAL ACTIVITY AS A DETERMINANT OF PARTICIPATION IN TOURISM OF DISABLED PEOPLE FROM THE AREA OF EASTERN POLAND

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Abstract. The main purpose of the study, whose results are presented in this paper, was to investigate and assess the influence of the vocational activity on the participation in tourism of people with disabilities residing within the territories of Eastern Poland. The empirical studies using the method of diagnostic survey were conducted in the years 2005–2007 in the following regions: podlaskie, lubelskie and podkarpackie. A comparative analysis of participation in tourism and recreation of two groups of disabled people – vocationally active and inactive – was conducted. There were taken into account the frequency of tourist traveling, preferred forms of tourism, premises and barriers of participation in the activity of tourism and recreation. Studies showed that the vocational activity is an important determinant of participation in tourism of people with disabilities. Conducted studies on the initiative of the Institute of Tourism and Recreation of State School in Biała Podlaska constituted a contribution to studies on the determinants of tourist and leisure activities of disabled people in Poland.

Key words: tourism, recreation, vocational activity, disability

INTRODUCTION

Disability is a common phenomenon and concerns all countries and every community. World Health Organization determines the size of this phenomenon on the 650 million i.e. approximately 10% of the total population. In Europe, one in six people has a disability to a degree from mild to significant[1], which means that about 80 million Europeans have

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[1] EU Labour Force Survey ad hoc module on employment of disabled people – LFS AHM, 2002.

no opportunity to participate fully in social and economic life due the barriers related to the environment and surrounding attitudes. This is the result of demographic changes – of aging population as well as of a more and more common, in most countries of the world, acceptance of this phenomenon manifested in building a tolerant and open society which creates and transforms surrounding in accordance with the principles of planning and programming of a universal and progressive aging of societies [Ostroff 2001; Steinfeld and Shea 2001; Darcy et al. 2010].

In recent years, as a result of studies and analysis related to the phenomenon of disability [Nagy 1969; Mashaw and Reno 1996; Darcy 2009], a number of definitions of disabled person and models of disability have been developed [Pope, Tarlov 1991; Pfeiffer 1999].

But the most important role in organizing the definition of disability is played by the World Health Organization (WHO). In 1980, the WHO chaired by Mr Wood formulated an official definition of disability [International Classification of Impairment, Disability and Handicap – ICIDH]. The distinction was showed between the impairment, which causes an "abnormal" functioning of a particular organ or body parts, the disability, which describes the limitation of daily psychological or physical efficiency as a result of damage to human organs or body parts, and the handicap, which is a result of injury or disability that hinders from performing certain social roles. This typology implies the existence of physical and psychological 'normality', disability is here a deviation from the existing standards of physical and mental functioning of a human [Martin 1988].

The definition presented by the WHO was accused of bringing the problems of people with disabilities only to medical issues, thus omitting explicit social and cultural aspects related to disability. Therefore, in 1997 the WHO presented a revised and corrected version of the previous classification under the name of International Classification of Impairments, Activities and Participation – a Manual of dimensions of disability and functioning [ICIDH-2]]ICIDH-2 WHO 1997].

Currently, there is a second, improved version of the classification, under the changed title: International Classification of Functioning, Disability and Health [ICF 2001], which combines medical and social models of disability. A bio-psycho-social model has been proposed, which includes the problem of dysfunctions from the perspective of biology, the individual and society. In the ICF classification, disability is a multidimensional phenomenon resulting from interactions between people and their physical and social environment. In other words, disability and functioning are seen as the results of interaction between health conditions (diseases, disorders and injuries) and other factors, which include environmental factors (legal and social structures, climate, architecture) and associated with an individual (such as age, sex, methods of coping, education, professional status, the experience gained etc.)[2].

In parallel with studies on the classification and the definition of disability, there were undertaken the activities related to the inclusion of this part of the population in the full stream of socio – economic activity. A result of these proceedings are documents of global,

[2] ICF należy do grupy klasyfikacji opracowanych przez WHO i skupionych wokół Międzynarodowej Klasyfikacji Chorób (International Classification of Diseases, ICD).

United Nations (UN) and regional, European Union character which try to create a legal and organizational framework of a full integration of disabled people into society[3].

In practice, the important and severe problems faced by people with incomplete efficiency are social barriers which often result from the characteristic tendency of modern civil societies to valuation. The disabled are treated as economically unproductive members of society constituting an additional burden on the state budget. Functioning stereotypes do not allow to recognize people with limited efficiency as valuable, but just as shiftless in life, and they are inclined quarrelsome towards the surroundings [Florek 2009]. In this situation, a special effort is required to promote the access of disabled people to the employment, preferably in the open labor market. This is one of the most important ways to fight against social exclusion of disabled people and to fight for their dignity and independent life. The vocational activity also constitutes the economic independence which makes a significant contribution to the free time activities, including the tourist activity.

The tourism that constitutes an essential factor of economic activation, increase in municipal budget revenues and employment of population, begins to play more and more important role in the processes of the socio-economic development [Baran, Grzebyk 2010]. Progressing around the world processes of urbanization are the reason for growing human alienation from the natural environment. This in turn entails an attempt of the modern generations to search for various forms of recreational activity in the natural environment, possibly as little as transformed [Mynarski, Sonelski 2010]. The social group to which tourism meets the specific features are people with disabilities. Tourism of disabled people is not only about satisfying the needs of the typical tourist attractions such as: the need to swap places, sightseeing, cultural, educational, or sports needs, but also it is

[3] The Standard Rules on the Equalization of Opportunities for Persons with Disabilities ONZ, 1993
Tready of Maastricht, 1992, Tready of Amsterdam, 1997, Tready of Nice, 2001
Resolution of the Council and of the Representatives of the Governments of the Member States Meeting within the Council of 20 December 1996 on Equality of Opportunity for People with Disabilities Raising Employment Levels of People with Disabilities – The Common Challenge, 29.09.1998 r., SEC (1998) 1550
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very often the only opportunity to test oneself and one's capabilities, to acquire new skills and habits, to overcome psychological barriers and to start believing in oneself. This in turn leads to more open and active attitudes in its immediate environment including those who target for active job search.

MATERIALS AND METHODS

The aim of this paper was to assess the impact of activity on the participation of disabled people in tourism who resided within territories of Eastern Poland. There were also analyzed the declared forms of tourist activity and the motives of their choice. In further parts of the paper were highlighted the barriers which according to respondents, to the greatest extent, limited or prevented their participation in tourism and recreation.

In studies, the method of diagnostic survey was used and the material was collected using a questionnaire survey which was conducted among people with disabilities residing within the area of lubelskie, podkarpackie and podlaskie region. The studies were conducted in the years 2005–2007 among a randomly selected group of 750 people with disabilities. The selection of the sample was made using the method of stratified – random selection with the main stratifications: region, place of residence, sex and degree of disability. A number of questionnaires in each stratification corresponds to the percentage participation of disabled people in particular regions. The obtained results were statistically analyzed using Statistica program. The arithmetic means and the standard deviations were calculated. When the assumptions of variables were met, Student's t – test was used for determining the differences between averages of two groups of independent variables. Differentiations were determined as statistically significant at $p < 0.05$.

In the study participated 50.3% of women and 49.7% of men. 56.4% of respondents resided in rural areas and 43.6% in the city. The education level of respondents was as follows: 36.0% of the disabled had a basic education, 37.0%, basic vocational education, 20.0% average, whereas 7.0% of respondents had completed secondary or higher school. Among the people surveyed, 41.2% were economically active people with vocational status (of whom 19.7% were employed, whereas 21.5% remained unemployed), while 58.8% were economically inactive. Among the respondents 42.1% reported very good economic situation, 40.1% of respondents declared the average situation, while 17.8% considered their material conditions as bad (insufficient).

RESULTS

Analyzing the frequency of tourist – recreational travels outside the place of residence, it was shown (Figure 1) that the largest group were people with disabilities who declared their participation in tourism and recreation as "several times a year" – they constituted 46.8% of respondents. This group was dominated by the economically inactive people, while in second place there were people with the status of the economically active. The next largest was a group of people declaring participationin tourism and recreation "once a year". Here clearly dominated economically active people. The third largest group of

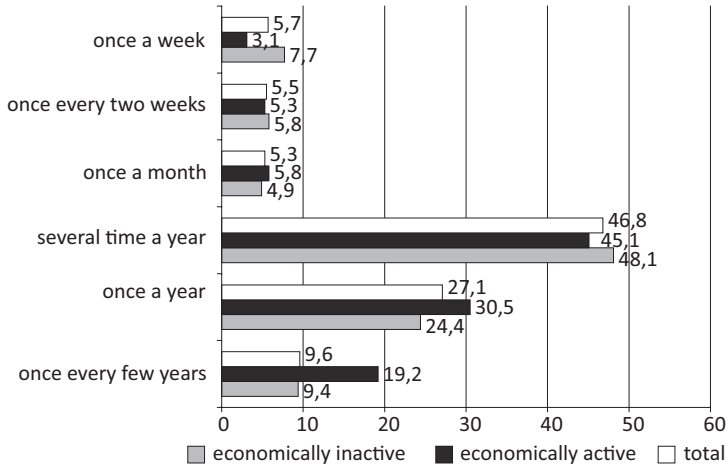

Fig. 1. The frequency of travels of a tourist-recreational character of people with disabilities in terms of their vocational activity (%)

Rys. 1. Częstotliwość wyjazdów o charakterze turystyczno-rekreacyjnym osób niepełnosprawnych z uwzględnieniem ich aktywności zawodowej (%)

Source: Own research.

Źródło: Badania własne.

respondents was declaring their participation in tourism and recreation only "once every few years" – (9.6%). Economically active people strongly dominated in this group compared to economically inactive people.

Analyzing the respondents' answers in terms of greater frequency of participation, there were much smaller numbers in particular groups and smaller differentiation between active and economically inactive people. The participation "once a month" was declared by 5.3% of respondents, "once every two weeks" by 5.5% and the participation of "once a week" was declared by 5.7% of people surveyed. The largest differentiation occurred in people declaring participation "once a week", where 7.7% of respondents were economically inactive, while 3.1% – were economically active disabled people.

Analyzing the participation in various forms of tourist activity of people with disabilities in terms of their vocational activity (Table 1), there was stated that the largest group constituted people with disabilities who participated in the sightseeing tours by coach (n = 373). Further, there were people participated in rehabilitation stays (n = 295), hiking (n = 188) and bicycle tours (n = 183). Respondents most often – on average three times in the last two years, participated in hiking. Disabled people, on average two times in the past two years participated in trips by coach and biking.

The studies also showed that disabled people more often declared their willingness to participate in tourism and recreation than their actual participation. The vocationally active respondents, on average, showed more desire to go on holiday travel than vocationally inactive people. The disabled in both groups showed a desire for more frequent participation in rehabilitation stays and sightseeing coach tours, at the same time slightly decreased their interest in hiking.

Table 1. Participation and declared willingness to participate in various forms of tourist activity by people with disabilities in terms of their occupational activity

Tabela 1. Uczestnictwo i deklarowana chęć uczestnictwa w różnych formach aktywności turystycznych przez osoby niepełnosprawne z uwzględnieniem ich aktywności zawodowej

Form of tourism	Participation in tourist forms						Declared willingness to participate					
	Economically active		Economically inactive		t	p	Economically active		Economically inactive		t	p
	$\bar{x}$ ±SD	n	$\bar{x}$ ±SD	n			$\bar{x}$ ±SD	n	$\bar{x}$ ±SD	n		
1*	1,9 ±0,7	110	1,7 ±0,6	185	1,395	0,167	3,7 ±0,7	299	3,6 ±0,6	420	0,865	0,387
2*	1,9 ±0,6	64	1,6 ±0,5	89	1,652	0,100	3,2 ±0,9	296	3,1 ±0,8	413	0,594	0,552
3*	2,4 ±0,9	155	2,7 ±0,8	218	–2,425	0,015*	3,7 ±1,0	297	3,6 ±0,9	418	1,505	0,132
4*	1,7 ±0,6	71	1,7 ±0,5	75	0,235	0,814	3,8 ±0,7	295	3,2 ±0,9	413	4,174	0,001*
5*	2,5 ±0,9	80	2,4 ±0,7	103	0,972	0,330	2,6 ±0,7	295	2,4 ±0,7	413	1,832	0,067
6*	1,5 ±0,4	54	1,5 ±0,4	92	0,378	0,705	2,4 ±0,8	296	2,6 ±0,6	415	–1,588	0,112
7*	1,6 ±0,5	25	1,4 ±0,5	33	1,212	0,230	2,2 ±0,6	296	2,0 ±0,4	412	1,474	0,140
8*	1,3 ±0,4	30	1,3 ±0,4	66	0,176	0,861	2,3 ±0,4	295	2,0 ±0,5	413	1,738	0,082
9*	1,2 ±0,6	28	1,2 ±0,3	45	–0,110	0,912	2,3 ±0,4	296	2,0 ±0,4	412	2,011	0,044*
10*	1,9 ±0,5	22	1,8 ±0,4	32	0,048	0,961	2,4 ±0,5	296	2,1 ±0,5	412	2,736	0,006*
11*	3,0 ±0,9	61	3,1 ±0,7	127	–0,251	0,801	2,4 ±0,6	297	2,6 ±0,7	412	–1,399	0,162

1* rehabilitation stay, 2* sanatorium, 3* sightseeing coach tour, 4* holiday travel, 5* bicycle tour, 6* pilgrimage, 7* camp, 8*bivouac, 9*kayaking, 10* sailing cruise, 11* hiking,
1* turnus rehabilitacyjny, 2* sanatorium, 3* krajoznawcza wycieczka autokarowa, 4* wczasy wypoczynkowe, 5* wycieczka rowerowa, 6* pielgrzymka, 7* obóz, 8*biwak, 9*spływ kajakowy, 10* rejs żeglarski, 11* wędrówki piesze,
* level of significance $p < 0,05$
* poziom istotności $p < 0,05$

Source: Own research.
Źródło: Badania własne.

A factor that determined the choice of tourist and recreational forms of activities by people with disabilities, regardless of their vocational activity (Table 2), was the "price". An equally important factor considered by economically active and inactive respondents was the "willingness" (need) of the disabled to have a contact with a friendly environment. This need was pointed out equally by vocationally active as well as economically inactive people. Additionally, important were also one's own interests manifested as individual needs. Among economically active disabled people, the level of importance of this element was slightly higher than among the economically inactive. The greatest difference between the analyzed groups occurred during the assessment of the significance of professionalism of activity leader or organizer of events ($p = 0.001$). The economically active disabled people showed a greater importance of this element while choosing the tourism and recreation than economically inactive people.

In assessing the significance of barriers that restrict or prevent participation of the disabled in tourism or recreation, it was found (which is also confirmed by other findings) that the greatest barrier was the high cost of participation (Table 3). This barrier was assessed in the scale of the importance of validity at 4.1 points. (scale 5 pts.). There were no differentiation of assessment between economically active and inactive groups.

Table 2. The elements determining the choice of tourist and recreational forms by people with disabilities in terms of their vocational activity
Tabela 2. Elementy decydujące o wyborze form turystycznych i rekreacyjnych przez osoby niepełnosprawne z uwzględnieniem ich aktywności zawodowej

The elements influencing the choice of tourist and recreational forms	Type of vocational activity				t	p
	Economically active		Economically inactive			
	$\bar{x}$ ±SD	n	$\bar{x}$ ±SD	n		
Price	4,0 ±1,1	306	3,9 ±1,1	431	1,358	0,174
Distance from place of residence	3,4 ±0,9	307	3,0 ±0,9	420	3,180	**0,002***
Possibility of attaining the means of transport	3,1 ±0,8	305	2,8 ±1,0	419	2,051	**0,040***
One's interests	3,5 ±0,8	306	3,2 ±0,7	421	2,299	**0,021***
Recommendations of a doctor, therapist	3,0 ±0,6	306	3,2 ±0,8	417	–1,670	0,095
Desire to contact interesting people	3,8 ±1,0	306	3,8 ±0,9	415	–0,113	0,908
Professionalism of a course instructor	3,3 ±0,8	303	2,8 ±0,7	410	4,356	**0,001***

* level of significance $p < 0,05$
* poziom istotności $p < 0,05$

Source: Own research.
Źródło: Badania własne.

Table 3. Barriers limiting or preventing participation of disabled people in tourism and recreation including their vocational activity
Tabela 3. Bariery ograniczające lub uniemożliwiające udział w turystyce lub rekreacji osobom niepełnosprawnym z uwzględnieniem ich aktywności zawodowej

Barriers	Vocational activity				t	P
	Economically active		Economically inactive			
	$\bar{x}$ ±SD	n	$\bar{x}$ ±SD	n		
Participation costs	4,1 ±1,1	307	4,1 ±1,2	433	0,930	0,352
Transport difficulties	3,1 ±0,8	307	2,8 ±0,7	430	2,138	**0,032***
Fear of people	2,2 ±0,4	306	2,1 ±0,3	431	0,838	0,402
Type of disability	2,4 ±04	307	2,6 ±0,6	427	–1,809	0,703
No information about the events	2,8 ±0,5	305	2,6 ±0,5	433	1,789	0,074
Lack of support from family	2,3 ±0,4	307	2,3 ±0,6	432	0,467	0,640
No offers form the institutions	2,6 ±0,6	306	2,4 ±0,4	432	1,798	0,073
Lack of organisations for disabled people	2,6 ±0,5	305	2,3 ±0,4	433	2,320	**0,020***
Lack of interest in activeness	2,3 ±0,5	304	2,3 ±0,6	431	0,316	0,751

* level of significance $p < 0,05$
* poziom istotności $p < 0,05$

Source: Own research.
Źródło: Badania własne.

Subsequently, these barriers were connected with communication difficulties and a lack of information. Significant differences were found in the statements of the respondents in terms of the lack of facilities and organizations for disabled people ($p = 0.002$). The economically active people recognized greater influence of the organization on improving the tourist and recreational activity of disabled people than economically inactive people.

The differentiation of the status of vocational activity occurred also in assessing the communication limits (p = 0.032).

CONCLUSIONS

Analyzing the collected research material, it should be noted that participation in tourist – recreational travels of disabled people residing within the territory of Eastern Poland was sporadic, i.e. declared at the level of a few trips a year and maximally of one departure outside the place of residence. The economically active disabled people, compared with the economically inactive, clearly predominated in the groups involved in tourism and recreation once a year and once every few years.

Most popular among respondents were sightseeing tours (by coach), followed by rehabilitation stays and hiking or bicycle tours (p = 183).

The decisive motives for deciding to participate in tourism and recreation by disabled people, regardless of their vocational activeness were the "price" and the "willingness" (need) of disabled people to have a contact with a friendly environment.

It was also found (which is also confirmed by other findings) that the greatest barriers limiting or preventing participation in tourism and recreation of disabled people were the high cost of participation, communication difficulties and lack of information.

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AKTYWNOŚĆ ZAWODOWA JAKO DETERMINANTA UCZESTNICTWA W TURYSTYCE OSÓB NIEPEŁNOSPRAWNYCH Z TERENÓW POLSKI WSCHODNIEJ

Streszczenie. Głównym celem badań, których wyniki prezentowane są w niniejszym opracowaniu było poznanie i dokonanie oceny wpływu aktywności zawodowej na uczestnictwo w turystyce osób niepełnosprawnych, zamieszkałych na terenach Wschodniej Polski. Badania empiryczne z wykorzystaniem metody sondażu diagnostycznego przeprowadzono w latach 2005–2007 na terenie województw podlaskiego, lubelskiego oraz podkarpackiego. Dokonano analizy porównawczej uczestnictwa w turystyce i rekreacji dwóch grup osób niepełnosprawnych – aktywnych zawodowo i biernych zawodowo. Uwzględniono częstotliwość wyjazdów turystycznych, preferowane formy turystyki, przesłanki oraz bariery uczestnictwa w aktywności turystyczno-rekreacyjnej. Badania wykazały, iż aktywność zawodowa stanowi istotną determinantę uczestnictwa w turystyce osób niepełnosprawnych. Przeprowadzone z inicjatywy Instytutu Turystyki i Rekreacji Państwowej Szkoły Wyższej w Białej Podlaskiej badania stanowią wkład do badań nad determinantami aktywności turystycznej i rekreacyjnej osób niepełnosprawnych w Polsce.

Słowa kluczowe: turystyka, rekreacja, aktywność zawodowa, niepełnosprawność

Accepted for print – Zaakceptowano do druku 27.05.2011

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