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THE INCOME SITUATION OF EASTERN POLAND CITIES WITH THE POWIAT RIGHTS AND THE SPATIAL DIFFERENTIATION OF DEVELOPMENT

Abstract. Municipal government units assume the role of employer, principal, client and investor. Their property management, service delivery or financial management activities have an impact on the local economy. Financial resources are the basis for the operation of local government units and a condition for the fulfillment of their tasks. Therefore, the purpose of this paper is to analyze the differences in profitability across urban districts of Eastern Poland in the context of regional disparities in development. A synthetic indicator will be used for that purpose. The financial situation in 2008, 2012 and 2016 was assessed based on source material from the Local Data Bank of the Central Statistical Office. Activities at district level are a heterogeneous category. Geographic location, financial standing, economic and infrastructural potential, and natural resources all have an impact on the activity and development of districts. Also, these factors provide a framework for the operation of local government units and are the condition for the fulfillment of their tasks. The synthetic indicators varied in the range from 0.33 to 0.60 in 2008, from 0.33 to 0.59 in 2012, and from 0.31 to 0.60 in 2016. Throughout the study period, Rzeszów, Olsztyn, Lublin and Białystok were the top-ranked units. While Kielce also performed well, Chełm, Przemysł, Tarnobrzeg and Łomża ranked at the bottom.

Keywords: synthetic indicator, district, development, income situation

INTRODUCTION

Municipal government units assume the role of employer, principal, client and investor. Their property management, service delivery or financial management activities have an impact on the local economy. Importantly, in order for the tasks to be selected reasonably, a multi-aspect analysis must be carried out first. Municipal government units act on their own behalf and bear full responsibility

for the performance of their public tasks. Usually, these tasks are unprofitable, and therefore should be financed with public funds. To do so, the relevant institution is required to own enough financial resources. The budget is at the core of government unit operations, which express provides a basis for optimum decision-making regarding development (Filas et al., 1999).

Urban districts are a specific combination of municipal- and district-level authorities with an extended scope

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of tasks. In addition to municipal tasks, they also fulfill the tasks of a district (Kotlińska, 2012). Urban districts have legal personality and develop their own financial policies under the existing law (Surówka, 2013; Wyszowska and Wyszowski, 2015).

PURPOSE, MATERIALS AND RESEARCH METHOD

The purpose of this paper is to analyze the differences in income situation in the context of regional disparities in development. A synthetic indicator will be used for that purpose. The analyses were carried out for 14 urban districts located in Eastern Poland (4 units in the Lubelskie voivodeship, 4 units in the Podkarpackie voivodeship, 3 units in the Podlaskie voivodeship, 1 unit in the Świętokrzyskie voivodeship, 2 units in the Warmińsko-Mazurskie voivodeship). The source material was 2008, 2012 and 2016 data from the Local Data Base of the Central Statistical Office. Demographic, financial, infrastructural and economic variables were used in the analysis. These aspects are an element of the process of qualitative and quantitative changes in the local economy.

The first stage of research is the selection and initial analysis of variables which describe the phenomenon under consideration. Variables characterized by low regional variation (a coefficient of variation below 0.10) and highly correlated variables were removed. According to the inverse correlation matrix method, diagonal entries greater than 10 are eliminated from the set of variables. This process is repeated until the entries do not exceed, or are close to, 10 (Wysocki, 1996; Zeliaś, 2002). Malina notes that high correlation levels result in redundant information on the phenomenon studied, and may lead to incorrect conclusions (Malina, 2004).

In the next stage of the research, the zero unitarization procedure was used to unify the nature of simple features based on the following formulas (Dziekański, 2016; 2017; Mioduchowska-Jaroszewicz, 2013; Wysocki, 1996):

$$z_{ij} = \frac{x_{ij} - \min_i x_{ij}}{\max_i x_{ij} - \min_i x_{ij}} \text{ if } x_i \in S \quad (1)$$

$$z_{ij} = \frac{\max_i x_{ij} - x_{ij}}{\max_i x_{ij} - \min_i x_{ij}} \text{ if } x_i \in D \quad (2)$$

where:

- S* – variable with a stimulating effect
- D* – variable with an inhibiting effect
- i* = 1, 2 ... *n*

j = 1, 2 ... *n*

x_{ij} – value of feature *j* in the unit considered

max – maximum value of feature *j*

min – minimum value of feature *j*

The standardization process was used to calculate the synthetic indicator of economic development of urban districts. The TOPSIS method was used, which takes into account the Euclidian distances of individual objects from the positive ideal solution and negative ideal solution based on the following formula (Standar, 2017; Kurzawa and Łuczak, 2018):

$$q_i = \frac{d_i^-}{d_i^- + d_i^+}, \text{ where } 0 \leq q_i \leq 1, i = 1, 2, \dots, n; \quad (3)$$

with:

d_i⁺ – is the distance from the positive ideal solution (the best unit in the study population)

d_i⁻ – is the distance from the negative ideal solution

q_i ∈ [0; 1]

The best object is considered to be the one with the shortest distance from the positive ideal solution and the longest distance from the negative ideal solution (Hwang and Yoon, 1981).

The clustering procedure was performed based on the synthetic indicator (Ward's method, Euclidean distances) (Szamrej-Baran, 2012). As a consequence, the study population of urban districts was divided into 4 quartile groups. The top group are the best units while the bottom group consists of weaker units. Also calculated were the coefficients of variation of the synthetic indicator (Trojak and Tokarski, 2013).

RESEARCH OUTCOMES

The essential role of own incomes in the local development process

Municipal government units act pursuant to and within the limits of the law, and incur expenditure reflecting the costs of own tasks (Dębowska-Romanowska, 1997). They establish a hierarchy of tasks to fulfill the needs of the local community. Expenditure on compulsory own tasks has priority over expenditure on other own tasks.

Local development, as a complex concept, includes economic, political and cultural changes, as well as processes that occur in the society. Usually, local development is interpreted in an economic, socio-cultural,

political, environmental and territorial context (Kudłacz, 2008). Local development is often considered as a specific process that involves significant changes in the local economy. It should be based on endogenous factors, involve local residents and take their needs into account (Kozuch, 2011). Interregional differences have a historical background, but the reasons behind the uneven levels of development of territorial units also include the differences in opportunities (Hryniewicz, 2000).

The financial situation is the guide behind the actions and the effect of earlier decisions and associated development opportunities. While being determinant for the development of the district, it is a synthetic expression of the potential for economic growth. It represents the financial standing in a given period, and can be the basis for a comprehensive assessment of the district's functioning. Also, the financial situation reflects the ability to finance services using the incomes collected in a given socio-economic environment in a given period. A financial analysis of the situation is a way to assess the status and evolution of local government finance. It also enables diagnosing the financial consequences of actions and tasks (Filipiak, 2006). As Cabaleiro-Casal points out, the financial situation cannot be described with a unidimensional space (a single indicator) (Cabaleiro-Casal et al., 2013).

There are two basic factors characterizing the financial economy and the development opportunities. The first one is own income. It demonstrates the foresight of local authorities and reflects the economic activity of residents and the worth of their assets. The second group is investment expenditure. It helps improving the living conditions for residents while driving social and economic development (Sobczyk, 2009).

Own income of urban districts is the main source of their budget incomes. Suburbanization, population ageing and related developments may affect the income situation. This can result in a reduced financial independence, thereby contributing to an economic slowdown (Głowicka-Wołoszyn, 2017). The independence of local government units is a complex problem which involves all aspects of their activities. It can be considered in economic, legal, political and organizational terms (Patrzalek, 2011). Therefore, the financial autonomy of LGUs is a prerequisite for a sustainable regional development.

Financial situation of Eastern Poland urban districts

Based on the synthetic indicator value, urban districts of Eastern Poland were classed into four quartile groups. The synthetic indicator calculated using TOPSIS fell within the following intervals: from 0.33 (in Przemyśl, the bottom-ranked unit, Podkarpackie voivodeship) to 0.60 (in Olsztyn, the top-ranked unit, Warmińsko-Mazurskie voivodeship) in 2008; from 0.33 (in Przemyśl and Tarnobrzeg, Podkarpackie voivodeship) to 0.59 (in Olsztyn) in 2012; and 0.31 (in Tarnobrzeg) to 0.60 (in Rzeszów, Podkarpackie voivodeship) in 2016. Throughout the study period, Rzeszów, Olsztyn, Lublin (Lubelskie voivodeship) and Białystok (Podlaskie voivodeship) were the top-ranked units. While Kielce also performed well, Chełm, Przemyśl, Tarnobrzeg and Łomża ranked at the bottom.

Municipal budget incomes should be allocated in appropriate areas, especially when it comes to own income. This should allow municipal government units to fulfill their tasks. Group A districts (the best ones: Rzeszów, Olsztyn, Lublin, Białystok) also had the highest share of own incomes in total income and the lowest ratio of transfer incomes to total incomes. This helps addressing the needs of the population and provides a sustainable development framework for municipal government units. Group D units (the bottom-ranked: Łomża, Podlasie voivodeship; Chełm, Lubelskie voivodeship, Przemyśl and Tarnobrzeg, see Table 1) report a low share of own incomes in total incomes and a much higher share of transfer incomes in total incomes. Note that subsidies are accounted as transfer incomes of local government units and, as shown by the analysis, have an impact on the local governments' autonomy in incurring expenditure.

The differences in effectiveness across districts are something natural, and result from uneven access to factors that are determinant for the phenomenon under consideration. The assessment should therefore take into account the local specificity under different structural and functional conditions (territorial capital). The Ward's clustering procedure (based on Euclidean distance) indicates that urban districts of Eastern Poland report similar levels of the synthetic indicator (share of own and transferred incomes in total incomes). Distinct values were observed in Lublin, Olsztyn, Białystok, Rzeszów and Kielce which suggest these units may be local growth centers. At 0.2, there were three clusters of municipal units grouped by own income levels; at 0.1, there

Table 1. Quartile groups of Eastern Poland urban districts in 2008, 2012 and 2016

Quartile group	Own income/total income			Transfer income/total income			Development indicator (TOPSIS)		
	2008	2012	2016	2008	2012	2016	2008	2012	2016
A Rzeszów	0.60	0.48	0.51	0.20	0.19	0.21	0.51	0.55	0.60
Olsztyn	0.61	0.53	0.56	0.19	0.18	0.20	0.60	0.59	0.57
Lublin	0.61	0.54	0.54	0.19	0.18	0.21	0.52	0.55	0.54
Białystok	0.60	0.52	0.54	0.20	0.16	0.21	0.53	0.53	0.54
B Kielce	0.58	0.52	0.54	0.21	0.19	0.22	0.51	0.49	0.48
Krosno	0.53	0.43	0.44	0.23	0.22	0.25	0.46	0.47	0.45
Suwałki	0.47	0.44	0.49	0.27	0.25	0.25	0.40	0.39	0.42
C Zamość	0.43	0.29	0.35	0.28	0.25	0.30	0.38	0.39	0.39
Elbląg	0.56	0.44	0.45	0.22	0.23	0.25	0.40	0.39	0.39
Biała Podlaska	0.49	0.38	0.38	0.25	0.26	0.31	0.35	0.37	0.37
D Łomża	0.44	0.41	0.46	0.28	0.27	0.27	0.37	0.34	0.35
Chełm	0.45	0.39	0.42	0.28	0.29	0.28	0.38	0.37	0.34
Przemyśl	0.39	0.32	0.38	0.30	0.28	0.30	0.33	0.33	0.34
Tarnobrzeg	0.50	0.48	0.44	0.25	0.26	0.28	0.35	0.33	0.31

Sorted by synthetic development indicator in 2016.

Source: own calculations based on the Local Data Bank of the Central Statistical Office.

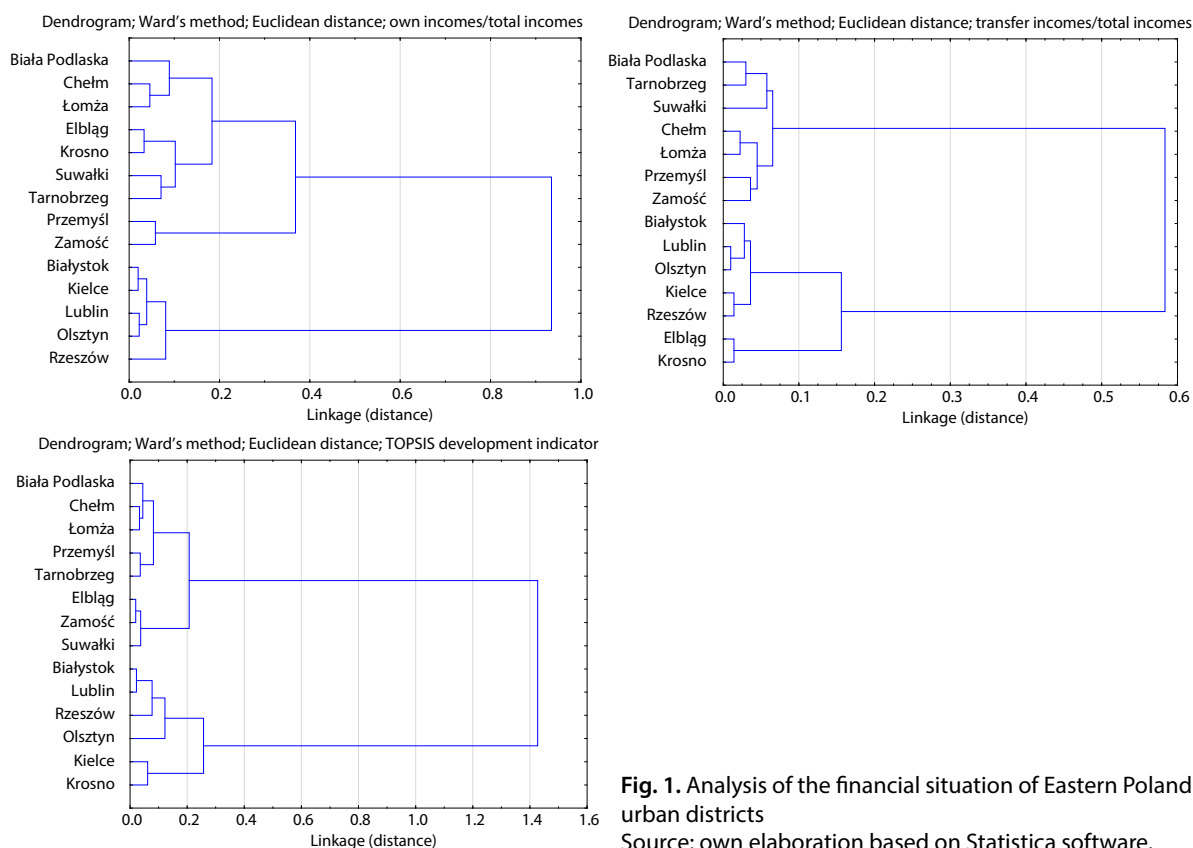


Fig. 1. Analysis of the financial situation of Eastern Poland urban districts
Source: own elaboration based on Statistica software.

Table 2. Measures of variation in the financial situation of urban districts in Eastern Poland in 2008, 2012 and 2016

Measure	Own income/total income			Transfer income/total income			development indicator (TOPSIS)		
	2008	2012	2016	2008	2012	2016	2008	2012	2016
Average	0.52	0.44	0.46	0.24	0.23	0.25	0.44	0.44	0.44
Median	0.52	0.44	0.46	0.24	0.24	0.25	0.40	0.39	0.41
Standard deviation	0.08	0.08	0.07	0.04	0.04	0.04	0.08	0.09	0.10
Quartile deviation	0.07	0.06	0.05	0.04	0.04	0.03	0.07	0.08	0.09
Classic coefficient of variation	0.15	0.18	0.15	0.16	0.19	0.15	0.20	0.21	0.22
Positional coefficient of variation	0.14	0.13	0.12	0.16	0.15	0.14	0.17	0.19	0.21
Min	0.39	0.29	0.35	0.19	0.16	0.20	0.33	0.33	0.31
Max	0.61	0.54	0.56	0.30	0.29	0.31	0.60	0.59	0.60
Range (max–min)	0.22	0.25	0.21	0.11	0.13	0.11	0.27	0.26	0.29
Quartile 1	0.46	0.40	0.43	0.20	0.19	0.21	0.37	0.37	0.36
Quartile 2	0.52	0.44	0.46	0.24	0.24	0.25	0.40	0.39	0.41
Quartile 3	0.60	0.51	0.53	0.28	0.26	0.28	0.51	0.52	0.53
Skewness	-0.18	-0.53	-0.15	0.10	-0.23	0.04	0.55	0.45	0.47

Source: own calculations based on the Local Data Bank of the Central Statistical Office.

were three nodes for transfer income; also, three nodes for the synthetic measure were observed at 0.2 (Fig. 1).

The measures of dispersion shown in Table 2 allowed to indicate the diversity of the population surveyed. Received spacing level is a measure of the spread characterizes the empirical area of variability of the examined objected. Low levels (0.22–0.21 for own incomes) or constant levels (0.11–0.11 for transfer incomes) suggest

the units tend to accumulate around the mean. The small increase in the range for the TOPSIS indicator (from 0.27 in 0.29 in 2008–2016) indicates small diverse. This is also confirmed by a small standard deviation.

As shown by the analysis of variation in the synthetic development indicator (in 2016 compared to 2008), the degree of differentiation across municipalities was stable (with a standard deviation of 0.08–0.10). Standard

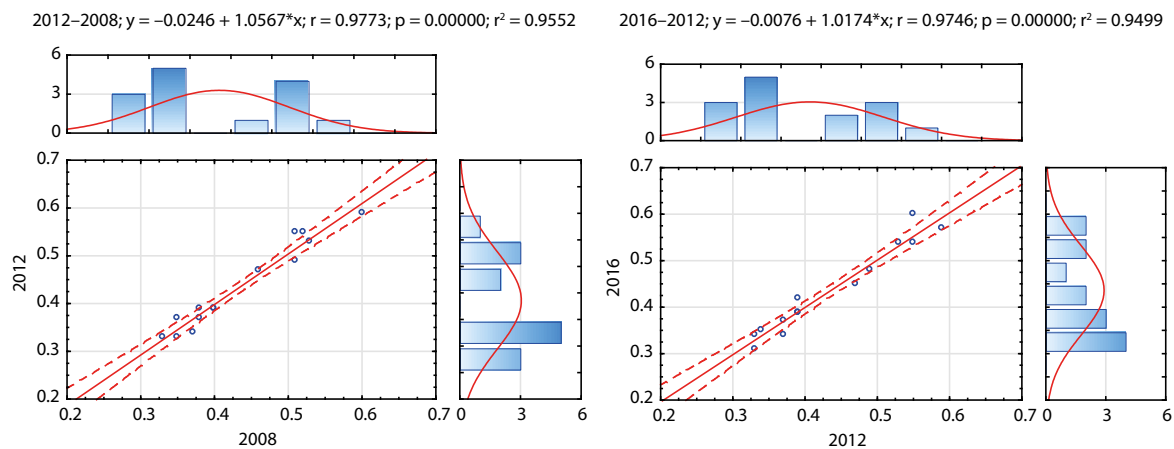


Fig. 2. Scattering year-to-year measure of the synthetic financial situation with the fit line
Source: own elaboration based on Statistica software.

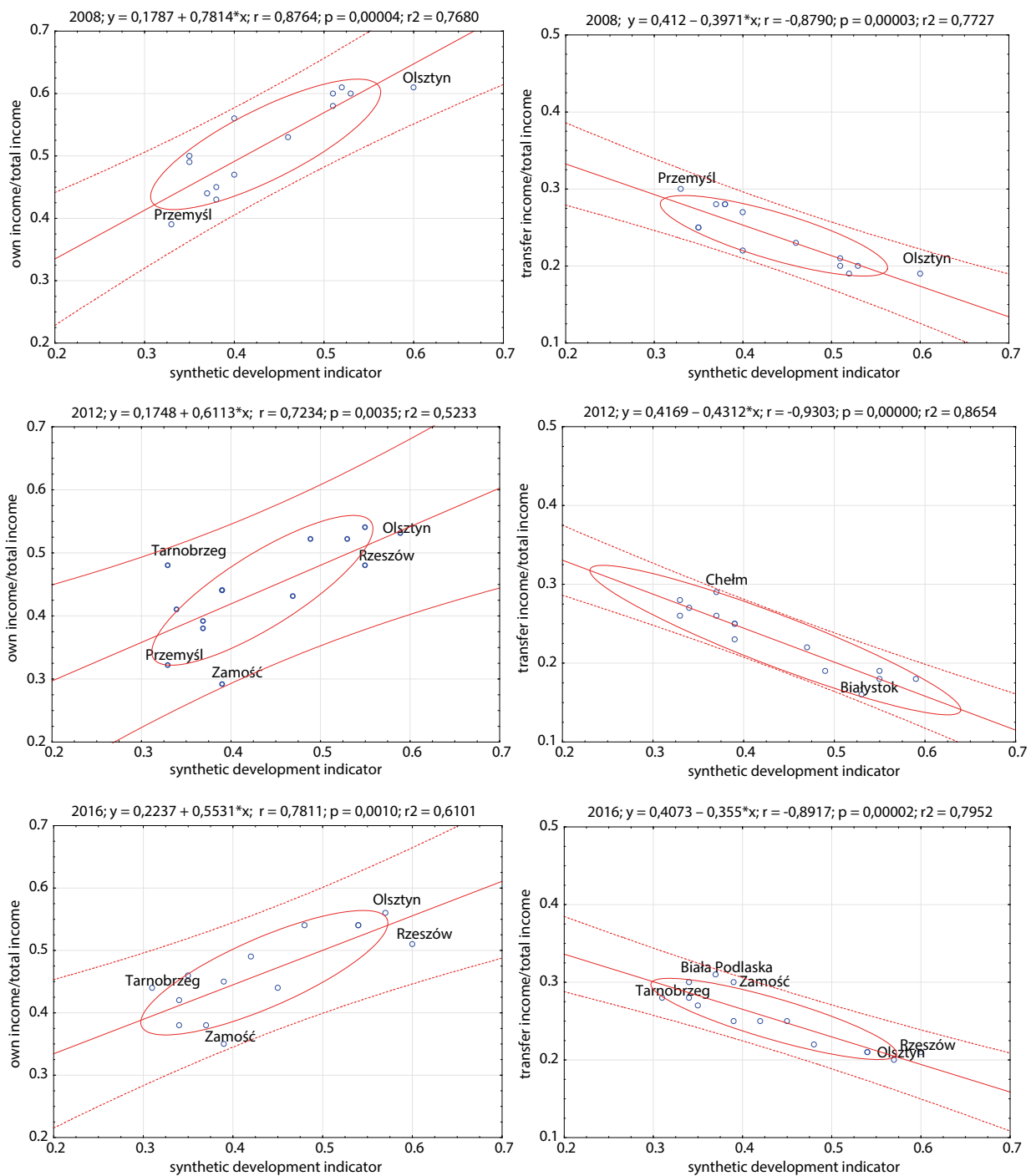


Fig. 3. Dispersion of the synthetic indicator of financial situation; ratio of own and transfer incomes to total incomes
Source: own elaboration based on Statistica software.

deviation decreased slightly in the case of own incomes (0.08–0.07), and remained stable for transfer incomes (0.04–0.04). In the study period, the distribution of the synthetic value was characterized by right-side

asymmetry, which is interpreted as the fact that the districts' efficiency level was above the mean for the synthetic indicator (Table 1).

On the one hand, the financial situation is the objective of district-level activities and the effect of previous decisions and associated development opportunities. The assessment of financial potential at district level is an element of support for the management process. As shown by the correlation coefficients calculated for the TOPSIS synthetic indicator, the phenomenon covered by this study varies quite importantly and steadily across regions. Over the 2008–2016 period, the synthetic indicator of development decreased slightly (the Pearson correlation coefficient was $r = 0.977 / r^2 = 0.955$ in 2012–2008 and $r = 0.974 / r^2 = 0.949$ in 2016–2012, see Fig. 2).

In the study period, the Pearson correlation coefficients between ratios of the synthetic indicator to own incomes and to transfer incomes suggest little variation across districts (a low degree of divergence). As regards own income, the correlation coefficient was $r = 0.876 / r^2 = 0.768$ in 2008 and $r = 0.781 / r^2 = 0.610$ in 2016; the corresponding values for transfer incomes were $r = -0.879 / r^2 = 0.772$ and $r = -0.891 / r^2 = 0.795$. Figure 3 shows that the changes are a two-speed process; outstanding districts are Przemyśl, Tarnobrzeg, Zamość (classed in the bottom quartile group), Olsztyn and Rzeszów (from the best group).

CONCLUSION

The lines of action of a district—as a multidimensional local system of interdependent and related economic, social and infrastructural factors—testify to the multidimensional nature of the development process. The sum of factors and their balance constitute the basis for assessment of district development and can be defined as the desired target of developmental changes.

Activities at district level are a heterogeneous category. They are affected by the location, benefits, finance, economic and infrastructural potential, and natural resources. These factors provide a framework for the operation of local government units and are the condition for the fulfillment of their tasks.

In this study, the financial situation varied across the districts. Based on the synthetic indicator value, urban districts of Eastern Poland were classed into four quartile groups. The synthetic indicators varied in the range from 0.33 to 0.60 in 2008, from 0.33 to 0.59 in 2012, and from 0.31 to 0.60 in 2016. Throughout the study period,

Rzeszów, Olsztyn, Lublin (Lubelskie voivodeship) and Białystok (Podlaskie voivodeship) were the top-ranked units. While Kielce also performed well, Chełm, Przemyśl, Tarnobrzeg and Łomża ranked at the bottom. Group A districts also had the highest share of own incomes in total income and the lowest ratio of transfer incomes to total incomes. Group D units reported a low share of own incomes in total incomes and a much higher share of transfer incomes in total incomes.

The municipalities' income situation and financial independence were related to the economic condition at regional and national level. This is an external factor independent of actions taken directly by municipalities. The financial situation of a district is a source of information on the potential for improvements in the economic condition of individuals (it affects the quality of living for residents). Information on the financial situation of urban districts is the basis for a comprehensive assessment of local government activities. The expenditure will reflect the development opportunities they experience.

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SYTUACJA DOCHODOWA MIAST NA PRAWACH POWIATU POLSKI WSCHODNIEJ A PRZESTRZENNE ZRÓŻNICOWANIE ROZWOJU

Abstrakt. Jednostki samorządu terytorialnego są pracodawcą, zleceniodawcą, klientem i inwestorem. Ich działania w obszarze gospodarowania majątkiem, świadczenia usług czy zarządzania finansami mają wpływ na lokalną gospodarkę. Celem artykułu jest analiza zróżnicowania sytuacji dochodowej miast na prawach powiatu Polski Wschodniej w kontekście przestrzennych dysproporcji poziomu rozwoju z wykorzystaniem miary syntetycznej. Działania powiatów mają charakter kategorii wielokryterialnej. Wpływ na nie mają renta położenia, finanse, potencjał gospodarczy i infrastrukturalny oraz zasoby naturalne. Stanowią one podstawę działania jednostek samorządu terytorialnego oraz warunek realizowania nałożonych na nie zadań. Miara syntetyczna w 2008 r. przyjmowała wartości od 0,33 do 0,60, w 2012 r. – od 0,33 do 0,59 oraz w 2016 r. od 0,31 do 0,60. Niezależnie od analizowanego roku w grupie najlepszych jednostek znalazły się Rzeszów, Olsztyn, Lublin (województwo lubelskie), Białystok (województwo podlaskie), wysoko znalazły się także Kielce (województwo świętokrzyskie). Najslabszymi jednostkami okazały się Chełm, Przemyśl, Tarnobrzeg, Łomża.

Słowa kluczowe: miara syntetyczna, powiat, rozwój, sytuacja dochodowa