

Beta and sigma convergence of incomes of municipalities in Lubusz Voivodeship between 1999 and 2019

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Abstract: In studies on regional and local development, the subject of interest are disproportions between territorial units constituting a given municipality. Changes in these categories over time are an important quality, too. This leads to the formulation of the concepts of convergence and divergence processes in the economic development of the studied units. The object of this paper is the analysis of the occurrence of real economic convergence at the level of municipalities using the example of Lubusz Voivodeship, in which study two measures relating to their income have been applied. The one is the municipality's own income as a measure of economic activity in its area. The other one is personal income of the population as a measure of the level of its wealth. Using the Theil index and regression models, the occurrence of beta and sigma convergence phenomena in both income categories in municipalities were investigated. The analysis was conducted on the basis of data derived from the Local Data Bank of the Central Statistical Office, covering the 1999–2019 period. The results indicate that both the beta and sigma convergence phenomena do take place in the development of municipalities' own income in the analyzed period. The above regularities, due to the volatility of tendencies, cannot be stated in the case of the personal income of the population.

Keywords: local development, economic convergence, own income of municipalities, personal income of municipality population

1. Introduction

In theoretical works on the diversification of the economy in spatial terms, the concepts of regional and local development are formulated. According to Andrzej Potoczek (2003, p. 14), the term *regional economic development* is generally understood as the process that involves any change in the region. Its main expression is economic growth, i.e. increase in the production of goods and services as a result of the use of production factors (material and personal) becoming greater, and an improvement in their efficiency. In practice, quantita-

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tive changes in production in a region are often accompanied by qualitative and structural changes. The increase in the quantity and improvement in the quality of goods and services produced in the region's economy is the basis for changes in the way, level and quality of life of the population living there. Thus, economic growth influences changes in the social sphere in the region.

Jerzy J. Parysek (2001, p. 22) defines the concept of *local development* as a complex of transformations of a given area with respect to the conditions that economic entities operate in its territory and the standard of living of its inhabitants. The core issues related to the development on a local scale include: maximization of the income of the local government and its population, an increase in consumption of material goods, provisions for satisfaction of social needs of residents, improved access to service facilities of various types and an improved quality of the natural environment. The following factors of local development are brought up: the structure of economic entities, local market and internal markets, labour resources, investment opportunities, advancements of science, technology and culture, condition of municipal ownership, creativity and entrepreneurship of inhabitants, natural resources, features of the natural environment, relations between local authorities and community (Pasiczny 2008, p. 105). In Poland, it is assumed that the regional level refers to voivodeships, and the local level refers to districts and municipalities (Jankowski, 2013, p. 231).

Local and regional development are complex categories, therefore their measurement requires the use of a wide set of features—symptoms of this phenomenon—to allow for quantitative assessments of the studied areas (Grzebyk, 2017, p. 45). In comparisons of economic development across voivodeships, the gross domestic product per capita is usually used as one of the most important measures (Korenik, 2003, p. 74). Other measures of voivodeship development taken into account in the analyses are: the level of population income, unemployment rate, size of production fixed assets, indicators describing the employment structure by sectors of the economy, population density, migration balance, percentage of urban and rural population, birth rate, life expectancy, the amount of municipal, state and private investment outlays.¹

However, in the case of municipalities, a direct use of the same set of indicators that are used to study voivodeship development is not possible (see Śleszyński, 2017). Due to the lack of data, there are no ready-made measures for the level of production, the value of fixed assets and income of the population at their level. A certain indirect solution, as assumed by Janusz Hryniewicz (1998, p. 58), is the use of the amount of their income as the core measure of the economic development of municipalities. Among their various categories, a particular attention is paid to the municipalities' own income. Pursuant to the Act on the Income of Local Government Units (Journal of Laws, 2003, no. 203, item 1966), they include: income from municipality own property, income from share in personal income tax (PIT) and legal income tax (CIT) that all constitute state revenues, income from property taxes, agricultural taxes, means of transport and other local taxes and fees. It is also assumed that the higher

¹ The GDP per capita indicator is a measure relating to the economic growth of voivodeships. Other indicators will testify to economic development in a broader sense when they illustrate—apart from an increase in the value of goods produced and services provided—favourable qualitative changes in the economy and social sphere in the individual voivodeships, too (see Parysek, 2018, p. 42).

value of municipalities' own income per capita is an indicator of greater economic activity in a given municipality.

On the other hand, Bartłomiej Kołsut and Artur Bajerski (2013) propose that as an indicator of personal income of the population there should be used wealth of municipality inhabitants. This indicator is calculated on the basis of a per capita averaged sum of two components. The first component is the revenues obtained by municipalities from the participation in personal income tax, which determine the level of income of non-agricultural population (inter alia from business activity, employment, pensions and disability pensions). The other component is the revenues to the municipality budgets from agricultural tax. Since this tax is charged depending on the acreage, type and class of agricultural land, it is assumed that it may provide grounds for estimation of income derived from agricultural activities.

Considering the fact that municipalities are diversified with respect to their development, significant disproportions in the level of income between municipalities depending on their size, administrative status or geographical location are pointed out (see Jarosiński, 2013). An important feature is also changes in the level of their differentiation over time. This leads to the formulation of the concept of municipal income convergence. In the studies concerning this issue, the term *convergence* in real (material) and nominal (financial) sense is used. The first type of convergence relates to real economic processes and means reduction in differences between the analyzed economies (Kusideł, 2013, p. 15). The other type applies to fulfilment by individual European Union countries of the conditions for joining the Euro area, defined in the Maastricht Treaty. Krzysztof Beck and Maciej Grodzicki (2014, p. 9) generally define real convergence as individuals becoming similar in terms of a given measure of economic development. Convergence in the sense of an economic phenomenon is described by him as one taking place when the differentiation in its level decreases over time. The very term of *divergence* (disparity, polarization) is an opposite phenomenon, i.e. an increase in the differentiation of the phenomenon. In line with this definition, one can also understand the convergence of income of municipalities.

More than once the phenomenon of economic convergence in real and financial terms has been studied at the level of OECD countries or regions, the European Union and Poland (Malaga, 2004; Łażniewska, Górecki and Chmielewski, 2011; Kusideł, 2013; Beck and Grodzicki, 2014). The objective of this paper is to analyze the occurrence of the phenomenon of economic convergence in real terms at the level of municipalities, after an example of Lubusz Voivodeship, using two measures relating to their income. The first one is the municipalities' own income, which is a measure of economic activity in their area, the other is the personal income of the population, which is a measure of its wealth. Using the Theil index and regression models, the occurrence of beta and sigma convergence phenomena in both income categories in municipalities was investigated. The analysis was carried out on the basis of data obtained from the Local Data Bank of the Central Statistical Office, covering the period 1999–2019.

2. Methods of convergence research

In the literature, the methods of convergence research were presented by Robert Barro and Xavier Sala-i-Martin (1992, 1996). They distinguish between beta (β) convergence and sigma (σ) convergence. *Beta convergence* refers to a process in which areas (regions, municipalities) characterized by a lower level (in terms of GDP per capita) grow faster than rich ones. The pace of per capita income growth is inversely proportional to its initial level. This phenomenon is called a catch-up (convergence) effect. The occurrence of divergence is related to the growing divergence between these areas.

In the classical approach, the model describing the phenomenon of beta convergence of income per capita is (Łażniewska et al., 2011, p. 69):

$$\ln\left(\frac{y_{iT}}{y_{i0}}\right) = \alpha + \beta \ln(y_{i0}) + \varepsilon_i, \quad (1)$$

where:

- α, β —model parameters
- y_{i0} —per capita income in the base period
- y_{iT} —per capita income over the period T
- ε_i —random component.

The model parameters are estimated using the method of least squares (LSM), known in econometrics. The value of the directional parameter $\beta < 0$ means the presence of convergence of the studied phenomenon. Otherwise, it is divergence that takes place.

Knowing the parameter β , the convergence coefficient λ can be determined, given as:

$$\lambda = -\frac{\ln(1 + \beta)}{T}. \quad (2)$$

The λ coefficient allows to determine the speed of convergence.

The above model (1) shows a phenomenon of beta convergence of municipalities' income in the so-called absolute terms. The only variable explaining the growth rate of income per capita is its initial level. In the conditional beta convergence model, the dynamics of income growth in the analyzed areas depends, apart from their initial level, also on other socio-economic variables (Malaga, 2004, p. 26).

The concept of *sigma convergence* means that the dispersion of the analyzed indicator (income per capita) for the studied group of areas (regions, municipalities) decreases over time (see Sala-i-Martin, 1996, p. 1020). To determine whether such a tendency occurs, the standard deviation of their income in a given period is calculated (Łażniewska et al., 2011):

$$\sigma_t = \sqrt{\frac{1}{N-1} \sum_{i=1}^N (y_{it} - \bar{y}_t)^2}, \quad (3)$$

where:

- \bar{y}_t —arithmetic mean of income per capita in the period t .

In practice, the classical or weighted coefficient of variation is also used to test sigma convergence (Kusideł, 2013, p. 54). Another interesting measure of differentiation is the Henri Theil index. When the income of municipalities is considered, it is expressed as follows:

$$T_t = \sum_{i=1}^N \frac{y_{it}}{Y_t} \ln \left(\frac{\frac{y_{it}}{Y_t}}{\frac{p_{it}}{P_t}} \right), \quad (4)$$

where:

y_{it}/Y_t —share of the municipality's income i in the value of the region Y 's income over the period t
 p_{it}/P_t —share of the municipality's population i in the total population with values in the range $[0; +\infty)$.

The Theil index is a normalized measure with values in the range $(0; +\infty)$. The value of zero means no differentiation of the examined feature (uniform distribution). Higher index values mean higher levels of inequality between objects.²

The sigma convergence analysis can be supplemented with the determination of the trend function determining the continuity of changes in the applied measure of income dispersion over time (Kusideł, 2013, p. 63). With this function, conclusion can be drawn up whether the decline in the differentiation is systematic or not over the period considered. The basis for inference was the negative and statistically significant value of the trend direction parameter.

It is also pointed out that there are specific relationships between both types of convergence (Sala-i-Martin, 1996). Beta convergence is necessary but not sufficient for sigma convergence to occur. This means that beta convergence can occur without sigma convergence, i.e. if income differentiation is kept constant. In some cases, it may even be accompanied by sigma divergence, manifested by an increase in their diversity. Such a situation may take place when initially the “worse-off” economy will show a “so fast” rate of income growth compared to the “better-off” economy that it will overtake it “that much” that the existing difference between them will increase.

3. Convergence of municipalities' own income in the region

Lubusz Voivodeship is one of the smallest voivodeships in Poland, if both territory and population size are taken into account. The area of the region located at the western border of the country is 13,988 square kilometres. According to the 2019 data, the voivodeship is inhabited by 1,011,592 people (GUS, 2020). Out of the total population, 64.9% are urban while the remaining 35.1% are rural. The value of the gross domestic product generated in the region amounts to PLN 49,071 million, which constitutes 2.1% of Poland's GDP. Calculated per capita, it gives 48.44 thousand PLN and the 9th place out of all 16 Poland's voivodeships.

The region has two capitals, Zielona Góra (the seat of the voivodeship diet) and Gorzów Wielkopolski (the seat of the voivodeship governor). The territorial division of the region includes: 12 districts, 2 cities with district rights (its capitals) and 82 municipalities. The total number of municipalities in the region consists of: 9 urban municipalities, 34 urban-rural municipalities and 39 rural municipalities. The least populated municipality in the region is Wymiarki (rural), with 2263 inhabitants. The municipality of Zielona Góra is the most populous with 141,222 inhabitants.

There is a significant diversification among the municipalities' own income, the level of which can be treated as a measure of economic activity in their area. Their amount per capita in nominal terms for the years 1999 and 2019 is presented in Table 1.³

² The Theil index, for example, is used by the OECD to study inequality across countries (see OECD, 2018).

³ In the years 1999–2014, 83 municipalities functioned within the administrative division of Lubusz Voivodeship. However, since 2015, the voivodeship has counted 82 municipalities. The change in the number

Table 1. Own income per capita in Lubusz Voivodeship municipalities in 1999 and 2019

1999			2019		
Pos.	Municipality	Own income (in PLN)	Pos.	Municipality	Own income (in PLN)
1.	Łęknica	3876.55	1.	Łęknica	3895.93
2.	Lubniewice	1710.10	2.	Zielona Góra	3834.01
3.	Słubice	1144.62	3.	Bobrowice	3669.35
4.	Przewóz	1003.21	4.	Kostrzyn nad Odrą	3486.87
5.	Zielona Góra (urban)	920.16	5.	Słubice	3445.17
83.	Bytom Odrzański	327.71	82.	Siedlisko	1307.53

Source: Author's own elaboration based on GUS, 2020.

Both the data for 1999 and 2019 indicate that the municipality of Łęknica (urban) is the wealthiest municipality in terms of its own income in the region. The income of this municipality per capita in 2019 amounted to PLN 3895.93. The poorest municipality in this respect is the municipality of Siedlisko (rural). The level of own income in this municipality is only PLN 1307.53. The dynamics of changes in municipalities' own income between 1999 and 2019 was different. They grew fastest in the Trzebiechów (rural) municipality. Own income per capita in this municipality increased on average by 11.1% annually. The lowest dynamics is observed in the Łęknica municipality, where the growth rate of own income did not exceed 0.025%. Hence, in 2019 the disproportions in the level of this income category between it and other municipalities, including urban-rural and rural ones, showing a higher growth rate than it, decreased.

The Theil index was used to assess the sigma convergence of municipalities' own income in 1999–2019. Changes in the index value are illustrated in Figure 1.

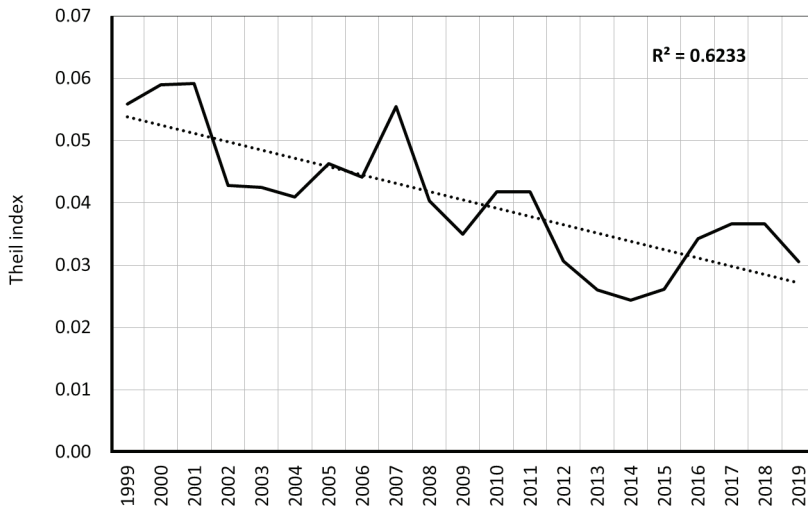


Figure 1. Sigma convergence of own income in Lubusz Voivodeship municipalities between 1999 and 2019

Source: Author's own elaboration.

of municipalities in the region is connected with the decision by the Council of Ministers of 29 July 2014 which merged the city of Zielona Góra and the surrounding rural municipality of Zielona Góra.

Although there were some fluctuations in the level of the Theil index in the analyzed period, it can be noticed that its values generally show a downward trend. The index value decreased from 0.0559 in 1999 to 0.0306 in 2019. The estimated trend function of the Theil index takes the form:

$$\hat{T}_t = 0.0551 - 0.0013 \cdot t, R^2 = 0.6233.$$

A negative value of the trend directional parameter indicates the presence of sigma convergence of municipalities' own income. The Theil index is decreasing by an average of 0.0013 per year. This conclusion is confirmed by the value of t-Student statistic. It amounted to -5.60 , which proves the significance of that parameter defining this tendency.⁴ The above function explains 62.33% of the development of the applied income inequality measure in the analyzed period.

The phenomenon of beta convergence of municipalities' own income per capita in the region is also visible. This phenomenon is illustrated in Figure 2.

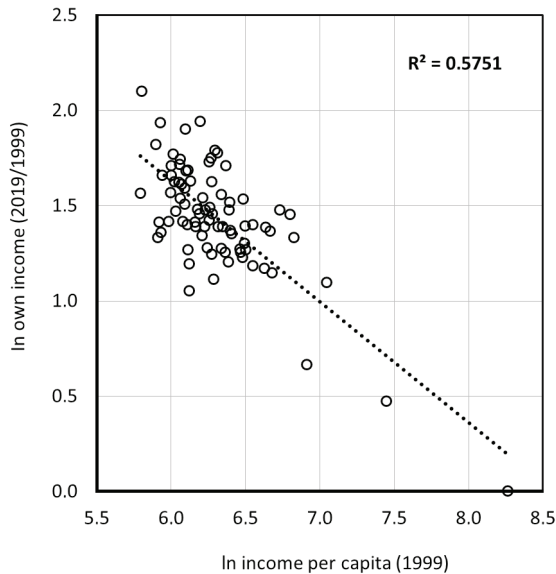


Figure 2. Beta convergence of own income in Lubusz Voivodeship municipalities between 1999 and 2019

Source: Author's own elaboration.

The chart shows a negative correlation between the initial level of municipalities own income in 1999 and their growth rate in 1999–2019. The regression function that describes this is as follows:

⁴ The formally verified hypothesis has the form of $\beta = 0$, while the opposite hypothesis being its negation is formulated as $\beta \neq 0$. That the parameter is significant, is confirmed once the calculated value of the t-Student statistics has been compared with the critical value obtained from the distribution table for a given significance level and $n-2$ degrees of freedom. In practical terms, a given parameter is assumed to be significant, if the absolute value of the test statistic is greater than 2 (see Hozer [ed.], 1997, p. 168).

$$\ln\left(\frac{\hat{y}_{it}}{y_{i0}}\right) = 5.434 - 0.634 \cdot \ln(y_{i0}), R^2 = 0.5751.$$

This function turns out to be fairly well fitted to the empirical data. The measure of fit R^2 takes the value of 57.51%. The β directional parameter is important in light of the t-Student statistic, which amounted to -10.41 . After appropriate calculations, the coefficient λ takes the value of 0.0478. This means that the differences in municipalities' own income decrease at an average rate of 4.78% annually. Therefore, it can be estimated that the time needed to reduce the distance between them by half is about 14.5 years.⁵

4. Convergence of personal income of the population of municipalities in the region

The other category describing the diversification of the economic situation in the municipalities of the region is the personal income of the population. This indicator was determined as the sum of the municipalities' income per capita from their share in the income tax on natural persons and from the agricultural tax. Data on their value in nominal terms in 1999 and 2019 are presented in Table 2.

Table 2. Personal income per capita in Lubusz Voivodeship municipalities in 1999 and 2019

1999			2019		
Pos.	Municipality	Personal income (in PLN)	Pos.	Municipality	Personal income (in PLN)
1.	Zielona Góra (urban)	298.76	1.	Zielona Góra	1972.88
2.	Szczaniec	271.96	2.	Kłodawa	1842.47
3.	Brody	259.65	3.	Świdnica	1435.74
4.	Gorzów Wlkp.	252.70	4.	Gorzów Wlkp.	1337.87
5.	Świebodzin	245.66	5.	Kostrzyn nad Odrą	1175.05
83.	Łęknica	135.83	82.	Kolsko	516.04

Source: Author's own elaboration based on BDL GUS, 2020.

If both years are juxtaposed, the highest value of personal income of the population is characteristic of the Zielona Góra municipality. In 2019, the rate in this municipality reached 1972.88 PLN per capita. The rural municipality of Kolsko is the poorest in terms of income of residents. The value of personal income per capita in this municipality is 516.04 PLN. At the same time, the growth rate of the population's income was different in individual municipalities in the analyzed period. Their greatest dynamics is recorded in the Kłodawa (rural) municipality. The average annual growth rate of the analyzed income category in nominal terms in this municipality amounted to 11.6%. The personal income of the population in another rural municipality—Brody—was growing most slowly. Their average growth rate was only 5.53%. Hence, the municipality fell from the 3rd place in 1999 to the 51st place in 2019. In turn, in some municipalities there is a situation of low growth dynamics with a simultaneous low level of income of the population. This

⁵ This time is determined by the so-called half-life factor. There is a relation between the speed of convergence and this coefficient: $hl = \ln 2 / \lambda$ (see Łażniewska et al., 2011, p. 70).

concerns such urban-rural and rural municipalities as: Trzebiel (5.80%), Kolsko (6.31%), Iłowa (6.66%), Małomice (6.66%), Krzeszyce (6.79%) and Bojadła (6.93%).

Changes in the inequality of personal income of the population of municipalities measured with the Theil index in 1999–2019 are presented in Figure 3.



Figure 3. Sigma convergence of population income in Lubusz Voivodeship municipalities between 1999 and 2019

Source: Author's own elaboration.

The course of the Theil index value does not indicate a clear trend of changes in the differentiation of personal income of the population in the region. It should be stated that although the value of the index increased from 0.0161 in 1999 to 0.0630 in 2019, the current trend is non-linear. In this case, the use of a linear function does not give satisfactory results.⁶ Therefore, for the purposes of further analysis, more homogeneous sub-periods in the development of the phenomenon were distinguished. Based on the chart observations, the division into three sub-periods was adopted, i.e. the years 1999–2005, 2006–2012 and 2013–2019.

The trend functions for particular years take the form:

$$- 1999-2005: \hat{T}_t = 0.0056 + 0.0108 \cdot t, R^2 = 0.9534$$

$$- 2006-2012: \hat{T}_t = 0.0931 - 0.0039 \cdot t, R^2 = 0.7251$$

$$- 2013-2019: \hat{T}_t = 0.0536 + 0.0015 \cdot t, R^2 = 0.3789.$$

The results show a high variability of trends in the shaping of the differentiation of personal income of the population in particular sub-periods. In the years 1999–2005 the phenomenon of sigma divergence was visible, which meant an increase in the differentiation of personal income of the population of municipalities. In 2006–2012, the trend is opposite. There is

⁶ The directional parameter of the trend was 0.0009 with the t-Student statistic of 1.42. The measure of fit R^2 was only 0.1052.

sigma convergence, i.e. a decrease in the differentiation of this income category across municipalities. The value of the directional parameter -0.0039 indicates, however, that the decline in the index level was slower in this case than its previous increase, reaching an average of 0.0108 per year in the first period. The above conclusions can be confirmed by testing both directional parameters of the trend. The t-Student statistics for them are 10.11 and -3.64 , respectively. For the 2013–2019 sub-period, this statistic, assuming the value of 1.74 , is in turn irrelevant. Thus, despite the fact that the directional parameter is 0.0015 , it means that there is no significant tendency in the shaping of the analyzed category in the last period.

The occurrence of beta convergence of personal income of the population in the three distinguished sub-periods was also analyzed.⁷ An illustration of the obtained results is shown in Figure 4.

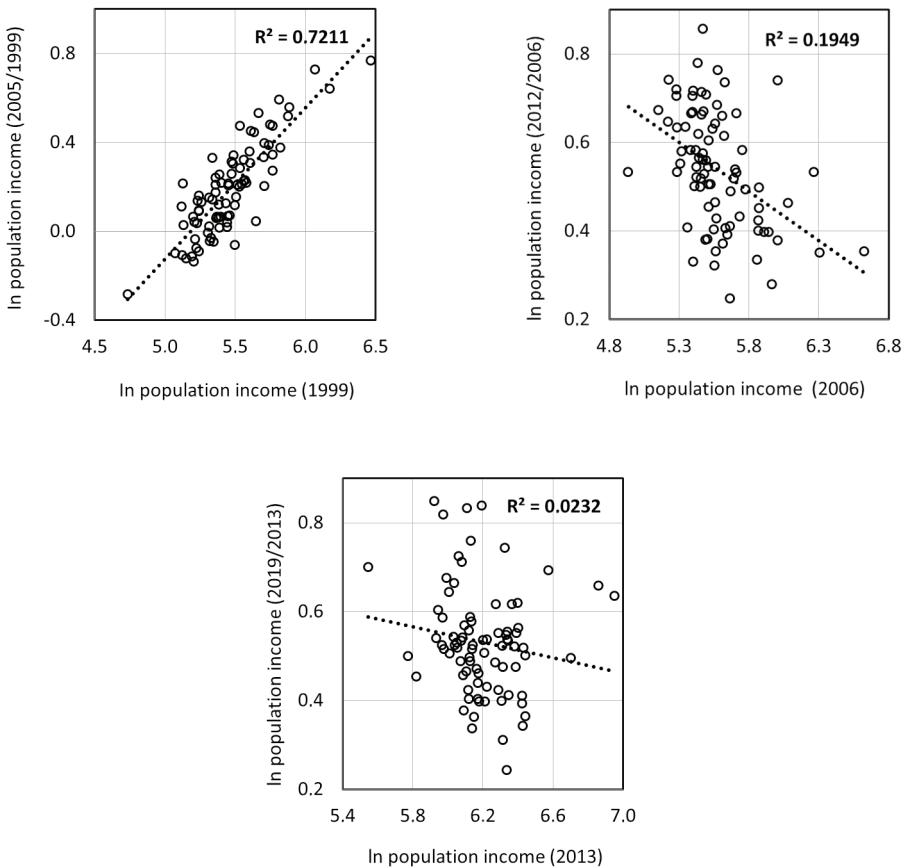


Figure 4. Beta convergence of population income in municipalities between 1999 and 2005, 2006 and 2012, 2013 and 2019

Source: Author's own elaboration.

⁷ There were also no statistically significant results that could confirm the beta convergence of this income category for the entire 1999–2019 period.

As it can be seen in the scatter diagrams of dependencies, each of the sub-periods is different. The regression function estimates for each of them are as follows:

$$- 1999-2005: \ln\left(\frac{\hat{y}_{it}}{y_{i0}}\right) = -3.539 + 0.683 \cdot \ln(y_{i0}), R^2 = 0.7211$$

$$- 2006-2012: \ln\left(\frac{\hat{y}_{it}}{y_{i0}}\right) = 1.777 - 0.222 \cdot \ln(y_{i0}), R^2 = 0.1949$$

$$- 2013-2019: \ln\left(\frac{\hat{y}_{it}}{y_{i0}}\right) = 1.068 - 0.087 \cdot \ln(y_{i0}), R^2 = 0.0232.$$

In the years 1999–2005 the phenomenon of beta divergence of personal income of the population of municipalities takes place. The directional parameter β for this sub-period is 0.683 and the t-Student statistic calculated for it is 14.47. The λ coefficient indicates that the pace of changes is negative, reaching an annual average of 7.44%. This means that inequality is increasing at this pace. In the years 2006–2012 the tendency is opposite, there is a beta convergence of personal income in municipalities. The directional parameter β is -0.222 and the value of the test statistic is -4.43 . This phenomenon can therefore also be statistically confirmed. The average annual speed of convergence λ for this sub-period is positive and amounts to 3.59%. In the next sub-period, although there is also a negative value of the β parameter, it is -0.087 and the speed of convergence λ reaches 1.30%, which could indicate a continuation of the phenomenon, it turns out to be statistically insignificant, though. In this case, the value of the t-statistic is only -1.38 . Much better for the first two sub-periods is also the fit of the estimated regression functions to the empirical data. For them it amounts to 72.11% and 19.49%, respectively, while for the third one it is only 2.32%.

It seems that the occurring variability of beta and sigma convergences of income of the population of municipalities in the region could have been influenced by many factors. Changes in employment in agriculture in rural and urban-rural municipalities could also be significant. Another factor could be that economic zones set up in some urban and urban-rural municipalities needed commuting to and fro. Residential migration of the population from urban municipalities to the surrounding rural municipalities could also likewise be attributable. Each of these factors could bring about changes in the dynamics of the income growth of the population of the surveyed municipalities in particular sub-periods.

5. Conclusion

The conducted analysis allows for the formulation of several conclusions concerning the shaping of the inequality of two important categories of the development of municipalities in Lubusz Voivodeship. The first is the municipalities' own income per capita, which is a measure of economic activity in their area. The results in that aspect indicate that in the years 1999–2019 there is both beta and sigma convergence of this income category. To put it another way, "better-off" municipalities are being caught up by "worse-off" ones in terms of their own income, and, *mutatis mutandis*, the general level of disproportions between them is decreasing.

However, the above effects cannot be come across in the case of changes in the differentiation of personal income of the population of municipalities. Generally, in the entire analyzed period, changes in the inequality of distribution of this income category are of a non-linear nature, and they take on different courses in individual sub-periods. Between 1999 and 2005, there is beta and sigma divergence in this income category, signifying an increasing level of inequal-

ity. In the 2006–2012 sub-period, their beta and sigma convergence takes place, i.e. a decrease in the level of inequality. In 2013–2019, the results indicate no significant trends in changes in the level of inequality in this income category in municipalities. In the context of the regional policy pursued in the voivodeship governorship, it would be recommended that the reasons for this state of affairs be considered. In this case, factors that could stimulate the process of personal income growth of the population of poorer municipalities should be subject to scouting out. These issues, however, require separate and more in-depth research going beyond the scope of this paper.

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Konwergencja typu beta i sigma dochodów gmin województwa lubuskiego w latach 1999–2019

Abstrakt: W studiach nad rozwojem regionalnym i lokalnym przedmiotem zainteresowania są dysproporcje między tworzącymi daną zbiorowość jednostkami terytorialnymi. Ważną cechą są również zachodzące zmiany tych kategorii w czasie. Prowadzi to do sformułowania pojęć procesów konwergencji i dywergencji rozwoju gospodarczego badanych jednostek. Celem artykułu jest dokonanie na przykładzie województwa lubuskiego analizy występowania realnej konwergencji gospodarczej na poziomie gmin z wykorzystaniem dwóch mierników odnoszących się do ich dochodów. Pierwszym są dochody własne gmin, jako miernik aktywności gospodarczej na

ich obszarze. Drugim – dochody osobiste ludności, jako miernik poziomu jej zamożności. Przy użyciu indeksu Theila i modeli regresji zbadano występowanie zjawisk konwergencji typu beta i sigma obu kategorii dochodów w gminach. Analizę przeprowadzono na podstawie danych z Banku Danych Lokalnych GUS, obejmując ją okres 1999–2019. Wyniki wskazują, że w zakresie kształtowania się dochodów własnych gmin w badanym okresie ma miejsce zarówno zjawisko konwergencji typu beta, jak i sigma. Powyższych prawidłowości, ze względu na zmienność tendencji, nie można jednak stwierdzić w przypadku kształtowania się dochodów osobistych ludności.

Słowa kluczowe: rozwój lokalny, konwergencja gospodarcza, dochody własne gmin, dochody osobiste ludności gmin