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EVALUATION OF REGIONAL WAGE CONVERGENCE IN POLAND

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Abstract. The aim of this paper is to present and analyze the regional differentiation of nominal wages in Section A of Polish classification of business activities (PKD) and in the entire economy in Poland in the years 2005–2013 and to examine whether there is a convergence or divergence process in the level of this wages. The results show that in spite of gradual wage growth in all voivodships, the regions do not converge in this term. In case of nominal wages in agriculture sector, a slight beta convergence is observed.

Key words: regional convergence, wage distribution, Poland

INTRODUCTION

The fact that regional economic development is unequal has long been recognized by economists. Disparities in socio-economic development of regions are a natural phenomenon arising from uneven access to the basic factors of production such as capital, labour, natural resources or technology. Regardless of the causes, the European Union (EU), since the early days of integration, has attempted to overcome this phenomenon in order to achieve a greater degree of cohesion within the Community. Already the Article 2 of the European Community Treaty[1] defines as its task "a high degree of convergence of economic performance" by establishing a common market and economic monetary union. Till now one of the main goals remains the attainment of progressive convergence of economic performance while fostering economic integration throughout the EU as a whole. In the newest strategy "Europe 2020" the socio-economic convergence for the EU member has been considered as one of the most important eco-

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[1] Treaty establishing The European Community, Rome, 25 March 1957.

nomic targets, concentrating national resources and EU funds on the areas and sectors where they can make the most important progress.

For a long time it appeared that the European countries were on a converging path and, therefore, the formulated policies and implemented structural funds brought about the desired effects. At the national level, relatively strong economic growth of those with low GDP per capita has meant that the EU countries have been converging [e.g. Kaitila 2004, Forgó and Jevčák 2015]. However, while the EU is experienced cross--country convergence, a number of studies have demonstrated that the inter-regional disparities have grown since the 1980s [Neven and Gouymte 1994, Button and Pentecost 1995, Siriopoulos and Asteriou 1998].

Many empirical studies examine regional convergence expressed in terms of a negative relation between growth rate and the initial level of per capita income or labour productivity. While regional differentiation of GDP is widely discussed and analysed there is not so much research concerning disparities in wages particullary on the regional level. Labour plays a major role in the functioning of an economy. From the point of view of enterprises, wages represent a labour cost that includes not only salaries paid to workers but also non-wage costs, mainly social contributions payable by the employer. As far as employees are concerned, wages comprise the price of their work and they generally represent their main source of income, and therefore have a major impact on their ability to spend or save.

Since Poland is a member of the EU and strives for socio-economic cohesion within the Community, an important economic question is whether it faces a convergence or divergence process in wages on the regional level. Does the price of labour in agriculture sector change in such a way as in other sectors of the economy? Accession of Poland to the EU brought on the changes to domestic agricultural sector. The agricultural market became larger and Common Agricultural Policy was implemented. Generally, agriculture is a sector with relatively lower level of wages than in other sectors. Poland remains the country with one of the lowest wages in this sector in the UE.

The presented paper focuses on the dynamism of changes in wages differentiation in Polish regions since the year 2005, so after joining the UE. The main aim of the study is to present and analyze the regional differentiation of nominal wages in the entire economy and in agriculture sector in Poland in the years 2005–2013 and to examine whether the level of those wages in Polish regions converge or diverge.

The structure of the paper is organized as follows. In the next section, the main research findings concerning the regional convergence process are summarized, with special attention devoted to the level of wages. Then, the Polish regional wages characteristics are described. After the description of the research method, the empirical results are shown. The article ends up with some conclusions.

REGIONAL CONVERGENCE – A BRIEF REVIEW

Convergence refers, in the economy, to the process aimed at reducing differences between entities featuring a diversified initial level of development [Markowska and Strahl 2012]. Both nominal and real variables can undergo this process, thus respectively

nominal or real convergence can be examined. Regarding regional convergence, it can be defined as the process or tendency of regions towards greater similarity or equality of variables of the economy.

Different approaches for the convergence process regarding GDP have been widely discussed in the literature [e.g. Sachs and Larrain 1993, Lipschitz et al. 2005, Pelkmans 2006]. In order to sum up existing scientific discussion and results few factors can be isolated, which influence the occurrence of convergance or divergence process.

The first factor, which is required for the regional convergence is the existence of decreasing marginal productivity of capital. A decline of marginal product of capital has a slowing down effect on economic growth rate [see Tokarski 2001a, b]. In the opposite situation, under an assumption of increasing marginal products of capital, the capital concentration and advancing polarization of economic development between regions can be expected. Capital flows to poorer regions, where usually capital resources per employee are lower, allow getting higher marginal productivity. This tendency favours equalization of technical devices, thus it implies the convergence process on labour productivity and wages. Capital flows cause that regions, that in initial year demonstrated lower level of income, are able to achieve faster economic growth rate.

The second important factor affecting the process of regional convergence is technological progress. Regional differentiation in generating and adopting new technologies may essentially diversify long-run economic growth paths [Tokarski and Gajewski 2003]. This may lead to divergence in the aspect of technical efficiency of production, which in turn will find reflection in divergence of GDP per capita. However, some authors raised another aspect of innovation progress [see for example: Abramowitz 1986, Keely and Quah 1998, Luiten and Harmsen 1999]. Namely, technological progress can be a factor enhancing convergence as long as economically backward regions may benefit from the technical improvements. The lack of costs of generating new technologies can be a favourable factor equalizing technical efficiencies. Additionally, the more universal and available new innovative solutions are, the faster process of convergence can be expected. However, fast technical development will make it more difficult for backward regions to catch up.

Other factors which might influence regional convergence process include disparities in the level of infrastructure, high fixed costs in enterprises and agglomeration effects. Economically weakest regions are often characterized by poor infrastructure, which increases the cost of investments, while high fixed costs are an obstacle for flows of investments.

What concerns economic agglomeration which affects regional income disparities, it has been a subject of economic geography research already since early 1990s [see Krugman 1991]. Combes et al. [2008] pointed out that "economic activities are concentrated in a limited number of regions, which form the core of a civilization, while the other regions stagnate, or even regress, and these are known as the periphery". According to Hanson [1997], wages are correlated with agglomeration and they decrease monotonically as one moves away from the economic center.

The basis for regional convergence to occur are continued structural changes, which allow a given region to reduce distance to the other more developed spatial units. Equalisation of GDP per capita leads to reducing disparities in the level of wages and

consequently in the standard of living of inhabitants. If long-term economic growth rate in affluent regions is higher than in others, those less well-off ones will suffer from lower wages growth and higher unemployment rate. This in turn foster migration flows. Therefore, in order to even out the level of wages, more and more financial resources for the redistribution actions will be required. However, capital mobility evokes also the structural changes, which consist of reallocation of productive factors to more effective application. For example, labour productivity in agriculture is much lower than in others sectors and the backward regions are characterized by high share of agriculture in the structure of regional GDP. In this case the labour flows to non-agricultural sectors increase social labour efficiency and indirectly also the level of wages [Zieliński 2011]. That is why high labour mobility fosters regional convergence, being complementary or even able to replace capital flows in the process of equalization of marginal productivity. The scale and directions of labor flows depend on such factors as differences in wages, unemployment rates, working conditions, standard of living, and removal expenses as well as social, demographic and economic characteristics of a given person [Amstrong and Taylor 2000]. Though, sometimes high labour mobility may not have positive influence on wages convergence. This happens when emigrating employees have high qualifications and their outflow means brain drain that can lead to divergence process. Spatial differentiation of wages is also connected with the economy structure, because salaries in individual sectors are not equal. The bigger share of employees in good paid sectors in a region, the higher are average wages.

The methods of analyzing the phenomenon of convergence generally come from the growth economics literature that isolated three concepts of convergence: unconditional (absolute) β-convergence, conditional β-convergence and σ-convergence [Barro and Sala-i-Martin 2003].

Absolute σ-convergence assumes that all economies are structurally identical and are characterized by the same steady states while differ only by their initial level of per capita incomes [Kang 2011]. This concept refers to a process in which poorer regions grow faster than richer ones and therefore catch up with them. The economies converge towards their steady states at a declining growth rate. However, the steady-state may depend on a series of determinants which are specific to each economy such, as internal policy, institutions, level of technologies, saving ratio, industrial structures. Beta-convergence is then said to be conditional. In this case, regions converge to their own steady states rather than to one general steady state assumed in unconditional β-convergence. Conditional β-convergence exists when the correlation between growth and initial income is negative under the assumption that the influence of other factors is held constant [Kang 2011].

The third concept, σ-convergence, refers to the dispersion of per capita income at a given moment in time. So, it serves as an indicator to measure weather the distribution of income across regions has become less uneven over time [Marzinotto 2012]. This type of convergence can be expressed by several indices such as simple standard deviation, coefficient of variance and Gini coefficient. If the dispersion of per capita income among economies falls over time, the occurrence of σ-convergence can be stated.

REGIONAL CHARACTERISTICS OF WAGES IN POLAND

The issue of wages convergence and spatial differences in the Polish labour market on the regional level so far have not been very extensively investigated [e.g. Newell and Socha 2005, Rogut and Tokarski 2007, Misiak et al. 2011, Zieliński 2011, Cieślik and Rokicki 2013]. In regard to economic development and the level of wages in Poland, it can be observed, mainly because of historical reasons, that in the western areas the standards of living and wages are higher and the unemployment rate is lower than in the eastern regions. However, the large fraction of the economy is concentrated in the Mazowieckie region, where the capital city is located. Due to Warsaw agglomeration, the capital region has the highest wages and the lowest unemployment rate in the country. Though, it does not apply to the peripheral subregions of this voivodship, which are economically backward.

Studies showed that after the economic transformation, salaries started slowly to increase in every Polish region and the distribution of wages had not become relevantly more unequal through the transition [Newell and Socha 2005, Cieślik and Rokicki 2013]. However, there is a clear contrast between the Mazowieckie region and the other regions. Especially since 1999, the regional wage differentials have increased as the Mazowieckie has experienced much higher wage growth rate than other regions, which was mainly driven by increasing salaries in Warsaw agglomeration. Except the distance from the capital, also the distance from the German border mattered for regional relative wages [Cieślik and Rokicki 2013].

As it is shown in Table 1, in 2005 the highest level of average monthly gross wage was definitely in Mazowieckie and then regions: Śląskie, Pomorskie, Dolnośląskie, Zachodniopomorskie and Małopolskie. The regions with the lowest wages were Podkarpackie, Warmińsko-mazurskie, Lubuskie and Kujawsko-pomorskie. In 2013, almost 10 years after joining the EU, the average wages increased in all regions in relation to initial year (2005) – from 48 to 60%, depending on a region. However, the biggest growth was seen in voivodships: Łódzkie, Lubelskie, Podkarpackie and Podlaskie, and the lowest in Mazowieckie.

Figure 1 illustrates regional differentiation of wages in Section A of PKD[2] in 2005 and 2013. In 2005, the highest wages in the sector of agriculture, forestry and fishing were paid in Świętokrzyskie and Podlaskie, followed by Mazowieckie, Śląskie and Podkarpackie region, while the lowest ones – in Wielkopolskie, Kujawsko-pomorskie and Opolskie region. In 2013 still the top ranked regions were respectively Świętokrzyskie, Podlaskie and Mazowieckie.

All voivodships experienced an increase in nominal wages between 2005 and 2013 (from 58 to 79%). Nevertheless, the biggest growth was witnessed in Opolskie, Dolnośląskie, Lubelskie, Kujawsko-pomorskie, Małopolskie and the lowest, in contrast, Podkarpackie, Świętokrzyskie and Śląskie (see Table 2).

[2] List of classification of business activities in Poland. Section A includes: products of agriculture, forestry and fishing.

Table 1. The average monthly nominal gross wages in Polish regions in 2005 and their increase till 2013

Region	Wages in 2005 (PLN)	Growth in 2005–2013 (%)
Mazowieckie	3 227.04	+ 47.92
Śląskie	2 587.07	+ 55.50
Pomorskie	2 511.25	+ 53.20
Dolnośląskie	2 477.56	+ 56.16
Zachodniopomorskie	2 307.99	+ 53.34
Małopolskie	2 303.42	+ 55.17
Wielkopolskie	2 263.60	+ 55.30
Opolskie	2 249.89	+ 54.38
Podlaskie	2 192.77	+ 56.55
Łódzkie	2 188.15	+ 60.42
Lubelskie	2 180.18	+ 60.01
Świętokrzyskie	2 173.15	+ 54.15
Kujawsko-pomorskie	2 153.46	+ 54.27
Lubuskie	2 144.35	+ 53.06
Warmińsko-mazurskie	2 103.99	+ 55.16
Podkarpackie	2 081.76	+ 57.69

Source: Own elaboration based on GUS data.

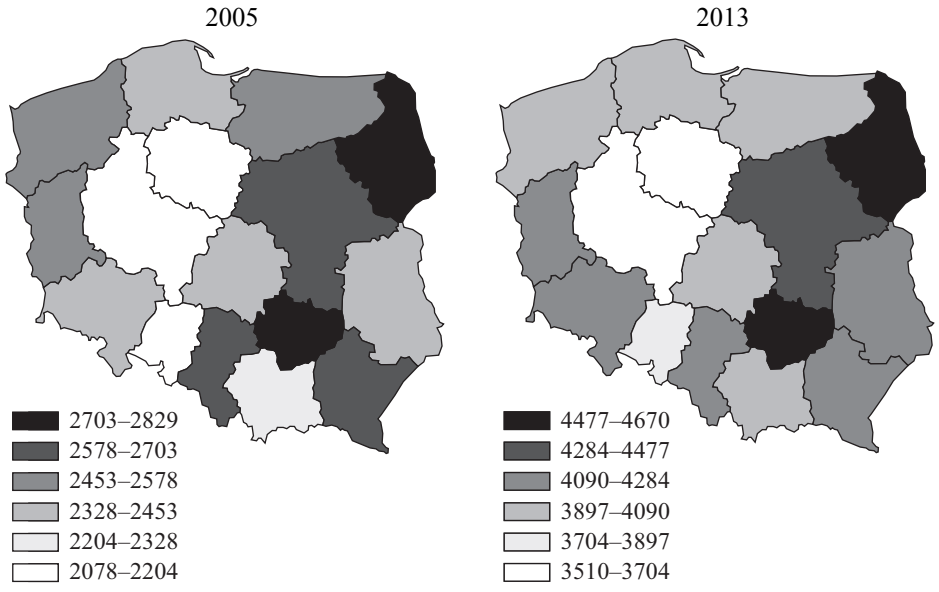

Fig. 1. Average nominal wages in Section A (PLN)

Source: Own elaboration based on GUS data.

Table 2. The growth of average nominal wages in the sector of agriculture, forestry and fishing (Section A) in 2005–2013

Region	Growth in 2005–2013 (%)	Region	Growth in 2005–2013 (%)
Opolskie	+ 79.28	Pomorskie	+ 67.08
Dolnośląskie	+ 71.99	Zachodniopomorskie	+ 64.63
Lubelskie	+ 71.80	Mazowieckie	+ 62.67
Kujawsko-pomorskie	+ 71.72	Lubuskie	+ 61.94
Małopolskie	+ 71.27	Warmińsko-mazurskie	+ 61.90
Podlaskie	+ 70.49	Śląskie	+ 59.68
Łódzkie	+ 69.36	Świętokrzyskie	+ 59.52
Wielkopolskie	+ 68.88	Podkarpackie	+ 58.41

Source: Own elaboration based on GUS data.

DATA AND RESEARCH METHOD

This study focuses on the analysis of average nominal wages at the regional level in Poland. The data come from the Polish Local Database GUS for the period of 2005––2013. Average monthly gross wages and salaries are defined by GUS as the relation of the sum of gross salaries and fees paid to certain groups of employees for performing work under labour contracts, payments from profit and from balance surplus in co-operatives, annual extra wages and salaries for employees of budgetary sphere entities to the average number of employees, excluding outworkers, apprentices and persons employed abroad.

In order to estimate the absolute β-convergence process on average monthly wages in an entire economy and in the Section A in Polish regions, the following regression equation[3] was applied:

$$\frac{1}{T}\ln\left(\frac{y(T)}{y(0)}\right) = \alpha_0 + \alpha_1 \ln y_0 \tag{1}$$

where: T – the number of investigated years;
$y(T)/y(0)$ – the level of average wage in a region in final year / the level of average wage in a region in initial year;
α_0 – constant level;
α_1 – slope parameter.

The dependent variable is average wages growth rate and the explanatory variable is the level of average wage in initial year. A negative relationship between these variables indicates a convergance, thus negative and statistically significant value of α_1 is

[3] For more explanation see Barro and Sala-i-Martin [2001].

the sign of a convergence process. In the next step, based on the value of α_1 the β-convergence can be estimated as follows:

$$\beta = \frac{1}{T}\ln(1 + \alpha_1 T) \tag{2}$$

The parameter β indicates the rate at which regions approach their steadystate per year and hence the speed of convergence. Based on β value, the so-called half-life (*hl*) can be computed, which means the time span which is necessary for current disparities to be halved:

$$hl = \ln 2/\beta \tag{3}$$

Convergence analysis through β-convergence concept focuses only on average values in reference time period. It brings little while trying to analyse the convergence process in particular years. To measure this, a Σ-convergence approach is much more suitable, which refers to a reduction of disparities among regions in time. Formally, β-convergence is necessary but not suffcient for Σ-convergence.

The most frequently used summary measures of Σ-convergence are the standard deviation or the coeffcient of variation of regional GDP per capita [Monfort 2008]. In this paper, in order to analyse Σ-convergence proces on avarage wages I used coefficient of variation which is defined as the ratio of the standard deviation to the mean. It shows the extent of variability in relation to the mean of the population.

$$c_v = \frac{\sigma}{\bar{x}} \tag{4}$$

RESULTS

Parameters regarding β-convergence calculated by using the equations (1)–(4) are listed in the Table 3.

Table 3. Statistic values measuring β-convergence process

Scope of research (2005–2013)	α_1	β	Half-life
Avarage wages in total	–0.012	0.013	53.30
Avarage wages in Section A	–0.029	0.034	20.38

Source: Own elaboration.

The estimated regression equation confirmed absolute beta convergence process on average monthly wages in the sector of agriculture, forestry and fishing (Section A) in Polish regions in the years 2005–2013. The slope of the line is negative and steep, slope parameter $\alpha_1 = –0.029$. However, this process occurs to a modest extent. The calculated value of 0.034 indicates very small rate at which regions approach their steadystate per year. The time span which is necessary for current disparities to be halved is 20 years.

As can be seen in Figure 2, Polish regions with the lowest level of wages in Section A in a basic year had the highest rate of growth of average wages in the next nine years. To this group belong definitely Opolskie, Kujawsko-pomorskie, Małopolskie and Wielkopolskie region. Quite high average growth rate was also achieved in Dolnośląskie, Lubelskie, Podlaskie and Łódzkie. It is worth to underline that Podlaskie is the only region with high wages in intial year which accomplished avarage wages growth rate as well. Definitely the lowest wages growth appeared in Podkarpackie, Świętokrzyskie, Śląskie, Warmińsko-mazurskie, Lubuskie and Mazowieckie. These are the regions which in initial year were characterized by the highest level of wages in agricultural/forestry sector.

What concerns the avarage wages in the entire regional economy in the years 2005––2013, admittedly the parameter $\alpha_1 = -0.012$ indicated beta convergence process, but it is not very statistically significant. However, the value of allows to exclude divergence process.

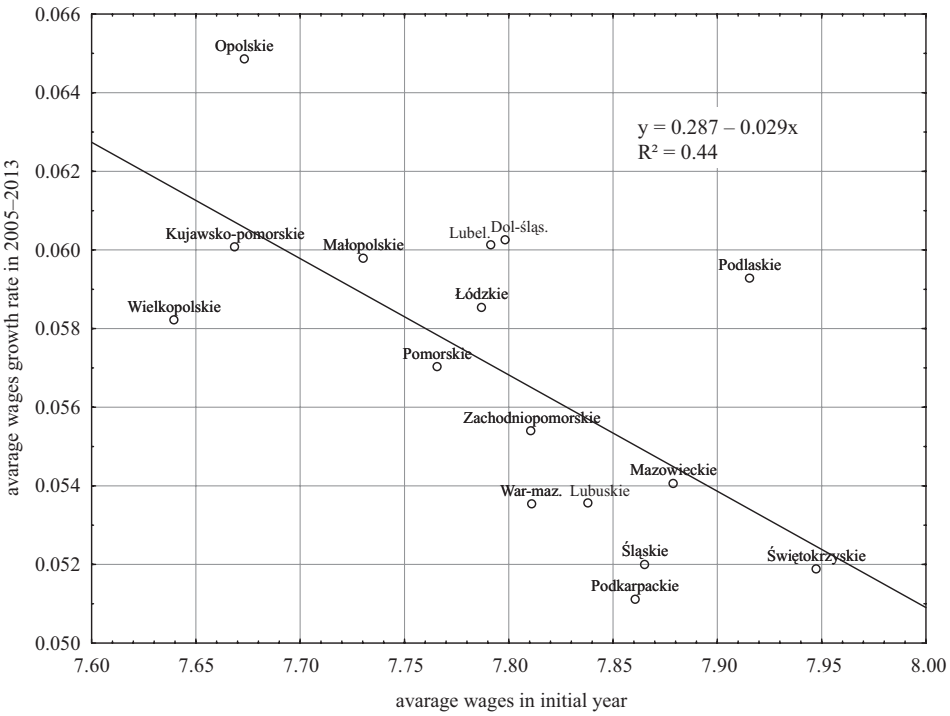

Fig. 2. Wages β-convergence in Section A of PKD in Polish regions in 2004–2014

Source: Own elaboration based on GUS data base.

Sigma-convergence in wages occurs when in the consecutive observation moments, coefficients of variation for the analyzed regions are characterized by a downward tendency. Figure 3 illustrates coefficients of variation for the wages in Section A and in the entire regional economy in the investigated period.

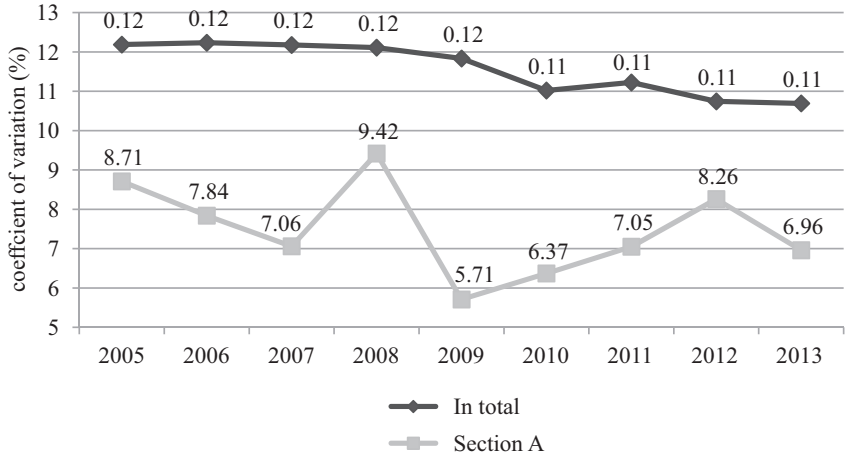

Fig. 3. Sigma-convergence of average wages in Section A and wages in the entire economy in the years 2005–2013

Source: Own elaboration.

Values of coefficients referring to average gross wages in a whole regional economy illustrate slight downward trend. This suggests that regional disparities in wages decrease. However, this process proceeds very slowly. As regards wages in section A, values of coeffcients of variation illustrate quite diversified tendencies. Fluctuations of the interregional dispersion measure values are quite noticeable, which means that the sigma convergance process on wages in agriculture and forestry does not occur.

CONCLUSIONS

In this paper the wages differentiation on the regional level after Poland's accession to the European Union was investigated. In the period 2005–2013, an increase of average nominal wages in the whole economy as well as wages in the agriculture, forestry and fishing (Section A) was observed in all Polish regions. However, their growth rate in Section A was higher comparing with the whole regional economy.

The results presented suggest that in spite of gradual wage growth in all voivodships, the regions rather do not converge in terms of wage level. However, the divergence in nominal wages was excluded as well.

In the case of nominal wages in Section A, a slight β-convergence was observed. The regions which in the basic year were characterized by the lowest wage levels in agricultural/forestry/fishery sector (Opolskie, Kujawsko-pomorskie, Małopolskie and Wielkopolskie) experienced the biggest percentage growth over the period 2005–2013. On the contrary, in the regions with the highest wages in 2005 (Podkarpackie, Świętokrzyskie, Śląskie) this growth was the lowest. However, no Σ-convergence was proved, suggesting that the distribution of wages in agricultural sector across regions has not become less uneven over the investigated period of nine years.

The paper leaves some issues to be considered in the further research. For example, it would be useful to consider the regional differentiation of wages in other sectors of the Polish economy, also taking into account labour productivity in particular sectors. Finally, it would also be instructive to investigate the influence of emigration of workers on the regional structure and level of wages in Poland.

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OCENA REGIONALNEJ KONWERGENCJI WYNAGRODZEŃ W POLSCE

Streszczenie. W artykule dokonano analizy regionalnego zróżnicowania nominalnych wynagrodzeń w sekcji A Polskiej klasyfikacji działalności (PKD) oraz w całej gospodarce w Polsce w latach 2005–2013, a następnie zbadano, czy zachodzi proces konwergencji, ewentualnie dywergencji, w tym zakresie. Wyniki wykazały, że mimo stopniowego wzrostu poziomu wynagrodzeń we wszystkich województwach, ich poziom między regionami nie wyrównuje się. W przypadku wynagrodzeń w sekcji A stwierdzono niewielką β-konwergencję.

Słowa kluczowe: konwergencja regionalna, zróżnicowanie wynagrodzeń, Polska

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