Evaluation of economic development differentiation of regions of Ukraine

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Abstract: In the current crisis conditions of the Ukrainian economy solving problems of regional development becomes crucial. In terms of limited financial resources, it is necessary to choose grounded priorities of financing on the basis of evaluation of the regional development. The results of the analysis of σ-convergence parameters dynamics (the coefficient of inequality, variation, skewness, concentration, entropy) in terms of Gross Regional Product per capita during 2004-2014 are presented. GRP is the resulting indicator of economic activity of all regions and makes it possible to identify the most productive regions of the country. It has been found out that there is an increase in the degree of uneven of their economic development during the analyzed period and further development of divergent trends. The necessity of adjusting the state regional policy has been grounded.

Keywords: divergence, differentiation, convergence, estimation, region, economic development.

1. Introduction

Spatial development of Ukraine at the present stage is characterized by increasing interregional social and economic asymmetry, fluctuation of economic downturns and increases with significant regional differences. Today, significant regional disproportions impede the economic growth and social stability. Such regional differences were forming in Ukraine for a long time as a result of natural, economic, historical, social and governmental factors. Therefore, one of the priority tasks of state regional policy is support of strong regions and stimulating the development of weak regions.

Regional uneven of economic development leads to such negative processes in the country as slowing economic growth, which is caused by the need to direct part of the resources for leveling of regional development rather than on its stimulation, increasing social tensions, development of disintegration processes.

In these conditions one of the main tasks of the state is to maintain territorial integrity, prevent social conflicts. It is necessary to create programs of sustainable and balanced regional development, which would take into account the peculiarities and potential of the region and were aimed at ensuring a high standard of living. Thus, an important direction of public policy today is the elimination of interregional differentiation of economic and social development.

2. Analysis of recent research and publications

The issue of spatial development was investigated by many researchers and practitioners and has found wide coverage in scientific works (B. M. Danylyshyn, M. I. Dolishnii, S. I. Dorohuntsov, O. I. Amosha, A. S. Lysetskyi, A. H. Mazur, D. P. Bogynia).

However, it should be noted, that despite the significant study of the problem of regional development the issue of overcoming the spatial differentiation of Ukraine's regions based on convergent-divergent trends of its economic development is still poorly investigated.

3. Formulation of the problem (purpose of the article)

The analysis of existing spatial differences in economic development of regions of Ukraine in dynamics and justification the directions of reducing such differentiation.

4. Main material exposition

Determination of interregional differentiation of economic development of Ukraine poses the question of choice and substantiation the instruments of quantitative evaluation of existing imbalances. As a modern instrument of assessment of uniformity or disproportions of areas is using the theory of convergence.

Convergence theory has been developing since the end of twentieth century in the scientific community of the West. In recent years it is an actual for the study of the regions different processes in post-socialist countries.

It is based on the deep theoretical foundation and is one of the varieties of the neoclassical theory of regional development (Kyzym, 2010, p. 385). Its theoretical basis are models of convergence grounded by R. Solow, T. Swan (Solow, 1956), R. Barro, X. Sala-i-Martin (1992), D. Wail, G. Mankiw, D. Romer (1992). These models are developed to assess the degree of convergence between system forming factors of development of different countries, but they also found their application in one country (Kyzym, Heiman, 2008, p. 15).

The theory of convergence implies convergence and gradual leveling of territories, it is leading to the formation of a single vector of change, and, eventually to a synergistic effect of forming their trajectory of development. The opposite process is called divergence and it describes the differences in the pace of regional development, which leads to further unevenness.

Estimation of σ-convergence includes the study of the dynamics of interregional differentiation by calculating the following indicators: the coefficient of inequality (MMR), the coefficient of variation (CV), the Gini coefficient (Gw), the Theil index (T), the coefficient of skewness (As).

The coefficient of inequality MMR shows the maximum extent of asymmetry of the studied parameters that are characterizing the economic development of regions and calculates as the ratio of maximum and minimum value of index of the regions development (1) (Aivazian, 2010):

$$MMR = \frac{\max(x_i)}{\min(x_i)},$$

(1)

x_i – value of the studied parameter of the region;

$i = 1,..,n$, n – number of regions.

The growth of the coefficient of inequality shows an increase in differentiation between regions by the level of the studied parameters.

The main disadvantage of this coefficient is such fact as its too great value may be caused by the presence of several regions that are differ significantly from the majority by the value of the selected parameter.

The coefficient of variation CV is used not only to assess variations but also to characterize the homogeneity of the whole. It is homogeneous if the coefficient does not exceed 33% (2) (Aivazian, 2010, p. 93):

$$CV = \frac{\sqrt{\dfrac{\sum\limits_{i=1}^{n}\left(x_i - \dfrac{1}{n}\sum\limits_{i=1}^{n}x_i\right)^2}{n-1}}}{\dfrac{1}{n}\sum\limits_{i=1}^{n}x_i}$$

(2)

x_i – value of the studied parameter of the region;

$i = 1,..,n$, n – number of regions.

The Gini coefficient Gw is one of the most prominent indicators of concentration. It describes not only the concentration of certain features (mostly households' income) but also reflects the general degree of differentiation of objects by the value of certain feature (3) (Kyzym, Heiman, 2008).

$$Gw = 1 - 2\sum_{i=1}^{n} w_{p_i} \cdot Cumw_{x_i} + \sum_{i=1}^{n} w_{p_i} \cdot w_{x_i}$$

(3)

w_{p_i} – share of the population of the group of the regions in the total country population;

$Cumw_{x_i}$ – cumulative share of value of the studied parameter of the i-region ranked in ascending list;

w_{x_i} – share of values of the studied parameter of the i-region in the total value of this parameter in the group of regions;

$i = 1,..,n$, n – number of regions.

The differentiation rates were calculated by groups that are formed depending on the level of selected parameter, because this approach greatly enriches the possibility of data analysis and its interpretation, allows to quantify the degree of differentiation within the individual groups.

The Gini coefficient ranges from 0 (complete equality) to 1 (complete differentiation). The low value of this coefficient means the balanced regional development.

Another indicator of the regional development asymmetry is Theil index (T). It is widely used in foreign science of regional development. This entropy index of inequality based on the use to measure inequality concept of entropy from information theory. Henry Theil offered it in his work "Economics and information theory" (Theil, 1967, p. 121-123).

The advantage of this index to evaluate interregional differentiation is its independence from the fluctuations of the studied parameters and absolute population. The index remains unchanged, if the rate of the population of each region increases or decreases in the same number of times (Storonianska, 2006, p. 104).

The Theil index determines by the formula (4) (Storonianska, 2008, p. 20):

$$T = \sum_{k=1}^{n}\left(\frac{x_i}{\sum\limits_{i=1}^{n}x_i}\right)\left(\ln \frac{x_i/p_i}{\sum\limits_{i=1}^{n}x_i \Big/ p}\right)$$

(4)

x_i – value of the studied parameter of the region;

p_i – population of the i-region;

p – population of the country;

$i, k = 1,..,n$, n – number of regions.

The index takes the minimum value, which is zero, in the case of absolute interregional parity and increases when the degree of interregional differentiation becomes higher.

The coefficient of skewness shows the proportion and the direction of the deviation of the difference between the average of the studied parameter and the parameter in the middle of the row (mode) (5) (Aivazian, 2010, p. 95; Mkhitarian and etc., 2005, p. 228).

$$As = \frac{\sum_{i=1}^{n}\left(x_i - \frac{1}{n}\sum_{i=1}^{n} x_i\right)^3}{n \cdot \left(\sum_{i=1}^{n}\left(x_i - \frac{1}{n}\sum_{i=1}^{n} x_i\right)^2 \Big/ n-1\right)^{3/2}}, \quad (5)$$

x_i – value of the studied parameter of the region;

$i = 1,..,n$, n – number of regions.

The value of the coefficient can be interpreted as follows:

As>0, it means the right-sided asymmetry and the prevalence of values more than the average level;

As<0, it means the left-sided asymmetry and the prevalence of values less than the average level;

As<0,25, it means the asymmetry is weak;

0,25<As<0,5, it means the average level of asymmetry;

As>0,5, it means the significant asymmetry.

The study of the differentiation of regions of Ukraine in 2004-2014 was made according to the index of GRP per capita. It is an indicator of economic development of regions and countries.

Table 1 shows the results of calculation of the σ-convergence of Ukrainian regions in terms of GRP per capita in the period from 2004 to 2014 (State Statistics Service of Ukraine, 2016).

Table 1. The dynamics of the σ-convergence indexes of Ukrainian regions from 2004 to 2014					
Period	**MMR**	**CV**	**Gw**	**T**	**As**
2004	2,7625	28,47	0,4605	0,2095	0,00000040
2005	2,7134	29,42	0,4638	0,2218	0,00000021
2006	2,7832	31,00	0,4744	0,2307	0,00000012
2007	2,8319	32,95	0,4797	0,2317	0,00000007
2008	3,1914	34,03	0,4841	0,2358	0,00000003
2009	2,9561	31,29	0,4527	0,2117	0,00000005
2010	3,1730	33,25	0,4637	0,2356	0,00000002
2011	3,1802	33,01	0,4680	0,2150	0,00000002
2012	3,0732	31,34	0,4478	0,2375	0,00000002
2013	3,0575	30,20	0,4322	0,2443	0,00000002
2014	3,8177	32,36	0,5037	0,2210	0,00000001

Figure 1 shows the dynamics of the σ-convergence indexes growth of Ukrainian regions in terms of GRP per capita.
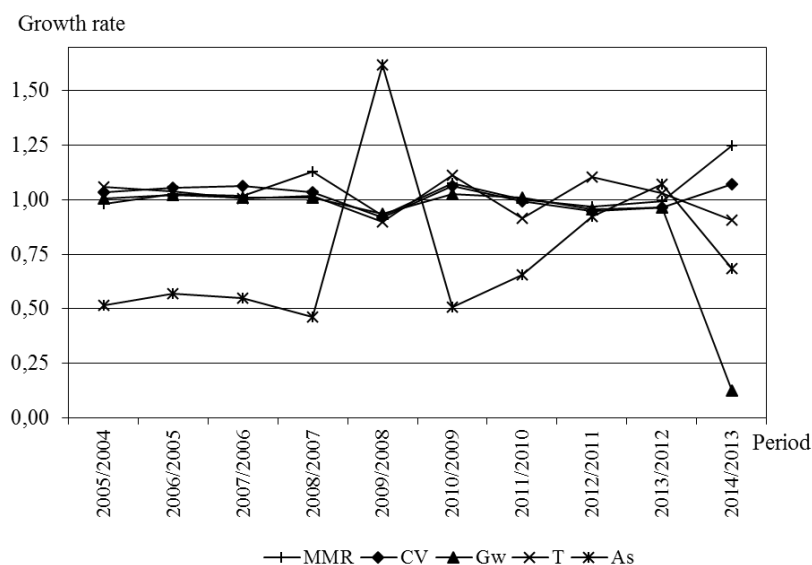
Fig. 1. The dynamics of the σ-convergence indexes growth of Ukrainian regions

According to the obtained results we can conclude next. The dynamics of all indexes that are characterized the σ-convergence is inherent the oscillatory character but there are no significant jumps in values of these indicators by regions of Ukraine.

The coefficient of inequality between maximum and minimum values of GRP per capita in Ukraine shows slight fluctuations in the value of the index over the years. An increase in the index dynamics may indicate a deepening of the existing differentiation between regions by the level of GRP.

The coefficient of variation dynamics in 2004-2014 also has oscillatory character, and its value is in the range 28-34%. All this demonstrate the high level of differentiation of the regions of Ukraine by selected parameter. This, in addition to the coefficient of inequality MMR, confirms the heterogeneity of the regions of Ukraine in terms of GRP.

The Gini coefficient also varies by years and it is nearly half of the limit value. There is a tendency to increase the regional differentiation in terms of created added value in the period 2004-2014.

A small dynamics of the entropy Theil index demonstrates the stable existence of uneven distribution of the regions by GRP per capita.

The coefficient of skewness reflects the distribution of amount of GRP per capita in the regions. The results of the analysis of the values of the coefficient allow to state that there is a very weak right-sided asymmetry among the regions of Ukraine and it has oscillatory character. All coefficients are positive and much lower than 0,25. Thus, we can say that almost all regions are on average level by the value of the studied parameter.

Based on the analysis it can be argued about the existence of tendencies to divergence among regions, to increase in their differentiation by the level of economic development. The calculated parameters vary slightly but in a negative direction.

5. Conclusions

The increase in parameters of variation indicates the existence of σ-divergence that is characterized the uneven regional development in Ukraine, which is growing by the end of the analyzed period. The most problematic in this regard are 2008 (as a result of the synergistic effect of national and global crisis on the process of regional development in Ukraine) and 2014 (as a result of the negative impact of the military and political situation in the country).

The indicators of concentration also have tendency to increase in value confirming the σ-divergence processes in the country.

As follows, we can talk about the inefficiency of the current state policy on reduction of differentiation of regional development. And it is necessary to develop and implement the theoretical and methical positions and practical recommendations on determination of the priority directions of its formation in the regions of Ukraine.

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Оцінювання диференціації економічного розвитку регіонів України
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Анотація. В сучасних кризових умовах української економіки ключове значення набуває вирішення проблем регіонального розвитку країни, зокрема в умовах обмежених фінансових ресурсів необхідним є обґрунтований вибір пріоритетних напрямків фінансування на підставі результатів оцінки розвитку регіонів. У статті розглянута можливість застосування теорії конвергенції для оцінки ступеня диференціації регіонів України за рівнем економічного розвитку. Представлені результати аналізу динаміки показників σ-конвергенції (коефіцієнтів нерівномірності, асиметрії, варіації, концентрації та ентропії) регіонів в період 2004-2014 рр. за показником ВРП на одну особу, який є результуючим показником економічної діяльності всіх суб'єктів регіону і дає можливість виявити найбільш продуктивні регіони країни. Виявлено збільшення ступеня нерівномірності їх економічного розвитку за аналізований період і подальший розвиток дивергентних тенденцій. Обґрунтовано необхідність коригування державної регіональної політики.

Ключові слова: дивергенція, диференціація, конвергенція, оцінка, регіон, економічний розвиток.

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Оценка дифференциации экономического развития регионов Украины
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Аннотация. В современных кризисных условиях украинской экономики ключевое значение имеет решение проблем регионального развития страны, в частности в условиях ограниченных финансовых ресурсов необходим обоснованный выбор приоритетных направлений финансирования на основании результатов оценки развития регионов. В статье рассмотрена возможность применения теории конвергенции для оценки степени дифференциации регионов Украины по уровню экономического развития. Представлены результаты анализа динамики показателей σ-конвергенции (коэффициентов неравномерности, асимметрии, вариации, концентрации и энтропии) регионов в период 2004-2014 гг. по показателю ВРП на душу населения, который является результирующим показателем экономической деятельности всех субъектов региона и дает возможность выявить наиболее продуктивные регионы страны. Выявлено увеличение степени неравномерности их экономического развития за анализируемый период и дальнейшее развитие дивергентных тенденций. Обоснована необходимость корректирования государственной региональной политики.

Ключевые слова: дивергенция, дифференциация, конвергенция, оценка, регион, экономическое развитие.

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