

UDC 005.52:330.101.541:330.876(477)

doi: 10.15330/jpnu.8.3. 85-96

## APPLICATION ANALYSIS OF KEY MACROECONOMIC INDICATORS IN TERMS OF REGIONAL DISPARITY

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**Abstract.** The purpose of the article is to study the causal links of the existence of disparities in the socio-economic development of the country's regions and identify key measures to overcome existing disparities in certain areas, taking into account systemic transformations in the modern economy. The main disparities in the regional development of Ukraine are considered and the criteria of regional disparities are defined. It is established that the largest disparities in regional development occur according to the indicators observed in the case of investment per capita. The regions-leaders and outsiders in terms of socio-economic development are selected according to the selected indicators.

The division of regions of Ukraine is carried out by means of the cluster analysis. The regions are divided into groups with similar characteristics for the four analyzed macroeconomic variables. The distances between the clusters were expressed using the Euclidean distance, which is widely used in this type of analysis. To combine objects into groups, Ward's method was used to create clusters with a small number of objects.

After the analysis, the following conclusions were made: across the country, the regions are characterized by large differences in the level of GRP per capita, capital investment per capita and unemployment, with smaller differences in income levels; an unfavourable phenomenon is the reduction of investment in the southern regions, which in fact leads to low economic growth and future trends; the condition for reducing regional disparities is overcoming barriers to the development of less developed regions, which may occur primarily through the consistent strengthening of their economy, improving the structure and more efficient use of investment resources aimed specifically at strengthening entrepreneurship and professional development.

**Keywords:** regional disparity, gross regional product, gross regional product per capita, macroeconomic indicators, decentralization.

**JEL Classification:** E01, E37.

## 1. INTRODUCTION

Decentralization processes in Ukraine have been going on since 2014. The first stage of reforming the system of public administration and local self-government, necessary for their successful implementation, has already been completed. During this time, we can identify both certain achievements and difficulties and shortcomings in achieving the goals and objectives of these reforms. Therefore, the decentralization of power was extremely necessary to address a number of issues of preserving and strengthening our statehood, including through the introduction of new regional policies. With the gradual introduction of decentralization, in remote parts of Ukraine, citizens have begun to believe in the ability of their communities to develop effectively and gain a decent future. The first step in the decentralization of power was budgetary (financial) decentralization. It helped to increase the level of financial support of local budgets and created conditions for motivating local governments to increase the revenue base of local budgets. Statistics are convincing evidence of the success of this reform. In particular, local budgets increased from 68.6 billion in 2014 to 275 billion UAH in 2019, so it means by 206.4 billion UAH. [1]

In addition, the structure of the economies of the UTCs has a multi-stage genesis, which reflects the complex historical path traversed by the country over the past century. With a wide range of natural resources, including rich agricultural potential, strong human capital and a promising geostrategic location, Ukraine has not yet been able to make good use of these opportunities to achieve sustainable development, and the fragmentation of existing capacity has been exacerbated by regional imbalances.

## 2. THEORETICAL BACKGROUND

Many domestic scholars have been analyzing the trends of regional development in recent years. Among the publications that deserve attention are the works of Yu. Vershigora [2], I. Yaroshenko I. Semigulin [3], N. Stoyanets [4] and others. In particular, Yu. Vershigora [2], studying the uneven development of the regions of Ukraine, focuses attention and draws conclusions based on the dynamics of major capital and foreign direct investment. The author notes that the elimination of disparities is possible provided the development of a stable stock market in all regions without exception.

I. Yaroshenko and I. Semigulin [3] to solve problems of disproportionate development of regions propose to make changes at the level of the Constitution of Ukraine, Budget and Tax Codes and by amending a number of laws governing various aspects of life in the regions of our state. Exploring the theoretical aspects of the problem of regional development N. Stoyanets [4], offers a methodology for regulating the socio-economic development of regions based on a forecasting scheme that contains the principles of forecasting, as well as forecasting strategic resources and monitoring the desired development results. A review of these and other publications shows that most authors pay sufficient attention to the facts of economic development of certain territories or regions of Ukraine, ignoring the social consequences of the socio-political and economic crisis of recent years: weakening social security and strengthening social isolation of vulnerable groups.

Disproportionate development of regions has a negative impact on the development of the country. Unfortunately, in Ukraine there is an extremely negative situation - an increase in disparities between regions in many respects, both economic and social. Today, the theory of convergence is used to determine the homogeneity or disproportionate development of regions. In order to understand this issue, it is necessary to consider in more detail what exactly is meant by the divergence and convergence of the term.

The terms convergence and divergence have not been used in the economic literature for some time. Only after foreign economists and sociologists (J. Tinbergen, E. Giddens, J. Sachs, etc.) applied this term to the analysis of the phenomena of public life. They argued that under the influence of modern industrial development, different economic systems acquire the same features, converge, as defined by the term "convergence". It is after that that these terms are actively used in the economic literature. These terms have become especially widespread in the regional economy, in particular, the term

"divergence" is widely used in the topic of disproportionate regional development [5].

### 3. RESEARCH OBJECTIVE, METHODOLOGY AND DATA

Analyze structural changes in the economy of the regions of Ukraine, trends in the deepening of territorial disparities and outline areas for balancing structural imbalances and ensuring the development of innovative and competitive activities in the regions. Methods used for the study: integral, indices, formalization, modeling, economic analysis.

### 4. RESULTS AND DISCUSSION

In our opinion, modern regional policy, which is able to balance the proportions of economic development, must take into account the dynamics of not only the internal but also the external environment. To do this, such a policy needs to be modified in the direction of its ability to adequately respond to the challenges of globalization in order to maximize the benefits that have arisen for the regions of Ukraine in connection with the foreign economic policy of openness and minimization of threats.

The initial data for the study are GRP indicators per capita. Nominal GDP of Ukraine in 2020 amounted to 4194102 million UAH, and increased by 5%. As for the average gross regional product per capita, in 2020. this figure amounted to 100.43 thousand UAH and respectively 6.2% growth, but this growth rate is the lowest since 2014. [1]

As for the indicators of 2019. then the average gross regional product in Ukraine is 94,661 thousand UAH., the leading indicator of GDP per capita, as usual, is Kyiv city (UAH 320.9 thousand), followed by Poltava region, Kyiv region, Dnipro region, which also occupy leading positions for several years in a row, the lowest GRP per capita - Donetsk region, Ternopil region, Zakarpattia region, Chernivtsi region, Luhansk region. As for the regions of Eastern Ukraine, their positions were caused by a large-scale military conflict, which has an extremely negative impact on the already not very strong economic potential of the country. These are both the results of the direct destruction of the region's economy - the part occupied and controlled by Ukraine - and the resulting problems of directly related enterprises.

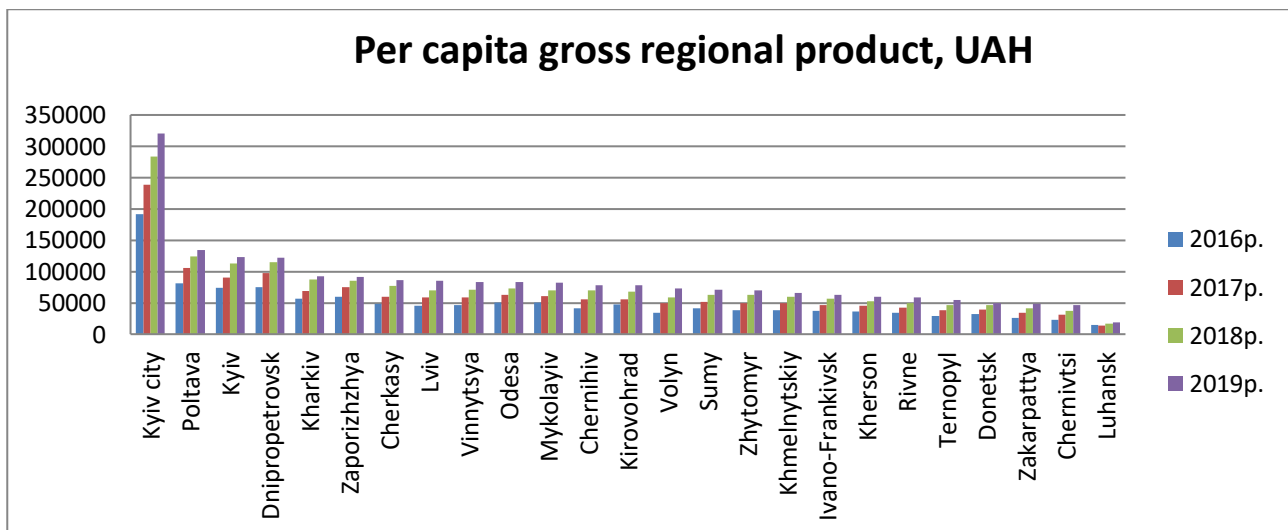


Fig. 1. Gross regional product per capita thousand UAH, 2015 – 2019.

\* Source: built by the authors on the basis of their own calculations [1]

Gross domestic product per capita is the ratio of total industrial production and population. Therefore, the study of the dynamics of individual components allows us to find a basis for its growth. The analysis shows that in the regions with the highest dynamics of GDP per capita, its growth was

based on the growth of the general level of GDP. The dynamics of population growth do not matter much. In turn, population growth was registered in the regions with the lowest GDP growth rates per capita.

Analyzing the main macroeconomic indicators, a specific regional economic "landscape" has emerged, which determines the features of economic development of regions at the present stage:

1) The regions show divergent trends in economic development. Under the same internal conditions and external conditions, the dynamics of the main indicators of most regions have not only different intensity but also different trend. This indicates increased competition from regions for resources and markets. In such conditions, the concentration of regional producers on their own interests increases and the interest in establishing internal cooperation weakens.

2) The industrial production of the regions returned to an extensive type of growth. Leaders in the dynamics of the industry in 2019. (Kirovograd, Mikolaiv, Odessa regions) provided an increase in production due to the extractive industry. The main industrial regions (Dniprovsk, Kharkiv oblasts) are increasing the volumes of production and supply of electricity, gas and water at rather moderate indicators in the processing industry.

3) The raw material specialization of agricultural production is intensifying. 6.1% growth in agriculture is provided exclusively by crop production, as well as by those regions that provide the bulk of agricultural production (Vinnytsia, Zhytomyr, Khmelnytsky regions). Instead, the regions that specialize in the production of livestock products and processing of raw materials (Cherkasy, Kherson, Poltava regions) have much lower growth rates. That is, agricultural producers in the regions are more focused not on deep processing, but on the effect of scale. [2]

4) The reorientation of regional exporters from the market of the Russian Federation (and the CIS) to other countries continues. Trade relations between the western border regions and neighboring EU member states are strengthening (for Zakarpattia, Lviv, and Volyn oblasts, the share of trade with the EU reaches 70%). At the same time, the commodity structure of exports is changing: the share of vegetable and oil and fat industry products is growing; the share of metallurgical, chemical and mechanical engineering products is decreasing. Thus, the regions in the development of the European market are forced to move to the position of price competition, giving way to the interests of commodity and geographical diversification of exports. [3]

5) Investment activity in the regions correlates with industrial dynamics. Leaders in terms of capital investment growth in 2019. There were Cherkasy, Mykolaiiv and Odesa regions. In addition, there are noticeable gradual changes in the structure of investments in favor of the real sector.

6) Challenges to determine the economic specialization of regions are growing. The role of industrial-agrarian regions is gradually decreasing in favor of predominantly agrarian and predominantly industrial ones. A cluster of regions has formed in the center of Ukraine, which is inferior to more specialized regions in terms of pace and quality of development. This is first reflected in the stagnation of the labor market and the highest levels of registered unemployment. Thus, the drivers of the development of the regions of Ukraine in the short term were: transit, cross-border trade, raw material exports and traditional industries due to the effect of scale. Given the different structures of the region's economy and different priorities in external cooperation, it cannot be assumed that the resumption of economic growth in 2019 has become a trend for all regions. Rather, the signs of economic recovery on a national scale have been the sum of regional growth rates. The desire of the regions for "self-sufficiency" can be clearly seen, but this goal is achieved through greater secrecy and increased competition between regions. In such conditions, there is an urgent need to develop tools to restore the multiplier effect of cooperation and cooperation within the country.

The analysis covered four macroeconomic variables  $x_{and}$  (for  $i=1, \dots, 4$ , where 1 - GDP per capita, 2 - gross fixed capital formation (hereinafter - investment per capita), 3 - available income population per capita, 4 - unemployment rate) (Tab. 1).

№	Name	Symbol	Unit
1.	GRP per capita	GRP Ph.D.	UAH, K
2.	The amount of capital investment per capita	Cap.inv. p.c.	UAH, K
3.	Disposable income per person	Income pop.p.c.	UAH, K
4.	Unemployment rate	RB	%

Tab. 1. Variables used in the study.

\* Source: own calculations

The calculation of data for further research are given in Tab. 2, 3, 4. Indicators of Kyiv city were not used for calculation.

№	Region	GRP Ph.D.		Cap.inv. p.c.		Income pop.p.c.		RB	
		UAH, K	% to Ukraine	UAH, K	% to Ukraine	UAH, K	% to Ukraine	%	% to Ukraine
	City of Kyiv	320,9	339,1	69,04	502,11	179,3	243,9	6,6	72,5
1.	Poltava region	134,3	141,8	13,32	96,87	72,8	104	11,5	126,4
2.	Kyiv region	123,2	130,2	18,75	136,36	76,2	126	8,2	90,1
3.	Dniprovsk region	122,3	129,1	23,19	168,65	89,1	109,7	7,9	70,3
4.	Kharkiv region	92,8	98,0	9,18	66,76	66,5	117,4	10,3	131,2
5.	Zaporizhya region	91,5	96,6	8,82	64,15	76,1	103,8	5,5	60,4
6.	Cherkasy region	86,3	91,1	10,03	72,95	59,6	105,7	6,6	72,5
7.	Lviv region	85,2	90,0	8,89	64,65	67,4	95,9	10,0	109,9
8.	Vinnytsia region	83,1	87,6	9,18	66,76	65,5	86,9	9,7	107,7
9.	Odesa region	82,9	87,5	11,29	82,11	75,3	95	10,2	112,1
10.	Mykolaiv region.	82,1	86,7	11,56	84,07	64,7	95,9	7,0	76,9
11.	Chernihiv region	78,1	82,5	8,93	64,95	56,0	87,9	11,0	120,9
12.	Kirovohrad region	77,8	82,1	7,6	55,27	58,5	88,1	12,0	131,9
13.	Volyn region	73,2	77,3	7,14	51,93	54,0	96,5	10,8	101,1
14.	Sumy region	70,6	74,6	8,4	61,09	65,9	80,3	11,6	127,5
15.	Zhytomyr region	70,2	74,1	8,9	64,73	62,6	90,3	10,0	96,7
16.	Khmelnyskiy region	66,0	69,7	7,13	51,85	58,9	90	10,8	118,7
17.	Ivano-Frankivsk region	63,2	66,7	6,84	49,75	56,5	83,6	8,3	91,2
18.	Kherson region	60,0	63,4	8,51	59,27	58,1	86,5	10,5	115,4
19.	Rivne region	58,3	61,5	6,24	45,38	55,9	82,4	10,2	112,1
20.	Ternopil region	54,8	57,8	6,47	47,05	55,5	55,1	14,4	158,2
21.	Donetsk region	49,3	52,0	8,00	58,18	39,8	75,1	14,0	117,6
22.	Zakarpattia region	48,8	51,5	5,98	43,49	47,9	69,9	9,4	131,2
23.	Chernivtsi region	46,1	48,7	4,12	29,96	49,1	74,1	8,9	97,8
24.	Luhansk region	18,8	19,9	1,49	10,84	25,0	35,6	16,0	175,8
	<b>Ukraine</b>	<b>94,661</b>	<b>100</b>	<b>13,75</b>	<b>100</b>	<b>57,9</b>	<b>100</b>	<b>8,6</b>	<b>100</b>

Tab. 2. The value of the analyzed variables in the regions of Ukraine in 2019.

\* Source: built by the authors on the basis of their own calculations [1]

The time frame of the study covers three periods:

- the first stage - the period of economic growth, which lasted from 2000 to 2008;
- the second stage - related to the impact of the global financial crisis (2008 to 2014);
- the third stage - the period of economic crisis associated with the occupation of Crimea and open hostilities in eastern Ukraine (2014 to 2019).

№	Region	GRP Ph.D.		Cap.inv. p.c.		Income pop.p.c.		RB	
		UAH, K	% to Ukraine	UAH, K	% to Ukraine	UAH, K	% to Ukraine	%	% to Ukraine
	Kyiv city	124,16	336,48	59,04	588,63	62,72	234,2	6,6	73,3
1.	Poltava region	48,04	130,19	12,32	119,61	26,2	97,83	10,6	117,78
2.	Dnipropetrovsk region	53,75	145,66	18,75	182,04	32,04	119,64	7,4	82,22
3.	Kyiv region	46,06	124,8	14,19	137,77	28,44	106,2	7,9	87,78
4.	Zaporizhia region	37,25	100,9	7,18	69,71	30,18	112,7	7,7	85,56
5.	Kharkiv region	35,33	95,7	8,82	85,63	26,27	98,1	7,7	85,56
6.	Odesa region	31,27	84,74	8,03	77,96	24,24	90,52	7,0	77,78
7.	Mykolaiv region	30,63	83,01	6,89	66,89	23,46	87,6	9,7	107,78
8.	Cherkasy region	30,36	82,28	9,18	89,13	21,76	81,25	10,1	112,22
9.	Vinnitsia region	27,25	73,85	9,7	94,17	23,42	87,45	10,9	121,11
10.	Lviv region	28,73	77,86	9,17	89,03	23,6	88,13	9,2	102,22
11.	Chernihiv region	26,53	71,9	6,65	64,56	23,09	86,22	11,0	122,22
12.	Kirovohrad region	29,22	79,19	5,6	54,37	21,95	81,96	10,0	111,11
13.	Sumy region	26,94	73,01	5,14	49,9	23,94	89,4	9,7	107,78
14.	Volyn region	23,22	62,93	7,4	71,84	20,14	75,21	9,8	108,89
15.	Khmelnitskyi region	24,66	66,83	7,9	76,7	22,69	84,73	10,5	116,67
16.	Zhytomyr region	23,68	64,17	5,13	49,81	22,1	82,52	11,1	123,33
17.	Ivano-Frankivsk region	27,23	73,79	5,56	53,98	20,36	76,03	8,9	98,89
18.	Kherson region	21,73	58,89	4,34	42,14	20,73	77,41	9,7	107,78
19.	Rivne region	24,76	67,1	5,24	50,87	21,78	81,33	10,8	120
20.	Donetsk region	27,77	75,26	4,47	43,4	26,23	97,95	9,1	101,11
21.	Ternopil region	20,23	54,82	6,80	66,01	18,4	68,71	11,1	123,33
22.	Zakarpattia region	19,17	51,95	4,98	48,35	17,36	64,82	10,5	116,67
23.	Chernivtsi region	16,55	44,85	3,98	38,64	18,48	69,01	9,3	103,33
24.	Luhansk region	14,08	38,16	4,15	40,29	19,79	73,9	8,4	93,33
	<b>Ukraine</b>	<b>36,90</b>	<b>100</b>	<b>10,3</b>	<b>100</b>	<b>26,78</b>	<b>100</b>	<b>9,0</b>	<b>100</b>

Tab. 3. The value of the analyzed variables in the regions of Ukraine in 2014.

\* Source: built by the authors on the basis of their own calculations [1]

The above division of the regions of Ukraine can be more clearly represented by cluster analysis. It has a static character, so it was chosen typical economic cycles with the following division: 2008, 2014 and 2019 (respectively, is the initial year of analysis, the year of the economic crisis and the final year of the study). The results of cluster analysis are presented in the form of dendrograms (hierarchical clustering), presented in Fig. 2, 3, 4.

№	Region	GRP Ph.D.		Cap.inv. p.c.		Income pop.p.c.		RB	
		UAH, K	% to Ukraine	UAH, K	% to Ukraine	UAH, K	% to Ukraine	%	% to Ukraine
	Kyiv city	61,59	301,03	24,06	343,17	24,96	181,92	3,0	42,25
1.	Poltava region	22,48	109,88	10,32	147,43	13,92	101,46	7,7	108,45
2.	Dnipropetrovsk region	30,91	151,08	12,75	182,14	15,46	112,68	5,2	73,24
3.	Kyiv region	20,59	100,64	13,69	195,57	14,29	104,15	6,2	87,32
4.	Zaporizhia region	23,23	113,54	6,18	88,29	15,27	111,3	6,7	94,37
5.	Kharkiv region	21,29	104,06	7,12	101,71	14,07	102,55	7,0	98,59
6.	Odesa region	19,64	95,99	8,03	114,71	11,75	85,64	5,3	74,65
7.	Mykolaiv region	16,18	79,08	5,89	84,14	12,63	92,06	9,2	129,58
8.	Cherkasy region	14,58	71,26	8,18	116,86	11,99	87,39	9,4	132,39
9.	Vinnitsia region	12,06	58,94	8,7	124,29	11,68	85,13	7,0	98,59
10.	Lviv region	13,9	67,94	6,17	88,14	12,72	92,71	8,8	123,94
11.	Chernihiv region	13,21	64,57	6,65	95	12,35	90,01	8,5	119,72
12.	Kirovohrad region	13,52	66,08	5,6	80	11,5	83,82	9,0	126,76
13.	Sumy region	13,62	66,57	5,14	73,43	13,19	96,14	8,3	116,9
14.	Volyn region	12,34	60,31	4,45	63,57	10,6	77,26	8,9	125,35
15.	Khmelnitskyi region	11,93	58,31	4,9	70	11,94	87,03	9,1	128,17
16.	Zhytomyr region	11,55	56,45	4,21	60,14	12,02	87,61	9,4	132,39
17.	Ivano-Frankivsk region	12,94	63,25	5,56	79,43	11,26	82,07	9,0	126,76
18.	Kherson region	11,94	58,36	4,34	62	11,25	82	9,3	130,99
19.	Rivne region	12,22	59,73	5,24	74,86	11,12	81,05	9,6	135,21
20.	Donetsk region	26,03	100,83	4,47	63,86	16,22	118,22	5,8	81,69
21.	Ternopil region	9,69	47,36	4,03	57,57	10,58	77,13	9,5	133,8
22.	Zakarpattia region	10,63	51,96	3,28	46,43	9,66	70,41	7,1	100
23.	Chernivtsi region	9,77	47,75	2,98	42,57	9,79	71,36	9,5	133,8
24.	Luhansk region	18,34	89,64	6,15	87,86	13,41	97,74	7,3	102,82
	<b>Ukraine</b>	<b>20,46</b>	<b>100</b>	<b>7,0</b>	<b>100</b>	<b>13,72</b>	<b>100</b>	<b>7,1</b>	<b>100</b>

Tab. 4 The value of the analyzed variables in the regions of Ukraine in 2008.

\* Source: built by the authors on the basis of their own calculations [1]

The regions are divided into groups with similar characteristics for the four analyzed macroeconomic variables. The distances between the clusters were expressed using the Euclidean distance, which is widely used in this type of analysis. To combine objects into groups, Ward's method was used to create clusters with a small number of objects. Actually, cluster analysis was performed by the method of hierarchical agglomeration.

Dendrograms created for 2014 and 2019 clearly indicate two clusters in the distribution of regions. This phenomenon is especially noticeable when abandoning the levers that unite the clusters for a scaled distance of about 10 units. Thus, there will be two groups of regions that are most similar to each other. In one cluster there are central regions with the highest level of GRP (Poltava region, Dnipro region, Kyiv region), in another - all the others (except Luhansk region in 2019). These results may indicate the existence of groups of regions with similar development trends, leading to the convergence of clubs.

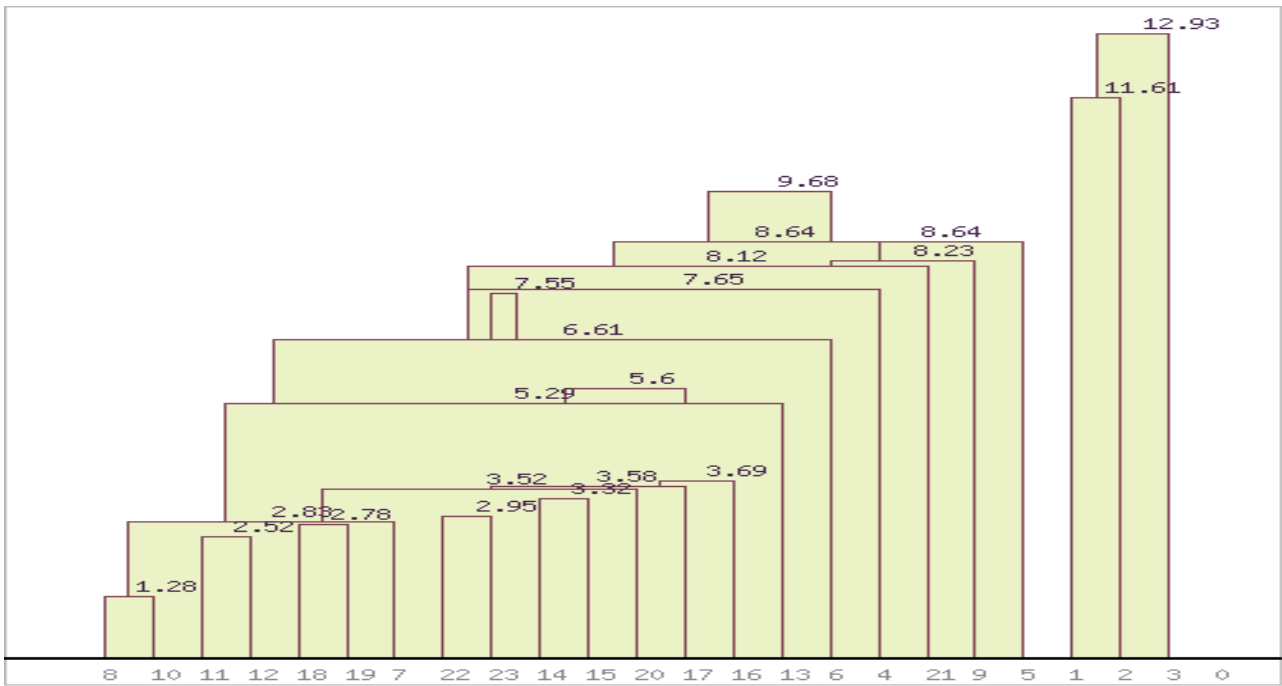


Fig. 2. Dendrogram using the Ward method, 2019.

\* Source: compiled by the author based on his own research

As a result we will receive 2 clusters:  $S_{(1,2,3)}$ ,  $S_{(4,6,7,8,10,11,12,13,9,14,15,16,17,18,19,20,5,21, 22,23)}$ ,  $S_{(24)}$ .

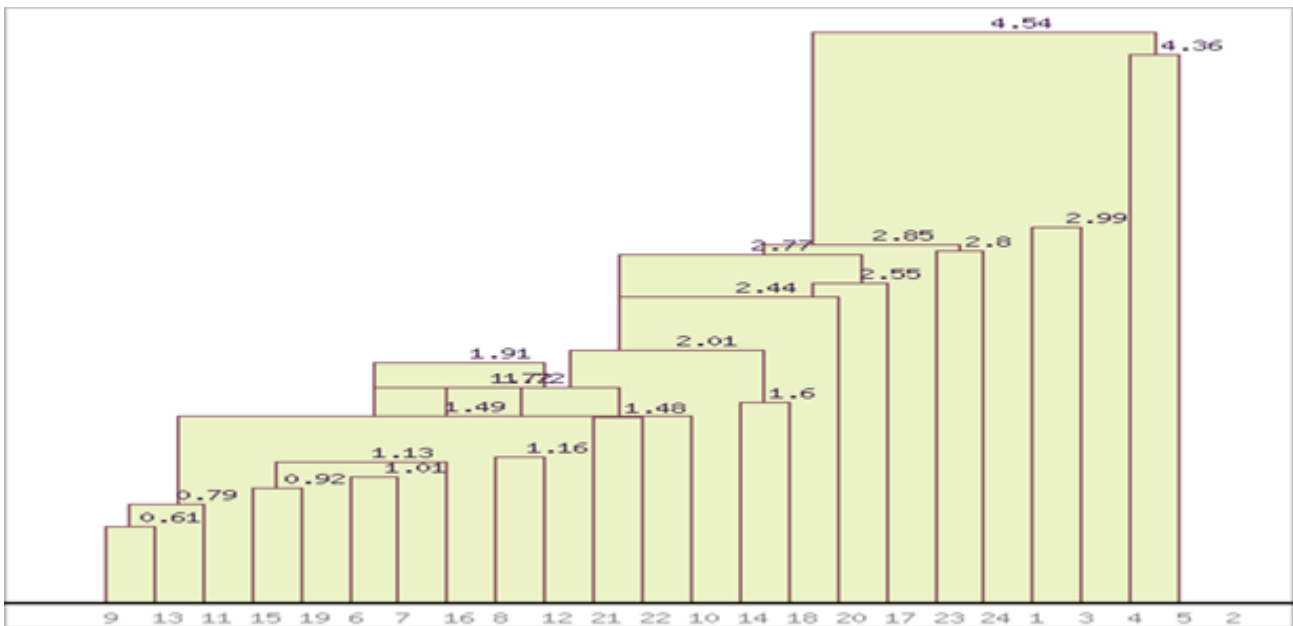


Fig. 3. Dendrogram using the Ward method, 2014.

\* Source: compiled by the author based on his own research

As a result we have 2 clusters:  $S_{(1,2,3)}$ ,  $S_{(4,5,6,7,8,12,9,13,11,10,15,19,16,14,18,20,17,21, 22,23,24)}$ .



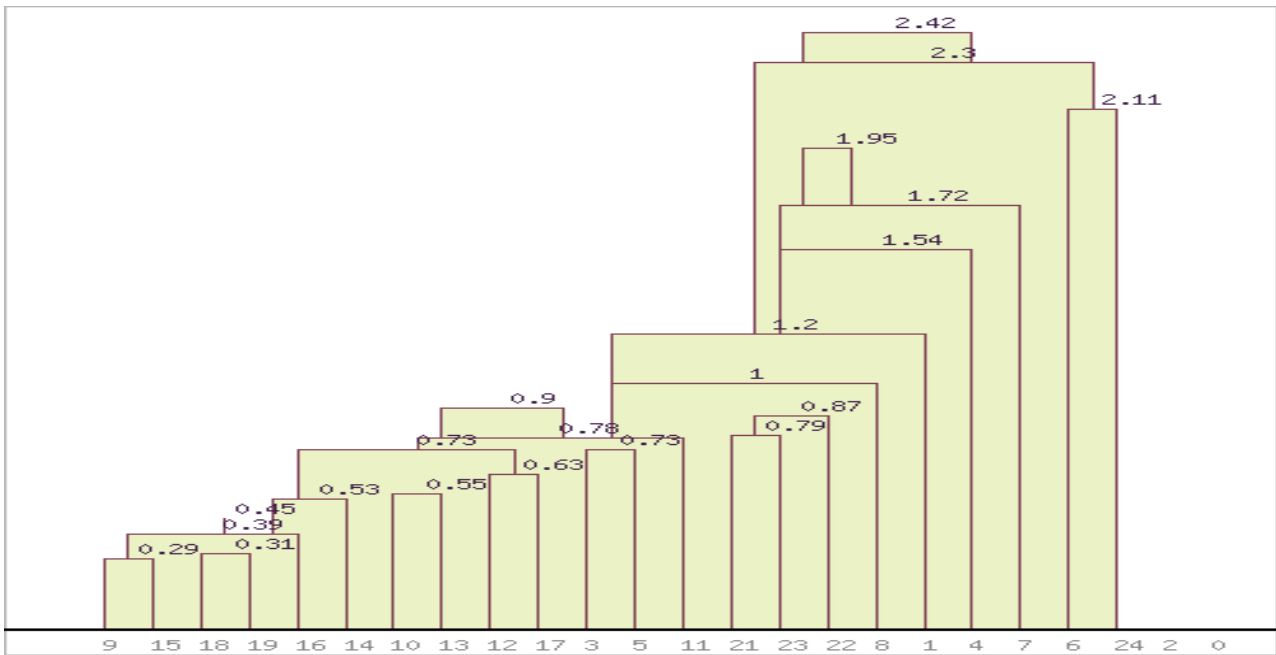


Fig. 4. Dendrogram using the Ward method, 2008.

\* Source: compiled by the author based on his own research

As a result, there is no clear clustering: S<sub>(1,3,5,4,6,24,7,8,9,15,16,18,19,14,12,17,10,13,11,21,23,22)</sub>, S<sub>(2)</sub>, S<sub>(20)</sub>.

To calculate the coefficient of variation for the studied macroeconomic variables, due to the strong heterogeneity of the group, the authors decided to divide it into 3 more homogeneous subgroups (Tab. 5).

Active ≥ 100% of the average	Non-performing ≥ 50% of the average	Depressed ≤ 50% of the average
Kyiv, Kyiv Poltava region Kyiv region Dnipro region	Kharkiv region Zaporizhyya region Cherkasy region Lviv region Vinnytsia region Odesa region Mykolaiv region Chernihiv region Kirovohrad region Volyn region Sumy region Zhytomyr region Khmelnitsky region. Ivano-Frankivsk region Kherson region Rivne region Ternopil region Donetsk region Zakarpattia region	Chernivtsi region Luhansk region

Tab. 5. Distribution of regions of Ukraine by gross regional product per capita in 2019, thousand UAH.

\* Source: calculated by the author independently without taking into account the temporarily occupied lands of the ARC and parts of Donetsk and Luhansk regions

Differences in the level of development of regions can be traced both in relation to the whole country and in relation to individual regions, as evidenced by the values of coefficients of variation based on the standard deviation. In the regions, the fluctuation of GRP per capita was relatively small: in 2019 it was 6.74% in the group of regions with a high level of GRP, 15.43% in the group with a medium level of GDP and 29.4% with a low level of GRP. (Tab. 6).

Large differences between the values of the variable within macro-regions are observed in the case of per capita investment. In the group of regions with a high level of GRP, the standard deviation of per capita investment is 21.91% of the group average. The smallest differentiation of this variable - 16.57% of the average value - is observed in regions with an average level of GRP per capita. The smallest differentiation is observed in terms of gross income. Therefore, in macro-regions, income should be considered equal, as the coefficient of variation does not exceed 21.9%. A higher value of this ratio was recorded in the group of regions with low GDP.

As in the case of per capita investment, there were clear differences between regions within macro-regions in terms of unemployment. If in the group of regions with high and low GRP, the coefficient of variation calculated for the unemployment rate in 2019 was 24.27% and 22.23%, respectively, in the regions with average GRP - only 18.68%.

Name	$V_{x2018}$ for variable:			
	GRP Ph.D.	Cap.inv. p.c.	Income pop.p.c.	RB
Ukraine	36,5	47,03	21,9	24,74
Regions with a high level of GRP	6,74	21,91	8,21	24,27
Regions with an average level of GRP	15,43	16,57	10,13	18,68
Regions with low GRP levels	29,4	42,89	24,23	22,23

Tab. 6. Coefficient of variation based on standard deviation, calculated for the analyzed variables for these groups of regions in 2019 (in %).

\* Source: own calculations

There are much greater differences between regions nationwide. This is confirmed by the highest values of the coefficient of variation calculated for the level of GRP and investment per capita, which in 2019 amounted to 36.5% and 47.03%, respectively. A high value is also expected by the coefficient of variation calculated by the unemployment rate (24.74%). The degree of diversification of the analyzed variables probably depended on the impact of the economic crisis. This has led to a recession in Ukraine, which in turn has led to reduced investment and GRP and, as a result, rising unemployment.

## 5. CONCLUSIONS

The analysis allows us to draw the following conclusions:

1. In the nationwide, the regions are characterized by large differences in the level of GRP per capita, capital investment per capita and unemployment, with smaller differences in income levels. These differences clearly divide the regions, on the one hand, into groups of more developed macro-regions of Central Ukraine and regions of Western and Eastern Ukraine, which lag behind in their development. The exception is Eastern Ukraine, which also suffers the most from the hydride war.

2. With regard to GRP per capita, investment per capita, income for the entire period of the study, due to statistically insignificant parameters of  $\beta$ -convergence, it is difficult to predict the phenomenon of convergence or divergence. Only in the period before the global crisis (2008) did the convergence processes take place, but mainly in macro-regions, and concerned certain variables. In the aftermath of the global financial crisis (2008 - 2014), there were clear differences in unemployment rates, GDP per capita and per capita investment between regions across the country. It can be said that the economic downturn in Ukraine caused by the economic crisis has increased inequality between the prosperous

central regions and the less developed regions of Western and Eastern Ukraine. Particularly unfavorable is the reduction of investment in the southern regions, which in fact leads to low economic growth and future trends.

3. The condition for reducing regional disparities is overcoming barriers to the development of less developed regions, which may occur primarily due to the consistent strengthening of their economy, improving the structure and more efficient use of investment resources aimed specifically at strengthening entrepreneurship and skills. Existing enterprises should also be supported in modernizing their activities and integrating into the international network of economic cooperation. Businesses need to receive real support from the government and local authorities to improve the business environment, including the technical infrastructure and institutional system.

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**Received:** September 15, 2021; **revised:** October 19, 2021.

Кондур Оксана, Томашевська Антоніна. Аналіз основних макроекономічних індикаторів в розрізі регіональної диспропорції. *Журнал Прикарпатського університету імені Василя Стефаника*, 8 (3) (2021), 85–96.

Мета статті полягає у дослідженні причинно-наслідкових зв'язків існування диспропорцій в соціально-економічному розвитку регіонів країни та визначенні основних заходів щодо подолання існуючих диспропорцій за окремими напрямками з урахуванням системних трансформацій в сучасній економіці країни. Розглянуто основні диспропорції в регіональному розвитку України та визначено критерії регіональних диспропорцій. Встановлено, що найбільші диспропорції в регіональному розвитку відбуваються за показниками спостерігаються у випадку інвестицій на душу населення. Виокремлено регіони-лідери й аутсайтери за соціально-економічним розвитком за обраними показниками.

Наведений поділ регіонів України проведено за допомогою кластерного аналізу. Регіони розподілені на групи з аналогічними характеристиками щодо чотирьох аналізованих макроекономічних змінних. Відстані між кластерами виражалися за допомогою евклідової відстані, що широко застосовується в цьому типі аналізу. Для об'єднання об'єктів до груп використовувався метод Варда для створення кластерів з невеликою кількістю об'єктів.

Після проведеного аналізу зроблено наступні висновки: в масштабах країни регіони характеризуються великими відмінностями в рівні ВРП на душу населення, капітальні інвестиції на душу населення і рівня безробіття, з меншими відмінностями щодо рівня доходів населення; несприятливим явищем є скорочення інвестицій в південні регіони, що фактично обумовлює низькі темпи економічного зростання і тенденції в майбутньому; умовою зниження диспропорцій регіонів є подолання бар'єрів на шляху розвитку менш розвинутих регіонів, що може відбуватися в першу чергу, завдяки послідовному зміцненню їх економіки, вдосконаленню структури і ефективнішому використанню інвестиційних ресурсів, що спрямовуються особливо з метою зміцнення підприємництва та підвищення професійної кваліфікації населення.

**Ключові слова:** регіональна диспропорція, валовий регіональний продукт, валовий регіональний продукт на душу населення, макроекономічні показники, децентралізація.