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ECONOMIC INEQUALITY OF THE REGIONAL DEVELOPMENT OF POLAND, SPAIN AND UKRAINE

ABSTRACT

The current work analyzes uneven regional economic development in Poland, Spain and Ukraine. It was determined that the unevenness of the economic development of the regions of the studied countries can be assessed by comparing statistical indicators, namely the index of the unevenness of the economic development of the countries, the dynamics of changes in the population of the studied countries and the comparison of regional economic statistics, in particular the indicators of the gross regional product. In order to identify the unevenness of regional economic development and justify the possible ways of their smoothing or levelling, the article uses such integral indicators as the coefficient of variation or Williamson's coefficient of variation, weighted coefficient of variation, relative mean deviation and Theil Index. The study of the indicated indicators made it possible to reveal contradictions in their analysis and the need to calculate additional indicators, as well as the influence of factors of direct and indirect influence on the economic unevenness of the regional development of the studied European countries.

Keywords: GDP per capita, regional economy, uneven economic development

JEL Classification: R13, R58, H73

INTRODUCTION

The modern world is extremely diverse in terms of economic development. It is important to emphasize that uneven economic development can be detected not only in the process of comparing statistical indicators of developed countries, countries with economies in transition or actual developing countries. In modern conditions, uneven economic development is inherent in any socio-economic system at the level of the enterprise, region or country. If at the level of enterprises the role of owners of global value chains with gross income, which may exceed the GDP of individual countries, is growing, then at the level of regions of any country the conditions for effective entrepreneurship and safe living of the local population is being formed. It is obvious that the growth of the level of regional inequality of economic development within an individual country can lead to instability and deterioration of the level and quality of life of the population in relatively backward regions of the research country.

The above determines the relevance of the study of the economic development inequality phenomenon of particular European countries' regions in the following areas:

1. The need to record, study, and identify the causes and preconditions of uneven economic development of regions for each of the countries, similar in territorial and demographic characteristics, as well as trends in general economic development - Poland, Spain and Ukraine, despite the fact that Spain can be characterized as an "old" EU country, Poland as a "more recent" EU country and Ukraine as an EU candidate;
2. Assessing the level of economic development of the regions of Poland, Spain and Ukraine over the long term during which the impact of all factors is likely to change (2011-2022);

3. Assessing the impact of the demographic factor on uneven economic development phenomenon of the researched countries' regions;
4. Analysis of economic inequality integrated indicators of the regions' development of the researched European countries where the reform of decentralization of the economic development central management functions at the regional level has been carried out or is being carried out.

LITERATURE REVIEW

In the scientific literature, there are a significant number of works that directly or indirectly study the patterns of uneven socio-economic development in the spatial dimension. The results of the review of such selected studies concern both a group of countries and a particular country.

Generalized research shows that despite the continuing recovery of the world economy, there is still an increase in the gap between developed countries, countries with economies in transition or developing countries [1]. The focus of research of some scholars is the uneven development of European countries [2]. Also, there is a comparison of income levels of particular countries [3] and even regions specifically [4, 5] which are the focus of large international business groups.

It is worth considering a study aimed at determining the contribution of industry and other sectors of the economy to regional divergence in Eastern Europe, in particular, in Poland and Ukraine [6, 7]. Regional inequalities in economic growth are observed in most countries and regions of some countries when studies focus on the peculiarities of convergence or divergence for the regions of Ukraine [8], as well as regional disparities in socio-economic development [9, 10, 11].

In the case of Poland, the level of economic security in Polish regions was measured [12]. An assessment of changes in income inequality was also conducted on the basis of survey data and tax returns [13]. In addition, studying the history of income distribution in Poland during 1892-2015 revealed the main role of state institutions and public policy in shaping income inequality in the long run [14]. In turn, researching the influence of historical heritage on the spatial differentiation of socio-economic development of Poland at the local level highlighted the phenomenon of uneven economic development of three groups of regions that were once ruled by other countries [15]. The role of Polish voivodships, which create the conditions necessary for the long-term economic and social development of their territories [16], is determined.

In turn, in scientific circles, Spain is considered a country with high regional inequality. Thus, the analysis of the evolution of inequality in regional GDP per capita in Spain shows that the reduction of regional inequality in economic development is accompanied by a geographical concentration of the richest regions in northeastern Spain and the poorest regions in the south [17].

The results of selected research works review on the particular topic give reason to believe in the significant impact of industrial revolutions, globalization and regionalization of international trade in the emergence of uneven economic development phenomenon of any socioeconomic system. In addition, there is a widespread opinion in scientific circles that modern globalization, despite the reduction of global inequality of economic development, i.e. economic inequality between countries, contributes to increasing the level of uneven economic development of regions in the researched countries.

AIMS AND OBJECTIVES

The article is aimed at studying the uneven regional economic development of Poland, Spain and Ukraine.

The objectives of the study are: to determine the index of uneven economic development of the countries, dynamics of population change in the studied countries and set of quantitative and qualitative indicators reflecting the current state of the region's economy and the dynamics of its change.

METHODS

The uneven economic development of the researched countries' regions can be assessed by comparing regional economic statistics, including indicators of gross regional product, indicators of economic activity of enterprises in the regions, indicators reflecting the dynamics of changes in foreign trade in goods and services of each region, in particular, indicators of statistics, development of science and technology in the region, indicators of information society development and environmental protection by regions of countries. The indicators of demographic and social statistics of the studied region in

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terms of population and migration indicators, indicators of local labor markets as well as indicators of income and expenditure of local households are also taken into account. In addition, the economic development of countries and their regions, in particular, is assessed using a set of indices that determine the place in the world rankings generally.

The following integrated indicators were used to study the uneven economic development of the respective country [18]:

1. *The coefficient of variation or Williamson's coefficient of variation* is a relative quantity that characterizes the variability of a particular characteristic. The value of the specified coefficient is from 0% to 100%. A larger value of the coefficient indicates a greater deviation of the value of the characteristic from the average. The coefficient of variation is used in the practice of estimating regional inequality by comparing the average deviation of per capita income in the regions as a whole per one territorial unit with the average value of the corresponding indicator in the country as a whole. Williamson's coefficient of variation is calculated by the formula:

$$CV_u = \frac{\sqrt{\sum_i \frac{(y_i - \overline{y_u})^2}{N}}}{\overline{y_u}}, \quad (1)$$

where y_i - the GDP per capita in a given region; y_u — GDP per capita on average in the country, N - number of regions.

In turn, GDP per capita on average in the country is calculated by the formula:

$$\overline{y_u} = \frac{1}{N}\sum_i * y_i, \quad (2)$$

Initially, this expression is calculated separately for each of the regions. Then from the sum of the calculated values, we get the square root, and the result is divided by the GDP per capita on average in the country.

The values of the indicator considered in the dynamics are not objective because it does not take into account the weight of the regions in terms of population.

2. *Weighted coefficient of variation* - used to eliminate the problem that is characteristic of the previous indicator. The weighted coefficient of variation takes into account the change in the value that causes a change in the characteristic for which the analysis is performed. That is, it takes into account the share of the region's population in the total population of the country to assess the deviation of the value of income per capita from the national average. This coefficient is calculated by the formula:

$$CVw = \frac{\sqrt{\sum_i (y_i - \overline{y})^2 \frac{p_i}{p}}}{\overline{y}}, \quad (3)$$

where y_i - the GDP per capita in a given region; y - GDP per capita on average in the country; $\frac{p_i}{p}$- the share of the region's population in its total population in the country.

Initially, the expression in the numerator is calculated separately for each region. Then from the sum of the found values, we get a square root, and we divide the received result by GDP per capita on the average in the country.

3. *Relative mean deviation* - the indicator reflects the degree of regional inequality, taking into account both the number of regions and the proportionality of population distribution in them. This coefficient is calculated by the formula:

$$R_w = \frac{\sum_i |y_i - \overline{y}| \frac{p_i}{p}}{\overline{y}}, \quad (4)$$

Initially, the numerator expression is also calculated separately for each region. In contrast to the previous coefficients, it calculates the absolute deviation of the value of GDP per capita by region from the corresponding value on average in the country. Then the sum of the values found is divided by GDP per capita on average in the country.

4. *Theil Index* - an indicator not only identifies regional inequalities but also reflects to some extent the relationship and interdependence between income and population in the region. It is used to measure social inequality. The Theil index has significant advantages in its ability to be divided into components by groups for which social inequality is

assessed - it will be the weighted sum of the indices of each group and the indicator of social inequality. This index is calculated by the formula:

$$T = \sum_i log_{x_i} * \left(\frac{x_i}{q_i}\right), \quad (5)$$

where x_i - the share of GDP per capita in the region, and q_i - the corresponding share of the region's population. First, we calculate the value of the expression for each of the regions and then find their total sum.

RESULTS

The indicator that makes it possible to assess the economic development of countries and their regions in the world rankings should include the index of uneven economic development of the country (Table 1), which has been calculated by the research institute Fund for Peace since 2007. This index takes into account inequality within the national economy regardless of the actual state of the country's economy under study. The higher the value of the index of uneven economic development of the country, the greater the level of uneven economic development of the country's regions in particular.

Table 1. Uneven economic development index by country, 0 (low) - 10 (high), points. *(Source: GlobalEconomy.com, 2022 [19])*

Year	Poland	Spain	Ukraine	Europe (41 countries)	World (176 countries)
2011	4.70	4.70	5.90	4.64	6.59
2012	4.40	4.40	5.60	4.40	6.42
2013	3.90	4.10	5.30	4.14	6.31
2014	3.80	3.80	5.00	3.97	6.19
2015	3.50	4.00	4.70	3.81	6.10
2016	3.20	3.70	4.40	3.56	6.01
2017	3.00	3.50	4.20	3.37	5.85
2018	2.70	3.20	3.90	3.10	5.63
2019	2.40	2.90	3.60	2.89	5.44
2020	2.10	2.60	3.30	2.61	5.24
2021	2.40	2.90	3.20	x	x
2022	2.20	3.00	2.90	x	x

To assess the dynamics of changes in the values of the index of uneven economic development, we present data for Poland, Spain and Ukraine from 2011 to 2022. The average value of the index of uneven economic development of Poland for this period was 2.92 index points with a minimum of 2.10 index points in 2020 and a maximum of 4.70 index points in 2011. In turn, the average value for Spain during the period 2011-2022 was 3.37 index points with a minimum of 2.60 index points in 2020 and a maximum of 4.70 index points in 2011. In addition, the average value of the index of uneven economic development of Ukraine for this period was 4.05 index points with a minimum of 2.90 index points in 2022 and a maximum of 5.90 index points in 2011. For comparison, the world average value of the economic inequality index in 2020 based on 176 countries was 5.24 index points, while the average value of the economic inequality index of 41 European countries was 2.61 index points. It follows that Spain is considered an EU country with relatively high stable regional disparities in economic development, while Poland and Ukraine in 1990, declaring state sovereignty, underwent major changes in the transition to a market economy.

The uneven economic development of the researched countries' regions contributes to the reduction of regional economies in Poland, Spain and Ukraine neglecting human capital in order to achieve high levels of consumption at the regional level [20]. Let's compare the dynamics of population change in the studied countries from 2011 to 2022 (Figure 1).

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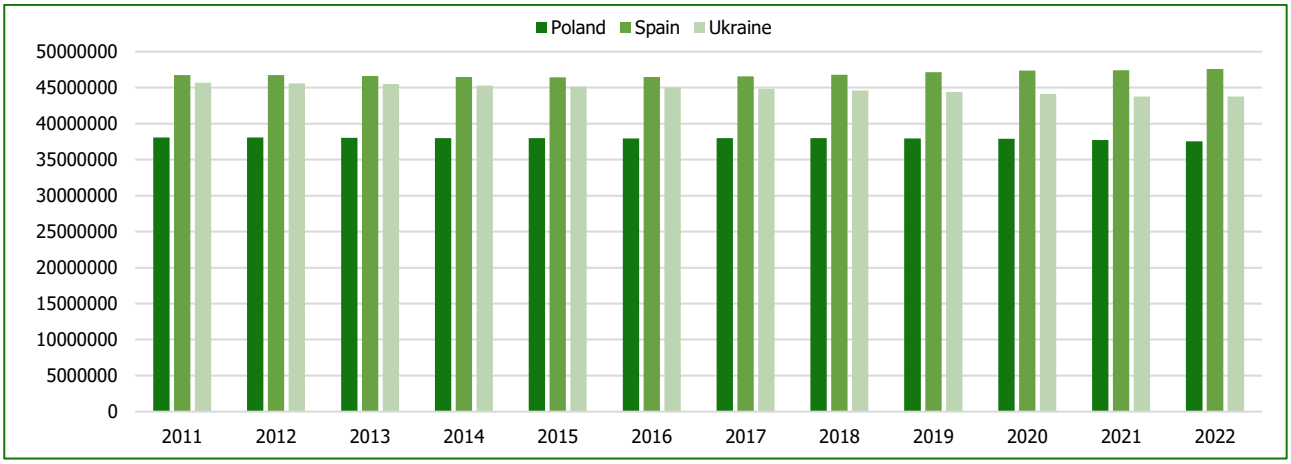

Figure 1. Population by country (2013-2022), million people. *(Source: World Bank Open Data, 2022 [21])*

The population of Poland in 2022 was 37.6 million people. Over the last 12 years, the population of the researched country has decreased by 1.26 %. In turn, the population of Spain for the period 2011-2022 increased by 2.0 1.3% and amounted to 47.6 million people due to immigration. In addition, the population of Ukraine during this period decreased due to the loss of control over part of its own territories and amounted to 43.8 million people. Common problems in the demographic situation of the researched countries from 2011 to 2022 are the low birth rate and the ageing of the local population.

To assess the impact of the demographic factor on the phenomenon of uneven economic development of the researched countries' regions, we compare the population by region for the period 2011-2022, since the specified statistical data are necessary for the calculation of most of the integral indicators of the unevenness of the countries' economic development, which were given in the Methods section. The population in Poland lives in 17 regions:

- Warmian-Masurian, Greater Poland, West Pomeranian, Kuyavian-Pomeranian, Łódи, Lublin, Lubuskie, Masovian, Lesser Poland, Lower Silesia, Opole, Podkarpackie, Podlasie, Pomerania, Cwiętokrzyskie and Silesian Voivodeships;
- Warsaw - the capital of Poland and the administrative centre of the Masovian Voivodeship.

The self-government bodies of these regions provide solutions to the issues of balanced development of the Polish economy. Typically, the Polish voivodeship has a population of over 2-3 million or 4-6% of the total population of Poland (Table 2).

Table 2. Population by regions of Poland (2011-2022), thousand people. *(Source: Statistics Poland, 2022; World Population Review, 2022 [22])*

Regions	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Lower Silesian	2916.6	2914.4	2910.0	2908.5	2904.2	2903.7	2902.5	2901.2	2900.2	2891.3	2880.4	2888.0
Kuyavian-Pomeranian	2098.4	2096.4	2092.6	2090.0	2086.2	2083.9	2082.9	2077.8	2072.4	2061.4	2047.9	2006.9
Lublin	2171.9	2165.7	2156,2	2147.7	2139,7	2133.3	2126.3	2117.6	2108.3	2095.3	2076.4	2024.6
Lubusz	1023.2	1023.3	1021.5	1020.3	1018.1	1017.4	1016.8	1014.5	1011.6	1007.1	999.2	979.9
Łódź	2533.7	2524.7	2513.1	2504.1	2493.6	2485.3	2476.3	2466.3	2454.8	2437.9	2416.9	2378.5
Lesser Poland	3346.8	3354.1	3360.6	3368.3	3372.6	3382.3	3391.4	3400.6	3410.9	3410.4	3407.7	3429.0
Masovian	5286.6	5301.8	5316.8	5334.5	5349.1	5365.9	5384.6	5403.4	5423.2	5425.0	5419.7	5510.6
Opole	1014.0	1010.2	1004.4	1000.9	996.0	993.0	990.1	986.5	982.6	976.8	969.4	942.4
Subcarpathian	2128.7	2130.0	2129.3	2129.2	2127.7	2127.7	2129.1	2129.0	2127.2	2121.2	2110.7	2079.1
Podlaskie	1201.0	1198.7	1195.0	1191.9	1188.8	1186.6	1184.5	1181.5	1178.4	1173.3	1165.3	1143.4
Pomeranian	2283.5	2290.1	2295.8	2302.1	2307.7	2315.6	2324.3	2333.5	2343.9	2346.7	2347.0	2358.3
Silesian	4626.4	4615.9	4599.4	4585.9	4570.8	4559.2	4548.2	4533.6	4517.6	4492.3	4455.9	4346.7
Holy Cross	1278.1	1274.0	1268.2	1263.2	1257.2	1252.9	1247.7	1241.5	1234.0	1224.6	1212.6	1178.2
Warmian-Masurian	1452.6	1450.7	1446.9	1444.0	1439.7	1436.4	1433.9	1429.0	1422.7	1416.5	1405.5	1366.4
Warsaw City	1706.6	1713.0	1722.0	1731.1	1740.2	1749.4	1758.6	1767.8	1775.9	1783.3	1789.6	1794.5
Greater Poland	3455.5	3462.2	3467.0	3472.6	3475.3	3481.6	3489.2	3494.0	3498.7	3496.5	3489.1	3493.6
West Pomeranian	1722.7	1721.4	1718.9	1715.4	1710.5	1708.2	1705.5	1701.0	1696.2	1688.0	1676.9	1640.6

The population of Poland in 2011-2022 grew in Warsaw (an increase of 5.15%), in the Lesser Poland, Masovian and Pomeranian voivodeships (an increase of 2.46%, 4.24% and 2.62%, respectively). In the vast majority of Polish voivodships in 2022 there is a decrease in the local population which decreased from 0.97% (Lower Silesian) to 7.82% (Holy Cross Voivodeship).

As of 2022, a large population lives in the Silesian Voivodeship with a rich historical heritage (11.51% of the Polish population or 4.4 million people), the largest in territory Masovian Voivodeship (14.59% of the Polish population or 5.5 million people) as well as in the western region of Poland - Greater Poland Voivodeship (9,14% of the Polish population or 3.5 million people). The least populated were the border Lubuskie Voivodeship (2.59% of the Polish population or 0.98 million people), the least in territory Opole Voivodeship (2.57% of the Polish population or 0.94 million people) and the border Podlaskie Voivodeship (3.03 % of the population of Poland or 1.1 million people).

It should be noted that, in 2022, the population in Warsaw alone exceeds the population in some regions. Among them are the West Pomeranian Voivodeship with a population of 1.6 million, the Warmian-Masurian Voivodeship with a population of 1.4 million and the Swiętokrzyskie Voivodeship (1.2 million) as well as the aforementioned Podlaskie Voivodeship (1.1 million people), Lubuskie Voivodeships with a population of 0.9 million people, respectively

In turn, the population of Spain lives in 17 autonomous communities, namely Andalusia, Aragon, Asturias, Valencia, Galicia, Extremadura, Cantabria, Castilla-La Mancha, Castilla-Leon, Catalonia, La Rioja, Madrid, Murcia, Navarre, The Basque Country, the Balearic Islands and the Canary Islands as well as the 2 autonomous cities of Melilla and Ceuta located on the Mediterranean and North African coasts, respectively (Table 3).

Table 3. Population by regions of Spain (2011-2022), thousand people. *(Source: National Statistics Institute, 2022 [23; 24])*

Regions	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Andalusia	8424.1	8450.0	8440.3	8402.3	8399.0	8388.1	8379.8	8384.4	8414.2	8371.0	8472.4	8538.4
Aragon	1346.3	1349.5	1347.2	1325.4	1317.8	1308.6	1308.8	1308.7	1319.3	1347.1	1326.3	1315.5
Asturias	1081.5	1077.4	1068.2	1061.8	1051.2	1042.6	1035.0	1028.2	1022.8	1084.3	1011.8	1005.4
Cantabria	593.1	593.9	591.9	588.7	585.2	582.2	580.3	580.2	581.1	582.9	584.5	585.2
Ceuta	82.4	84.0	84.2	85.0	84.3	84.5	85.0	85.1	84.8	84.2	83.5	82.8
Castilla and Leon	2558.5	2546.1	2519.9	2494.8	2472.1	2447.5	2425.8	2409.2	2399.5	2394.9	2383.1	2376.0
Castilla-La Mancha	2115.3	2121.9	2101.0	2078.6	2059.2	2041.6	2031.5	2026.8	2032.9	2045.2	2049.6	2058.0
Canary Islands	2126.8	2118.3	2118.7	2104.8	2100.3	2101.9	2108.1	2127.7	2153.4	2176.0	2173.0	2261.7
Catalonia	7539.6	7570.9	7553.7	7518.9	7508.1	7522.6	7555.8	7600.1	7675.2	7780.5	7763.3	7710.1
Extremadura	1109.4	1108.1	1104.0	1099.6	1093.0	1087.8	1079.9	1072.9	1067.7	1064.0	1059.5	1051.7
Galicia	2795.4	2781.5	2765.9	2748.7	2732.3	2718.5	2708.3	2701.7	2699.5	2701.8	2695.6	2693.5
Balearic Islands	1113.1	1119.4	1111.7	1103.4	1104.5	1107.2	1116.0	1128.9	1149.5	1171.5	1173.0	1232.3
Murcia	1470.1	1474.4	1472.0	1466.8	1467.3	1464.8	1470.3	1478.5	1493.9	1511.3	1518.4	1531.1
Madrid	6489.7	6498.6	6495.6	6454.4	6437.0	6467.0	6507.2	6578.1	6663.4	6779.9	6751.3	6825.0
Melilla	78.5	80.8	83.7	84.5	85.6	86.0	86.1	86.4	86.5	87.1	86.3	82.8
Navarre	642.1	644.6	644.5	640.8	640.5	640.6	643.2	647.6	654.2	661.2	661.6	661.8
Basque Country	2184.6	2193.1	2191.7	2189.0	2189.3	2189.5	2194.2	2199.1	2207.8	2220.5	22134.0	2181.3
La Rioja	323.0	323.6	322.0	319.0	317.1	315.8	315.4	315.7	316.8	319.9	319.8	316.8
Valencian Community	5117.2	5129.3	5113.8	5004.8	4980.7	4960.0	4941.5	4963.7	5003.8	5057.4	5058.1	5106.2

As the population of Spain during the period 2011-2022 increased by 0.9% and amounted to 47.6 million people, we'll find out the regional features of this growth. Thus, the population of Spain in 2011-2022 grew in the port city of Melilla (an increase of 5.5%), in the Balearic Islands with a continental climate and in the urban agglomeration - Madrid (an increase of 10.7% and 5.16%, respectively).

As of 2022, the largest population lives in Andalusia (17.93% of Spain or 8.45 million people), Catalonia (16.20% of Spain or 7.7 million people) - autonomous communities with a Mediterranean climate, and also in Madrid (14.33% of the Spanish population or 6.8 million people) as well as Valencia with a population of 5.1 million people or 10.72% of the total Spanish population. The least populated are the autonomous cities of Melilla and Ceuta (0.17% of Spain's population or 0.8 thousand people) through a small area, La Rioja (0.67% of Spain's population or 0.3 million people), and Cantabria (1.23% of

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the population of Spain or 0.6 million people) as well as Navarre (1.39% of the population of Spain or 0.7 million people), which are located in northern Spain. Thus, we observe an uneven distribution of the local population in Spain which prefers to live in the coastal zone of the Mediterranean [25].

The population of Ukraine in 2011-2022 is also unevenly distributed in the context of the Autonomous Republic of Crimea, 24 regions and 2 cities of national importance - Kyiv and Sevastopol (Table 4).

Table 4. Population by regions of Ukraine (2011-2022), thousand people. Note: * - as of February 1, 2022. *(Source: State Statistic Service of Ukraine, 2022 [26])*

Regions	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022*
Crimea	1963.0	1965.2	1966.2	x	x	x	x	x	x	x	x	x
Vinnytsia	1634.2	1627.0	1622.7	1603.5	1602.2	1590.4	1575.8	1553.3	1545.4	1522.0	1509.5	15077.4
Volyn	1038.6	1040.0	1040.6	1040.2	1042.7	1041.0	1038.5	1032.6	1031.4	1024.7	1021.4	1020.8
Dnipropetrovsk	3320.3	3307.8	3300.1	3273.3	3254.9	3230.4	3231.1	3203.2	3176.6	3138.7	3096.5	3093.2
Donetsk	4403.2	4375.4	4359.7	4284.4	4265.1	4244.1	4200.5	4153.0	4131.8	4087.4	4059.4	4056.4
Zhytomyr	1273.2	1268.9	1265.7	1256.7	1247.5	1240.5	1231.2	1221.0	1208.2	1196.3	1179.0	1177.6
Zakarpattia	1250.8	1254.4	1255.6	1256.7	1259.2	1258.8	1258.2	1254.0	1253.8	1247.3	1244.5	1243.7
Zaporizhzhia	1791.7	1785.2	1780.5	1765.1	1753.6	1739.5	1723.2	1705.0	1687.4	1665.7	1638.5	1636.3
Ivano-Frankivsk	1380.1	1381.8	1381.9	1379.8	13824	1379.9	1377.5	1370.5	1368.1	1358.4	1351.8	1350.6
Kyiv	1719.6	1722.1	1723.8	1723.5	1732.2	1734.5	1754.3	1762.2	1781.0	1782.8	1795.1	1795.5
Kirovohrad	1002.4	995.2	991.4	974.2	973.2	965.8	956.3	939.1	933.1	913.7	903.7	902.2
Luhansk	2272.7	2256.6	2248.0	2215.6	2205.4	2195.3	2167.8	2147.2	2135.9	2116.7	2102.9	2101.7
Lviv	2540.9	2540.7	2539.6	2519.4	2534.2	2534.0	2529.6	2503.7	2512.1	2479.4	2478.1	2476.1
Mykolaiv	1178.2	1173.5	1170.9	1163.6	1158.2	1150.1	1141.3	1130.4	1119.9	1107.7	1091.8	1090.5
Odessa	2388.3	2395.2	2395.8	2385.4	2390.3	2386.5	2383.1	2369.2	2377.2	2357.0	2351.4	2349.7
Poltava	1477.2	1467.8	1463.0	1441.1	1438.9	1426.8	1413.8	1392.6	1387.0	1363.7	1352.3	1350.6
Rivne	1154.3	1156.9	1157.9	1160.1	1161.8	1162.8	1160.6	1156.2	1153.0	1147.4	1141.8	1140.9
Sumy	1152.3	1143.2	1138.1	1121.3	1113.3	1104.5	1094.3	1079.2	1068.2	1051.3	1035.8	1034.4
Ternopil	1080.4	1077.3	1075.3	1066.7	1065.7	1059.2	1052.3	1042.6	1038.7	1027.3	1021.7	1021.0
Kharkiv	2742.2	2744.4	2740.8	2715.7	2718.6	2701.2	2694.0	2660.0	2658.5	2618.2	2598.9	2596.3
Kherson	1083.4	1078.2	1075.4	1066.4	1062.4	1055.6	1047.0	1036.2	1027.9	1015.3	1001.6	1000.4
Khmelnytskyi	1320.2	1314.0	1310.5	1298.1	1294.4	1285.3	1274.4	1261.5	1254.7	1240.6	1228.9	1227.5
Cherkasy	1277.3	1268.9	1264.4	1248.2	1243.0	1231.2	1220.4	1202.7	1192.1	1174.6	1160.7	1159.2
Chernivtsi	905.3	907.2	907.8	906.9	909.9	908.1	906.7	901.3	901.6	893.5	890.4	890.0
Chernihiv	1088.5	1077.8	1072.3	1047.1	1045.0	1033.4	1020.1	997.2	991.3	968.2	959.3	957.7
Kyiv City	2814.3	2845.0	2856.9	2846.7	2906.6	2925.8	2934.5	2909.5	2967.4	2920.9	2952.3	2950.7
Sevastopol City	381.2	383.4	384.7	x	x	x	x	x	x	x	x	x

It should be noted that from 2011 to 2021 the population of Ukraine by region grew only in Kyiv, which shows an increase of 4.9% over the past 11 years, despite the national decline in population in the regional context. Manifestations of the demographic crisis for 2011-2021 can be observed in the Chernihiv region (reduction of the local population amounted to 11.87%), Kirovograd, Sumy and Cherkasy regions, where population decline amounted to more than 9.0%, as well as in Zaporizhzhia and Poltava regions (reduction of the local population amounted to more than 8.0%). This situation is caused by low birth rates which do not cover the high mortality rate, migration processes due to the attractiveness of regional and foreign labour markets as well as hostilities in the Autonomous Republic of Crimea, Sevastopol, Donetsk and Luhansk regions.

In 2021, the population of Kyiv was at the level of 2.95 million people or 7.17% of the total population of Ukraine which exceeds the population of the entire Kharkiv region (6.31% of the population of Ukraine or 2.6 million people), Lviv region (6.0% of the population of Ukraine or 2.5 million people) and Odessa region (5.7% of the population of Ukraine or 2.5

million people). The least populated were Volyn, Zhytomyr, Kirovohrad, Mykolaiv, Rivne, Sumy, Ternopil, Kherson, Cherkasy, Chernivtsi and Chernihiv regions with nearly 28% of the total population.

The full-scale invasion of Russia on the territory of Ukraine in February 2022 made significant adjustments to all spheres of life of Ukrainians and the functioning of the country as a whole. In particular, the last reporting period of the analyzed indicator is February 2022, since statistical data may be limited during martial law [27].

Carrying out a comparative analysis of the economic development of the regions of the researched countries requires a study of a set of quantitative and qualitative indicators that reflect the current state of the region's economy and the dynamics of its change. Thus, the most common approach to comparative analysis of the development level of Poland, Spain and Ukraine is the study of gross regional product per capita, the dynamics analysis of which allows to compare the level of economic development in different regions of the researched countries as well as compare countries with each other.

The level of economic development in the regions of Poland during 2011-2022 is heterogeneous (Table 5).

Table 5. GDP by regions of Poland (2010-2022), PLN billion. *(Source: Statistics Poland, 2022 [28])*

Regions	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Lower Silesian	135.0	139.9	140.2	145.5	151.7	155.7	166.1	175.7	189.4	194.6	222.7	263.1
Kuyavian-Pomeranian	69.7	72.1	73.9	76.1	79.7	82.4	87.3	93.3	98.7	102.3	114.9	133.9
Lublin	61.5	64.3	65.8	67.1	68.7	71.2	76.4	79.5	86.1	86.9	97.5	112.0
Lubusz	34.5	35.9	36.6	38.4	39.8	41.3	43.5	46.1	49.1	49.9	56.1	65.2
Łódź	95.5	99.6	101.1	105.0	109.4	112.4	119.5	127.0	138.3	144.1	159.7	181.9
Lesser Poland	120.7	125.1	128.1	134.0	142.1	148.2	160.3	172.7	186.2	189.3	215.8	246.9
Masovian	340.1	356.7	366.3	381.6	398.9	412.4	104.3	109.9	120.3	120.4	138.4	168.1
Opole	33.7	34.6	34.9	36.4	37.8	38.4	40.7	43.4	46.5	46.8	54.0	60.9
Subcarpathian	60.7	62.9	65.1	67.4	70.6	72.5	77.0	83.1	89.8	89.2	101.5	114.7
Podlaskie	35.7	36.3	37.5	38.6	39.6	40.7	44.2	46.9	50.9	52.4	58.4	68.5
Pomeranian	89.0	94.5	95.0	97.8	103.6	108.2	116.0	125.0	136.1	135.3	157.8	191.4
Silesian	202.3	207.3	206.4	213.6	222.8	229.0	244.1	260.5	277.0	270.9	314.5	371.2
Holy Cross	39.6	40.4	39.9	41.3	42.6	43.5	46.3	49.7	52.7	53.7	60.4	66.8
Warmian-Masurian	42.5	43.9	44.6	46.2	47.9	49.6	52.2	54.2	58.2	60.5	67.8	77.2
Warsaw City	x	x	x	x	x	x	341.3	368.0	403.1	412.8	455.4	536.3
Greater Poland	147.5	154.9	159.8	166.5	176.4	183.7	196.9	208.2	226.4	231.8	259.9	300.2
West Pomeranian	58.8	61.1	61.7	64.4	67.8	69.3	73.7	78.3	84.1	85.8	96.5	109.3

As of 2022, the largest GDP in Poland was generated in Warsaw (17.48% of total GDP or PLN 536.3 billion), Silesian Voivodeship (12.1% of total GDP or PLN 371.2 billion) and in the Greater Poland Voivodeship (9.79% of total GDP or PLN 300.2 billion). Less than 5% of Poland's GDP per region was generated in Kuyavian-Pomeranian, Lublin, Lubuskie, Opole, Subcarpathian, Podlaskie, Holy Cross, Warmian-Masurian and West Pomeranian Voivodeships, which account for 26.36% of Poland's GDP in 2020.

In general, Poland demonstrates the benefits of a diversified economy. The development of the regional economy does not depend on any one sector of the industrial and agricultural economy which would generate the lion's share of Poland's GDP. In addition, Poland also does not show high dependence on exports being a country with a significant internal market which contributes to the stabilization of regional development of the Polish economy [29]. The level of consumption in the regions of Poland during 2011-2022 is growing dynamically (Table 6).

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Table 6. GDP per capita by regions of Poland (2011-2022), PLN thousand. *(Source: Statistics Poland, 2022 [28])*

Regions	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Lower Silesian	46.3	48.0	48.2	50.0	52.2	53.6	57.2	60.6	65.4	67.1	76.7	90.9
Kuyavian-Pomeranian	33.2	34.4	35.2	36.4	38.2	39.5	41.9	44.9	47.6	49.4	56.8	66.5
Lublin	28.3	29.6	30.4	31.2	32.1	33.3	35.9	37.5	40.8	41.3	47.6	55.2
Lubusz	33.7	35.1	35.8	27.6	39.1	40.6	42.8	45.4	48.5	49.4	56.7	66.2
Łódź	37.6	39.4	40.1	41.8	43.8	45.2	48.2	51.4	56.2	58.8	66.4	76.2
Lesser Poland	36.1	37.3	38.2	39.8	42.2	43.9	47.3	50.9	54.7	55.4	62.9	72.2
Masovian	59.7	64.5	67.4	69.0	71.7	77.0	44.3	46.8	51.5	51.6	60.9	74.5
Opole	33.2	34.2	34.6	36.3	37.8	38.6	41.1	43.9	47.3	47.7	56.7	64.4
Subcarpathian	26.1	28.6	29.6	30.6	31.6	34.1	36.2	39.0	42.2	41.9	48 .5	55.1
Podlaskie	29.7	30.3	31.4	32.4	33.3	34.3	37.3	39.6	43.1	44.5	50.6	59.8
Pomeranian	39.1	41.3	41.5	42.6	45.0	46.8	50.0	53.7	58.2	57.7	66.9	81.1
Silesian	43.7	44.9	44.8	46.5	48.7	50.2	53.6	57.4	61.2	60.1	71.6	85.1
Holy Cross	31.0	31.6	31.4	32.6	33.8	34.7	37.0	39.9	42.6	43.6	50.6	56.5
Warmian-Masurian	29.3	30.2	30.8	32.0	33.2	34.5	36.4	38.1	40.9	42.6	49.1	56.4
Warsaw City	X	X	X	X	X	X	113.0	120.9	131.3	133.4	140.5	164.8
Greater Poland	42.8	44.8	46.1	48.0	50.8	52.8	56.5	59.6	64.8	66.2	74.2	85.9
West Pomeranian	34.1	35.5	35.9	37.5	39.6	40.5	43.2	45.9	49.5	50.7	58.3	66.4

In 2011-2022, the largest GDP per capita in the regions of Poland grew in Subcarpathian Voivodeship (GDP growth per capita was 52.61%), Łódź Voivodeship (GDP growth per capita was 50.64%), Greater Poland Voivodeship (GDP growth per capita amounted to 50.21%), and in Pomeranian Voivodeship (GDP growth per capita amounted to 51.87%). In turn, the GDP per capita of Poland over the past years has grown most slowly in Silesia and Holy Cross (an increase of 48.67% and 45.21%, respectively), in Opole Voivodeship (an increase of 48.37%), in Lower Silesian and Lublin Voivodeship where per capita GDP growth was 49.11% and 48.75%, respectively.

In 2022, the leaders in terms of GDP per capita in the regions of Poland are Warsaw (PLN 164.8 thousand), Lower Silesian Voivodeship (PLN 90.9 thousand) and Greater Poland Voivodeship (PLN 85.9 thousand). It should be noted that in 2022, the highest level of GDP per capita in the Polish capital was 3 times higher than the value of GDP per capita of Lublin or Podkarpackie Voivodeship which recorded its lowest level (PLN 55.2 thousand and PLN 55.1 thousand, respectively).

An assessment of the dynamics of changes in GDP by regions of Spain over the past 12 years shows an unstable and cyclical trend towards economic growth in general (Table 7).

Table 7. GDP by regions of Spain (2011-2022), EUR million. *(Source: Countryeconomy.com, 2022 [30])*

Regions	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Andalusia	143.4	138.0	136.0	137.7	144.7	148.4	155.4	160.6	165.0	150.6	164.0	180.2
Aragon	33.4	32.0	32.1	32.3	32.9	34.2	35.6	36.9	38.1	35.3	38.2	41.8
Asturias	22.4	21.4	20.7	20.7	21.4	21.7	22.6	23.2	23.7	21.5	23.6	25.8
Cantabria	12.6	12.2	11.9	12.1	12.3	12.7	13.2	13.7	14.2	12.9	14.0	15.4
Ceuta	1.6	1.5	1.6	1.5	1.6	1.6	1.7	1.7	1.8	1.6	1.8	1.9
Castilla and Leon	54.6	52.9	51.5	51.5	53.2	54.8	56.1	58.5	59.9	55.4	59.3	64.2
Castilla-La Mancha	38.3	36.9	36.2	35.4	37.1	38.3	39.9	41.5	42.5	39.6	42.9	46.7
Canary Islands	40.6	39.2	39.0	39.3	40.6	42.0	44.2	45.8	47.5	39.2	42.9	49.0
Catalonia	198.9	193.4	192.0	195.4	204.4	212.7	221.5	229.1	237.5	212.9	232.1	255.2
Extremadura	17.7	17.1	17.1	17.0	17.9	18.5	19.5	20.1	20.5	19.4	20.7	22.5
Galicia	55.8	54.0	53.9	54.2	56.7	58.3	60.4	62.4	64.3	59.1	63.8	69.8
Balearic Islands	26.4	26.0	25.9	26.8	28.2	29.8	31.4	32.7	34.2	26.8	30.0	35.5.
Murcia	27.2	26.5	26.6	26.7	28.5	29.4	30.5	31.1	32.3	29.9	32.7	35.8
Madrid	198.5	195.0	192.6	195.0	204.2	211.7	222.0	230.8	241.0	216.5	237.5	261.7
Melilla	1.4	1.4	1.4	1.4	1.5	1.5	1.5	1.6	1.6	1.5	1.6	1.8
Navarre	17.9	17.3	17.2	17.5	18.1	18.7	19.5	20.1	20.9	19.3	20.5	22.6
Basque Country	64.1	62.6	61.6	62.7	65.0	67.1	69.7	71.9	74.1	66.6	72.2	79.4
La Rioja	7.9	7.6	7.5	7.7	8.0	8.0	8.3	8.6	8.8	8.1	8.6	9.5
Valencian Community	99.7	95.2	94.3	96.3	100.1	103.2	107.8	111.7	115.4	104.7	114.8	126.4

In 2022, Spain's largest GDP was generated in Madrid (19.46% of total GDP or EUR 261.71 million), Catalonia (17.25% of total GDP or EUR 255.2 million) and Andalusia (13.40% of total GDP or EUR 180.2 million). Less than 2% of Spain's GDP per region was produced in Asturias, Cantabria, Ceuta, Extremadura, Melilla, Navarre, and La Ríos in 2022.

In turn, the assessment of the dynamics of changes in GDP per capita in the regions of Spain during 2011-2022 shows an unstable and cyclical trend towards economic growth in the welfare of the local population (Table 8).

Table 8. GDP per capita by regions of Spain (2011-2022), EUR thousand. *(Source: Countryeconomy.com, 2022 [30])*

Regions	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Andalusia	17.2	16.5	16.2	16.4	17.2	17.7	18.5	19.1	19.5	17.7	19.3	21.1
Aragon	24.8	23.8	24.0	24.3	24.9	26.0	27.1	28.0	28.8	26.5	28.7	31.1
Asturias	20.8	20.0	19.5	19.6	20.5	20.9	21.9	22.7	23.2	21.1	23.4	25.7
Cantabria	21.3	20.6	20.2	20.6	21.1	21.9	22.8	23.7	24.4	22.1	24.0	26.2
Ceuta	19.0	18.1	18.4	18.2	18.9	19.3	19.5	20.3	21.0	19.6	21.2	23.1
Castilla and Leon	21.5	20.9	20.6	20.7	21.6	22.4	23.1	24.3	24.9	23.2	24.9	27.0
Castilla-La Mancha	18.2	17.6	17.4	17.1	18.1	18.8	19.6	20.4	20.8	19.4	20.9	22.6
Canary Islands	19.6	18.7	18.5	18.5	19.1	19.6	20.4	20.9	21.4	17.4	19.7	22.3
Catalonia	26.5	25.8	25.8	26.4	27.6	28.7	29.7	30.5	31.2	27.8	29.9	32.6
Extremadura	16.1	15.5	15.5	15.6	16.5	17.1	18.2	18.8	19.3	18.3	19.5	21.3
Galicia	20.1	19.5	19.6	19.8	20.8	21.5	22.3	23.1	23.8	21.9	23.7	25.9
Balearic Islands	24.1	23.5	23.3	23.9	25.0	26.1	27.1	27.8	28.5	22.0	25.4	29.6
Murcia	18.6	18.1	18.2	18.3	19.5	20.0	20.7	21.0	21.6	19.8	21.5	23.2
Madrid	31.0	30.3	30.1	30.6	31.9	32.8	34.1	35.0	36.0	32.0	35.4	38.4
Melilla	17.7	16.6	16.6	16.7	17.3	17.8	17.9	18.6	19.2	17.9	18.8	20.7
Navarre	28.1	27.0	27.1	27.5	28.5	29.4	30.5	31.1	32.0	29.3	31.0	33.8
Basque Country	29.4	28.7	28.4	28.9	30.0	31.0	32.1	33.1	33.9	30.4	32.8	35.8
La Rioja	24.6	23.9	23.8	24.5	25.5	25.6	26.6	27.5	28.1	25.7	27.0	29.6
Valencian Community	19.9	19.0	19.0	19.5	20.3	20.9	21.9	22.6	23.1	20.8	22.6	24.5

In 2011-2022, the highest GDP per capita in the regions of Spain grew in Extremadura (GDP growth per capita was 24.69%), Galicia (GDP growth per capita was 22.33%), Castile and Leon GDP growth per capita was 20.44%). In turn, Spain's per capita GDP has declined over the past 12 years in the Canary and Barlear Islands (GDP per capita fell by 12.24% and 18.6%, respectively) depending on the state of the tourism industry. In addition, Spain's GDP per capita growth was the slowest in 2011-2022 in Melilla where per capita GDP increase was less than 14.56%.

The leaders in terms of GDP per capita in Spain by regions in 2020 are Madrid (EUR 38.4 thousand), the Basque Country (EUR 35.8 thousand), Navarre (EUR 23.8 thousand) and Catalonia (EUR 32.6 thousand). It is worth noting that in 2022 the highest level of GDP per capita in Madrid was almost 2 times higher than the value of GDP per capita in the Canary Islands which recorded its lowest level in Spain (EUR 22.3 thousand).

Comparing the GDP of Spain by region and the GDP per capita of 2019-2020, it is easy to see the destructive impact of restrictions on the control and prevention of coronavirus disease on the growth of their values. The uneven economic development of Spain's regions generally encourages internal migration in search of work in tourism, construction or trade.

In 2011-2021, Ukraine achieved positive dynamics of GDP creation by region (Table 9).

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Table 9. GDP by regions of Ukraine (2011-2021), UAH billion. *(Source: State Statistic Service of Ukraine, 2022 [31])*

Regions	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Crimea	38.2	44.5	46.4	x	x	x	x	x	x	x	x
Vinnytsia	29.1	33.0	36.2	44.0	59.9	74.4	92.3	111.5	129.1	135.9	173.5
Volyn	17.6	20.0	20.6	24.2	31.7	35.7	51.9	60.4	75.6	77.4	92.5
Dnipropetrovsk	140.0	148.0	152.9	176.5	215.2	244.5	313.5	369.4	390.3	398.7	582.4
Donetsk	161.0	170.8	164.9	120.0	115.0	137.5	165.9	192.2	204.9	206.3	283.3
Zhytomyr	21.9	24.8	25.7	29.8	38.4	47.9	61.4	77.1	85.3	91.4	113.9
Zakarpattia	18.1	21.4	21.4	24.1	29.0	32.4	43.0	52.4	61.3	62.0	75.6
Zaporizhzhia	49.5	54.8	54.4	66.0	89.1	104.3	130.2	147.0	155.2	167.3	228.9
Ivano-Frankivsk	26.8	32.3	33.2	37.6	45.9	51.4	63.8	78.4	86.7	90.4	119.7
Kyiv	59.2	69.7	68.9	79.6	104.0	128.6	156.8	198.1	218.6	242.4	291.6
Kirovohrad	20.0	22.1	25.3	28.8	38.4	46.0	53.0	64.4	73.1	75.2	99.6
Luhansk	57.2	58.8	55.1	31.4	23.8	31.4	30.3	35.2	40.3	43.2	52.1
Lviv	52.1	62.0	63.3	72.9	94.7	114.8	147.3	177.2	214.4	236.3	296.2
Mykolaiv	27.6	29.2	32.0	35.4	48.2	57.8	69.3	79.9	92.4	96.6	124.2
Odesa	61.5	64.7	69.8	74.9	99.8	119.8	149.4	173.2	197.2	220.2	271.7
Poltava	52.3	56.6	58.5	69.8	95.9	116.3	150.5	174.1	187.3	188.4	266.7
Rivne	19.3	21.8	22.0	28.7	35.3	39.5	48.8	56.8	67.4	71.9	88.9
Sumy	22.9	24.9	26.8	30.4	41.6	46.3	56.5	68.5	75.8	80.4	105.3
Ternopil	16.3	18.0	18.1	21.7	26.7	31.1	40.7	49.1	57.1	62.7	81.5
Kharkiv	76.9	82.2	85.3	96.6	124.8	154.9	187.2	233.3	247.6	257.8	319.8
Kherson	18.4	19.4	20.8	23.3	32.2	38.7	47.8	55.2	61.9	68.5	88.2
Khmelnytskyi	22.8	26.2	26.4	32.2	41.1	48.9	63.8	75.6	83.0	96.4	119.9
Cherkasy	27.0	31.3	33.1	38.5	50.8	59.4	73.1	93.3	103.5	108.8	131.2
Chernivtsi	12.0	13.2	13.8	15.0	18.5	21.2	28.6	33.9	41.7	45.1	54.6
Chernihiv	21.2	23.9	24.2	28.2	37.0	43.4	56.6	70.6	78.0	84.1	113.5
Kyiv City	223.8	275.7	312.6	357.4	451.7	559.1	699.4	833.3	949.6	1014.7	1276.4
Sevastopol City	9.4	9.9	11.1	x	x	x	x	x	x	x	x

Over the past years, GDP has increased by 5 times in Kyiv (an increase of UAH 1052.6 billion) as well as in Lviv region (an increase of UAH 244.1 billion), Vinnytsia region (an increase of UAH 144.4 billion), Volyn region (an increase of UAH 74.9 billion). In turn, the volume of GDP by regions of Ukraine fell in the Luhansk region due to the partial loss of the territory. In addition, in 2011-2021 GDP growth was the least in the Donetsk region, Zaporizhia region as well as in the Dnipropetrovsk region where growth GDP amounted to UAH 442.3 billion.

By the end of 2021, 23.42% of the total GDP of Ukraine was generated in Kyiv by UAH 1276.4 billion. At the same time, the leaders in economic growth in 2021 are Dnipropetrovsk region (10.68% of total GDP or UAH 582.4 billion), Kharkiv region (5.87% of total GDP or UAH 319.8 billion), Lviv region (5.43% of total GDP or UAH 296.2 billion), Kyiv region (5.35% of total GDP or UAH 291.5 billion) as well as Donetsk region (5,2% of total GDP or UAH 283.3 billion). According to the results of 2021, less than 2% of Ukraine's GDP per region was produced in Volyn, Zakarpattia, Kirovohrad, Luhansk, Rivne, Ternopil, Kherson and Chernivtsi regions.

Similarly, over the last 11 years, GDP per capita has grown the most in the Vinnytsia region (6 times) (Table 10).

Table 10. GDP per capita in terms of regions of Ukraine (2011-2021), UAH thousand. *(Source: State Statistic Service of Ukraine, 2022 [26; 31])*

Regions	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Crimea	19.5	22.7	23.6	x	x	x	x	x	x	x	x
Vinnytsia	17.8	20.3	22.3	27.4	37.4	46.8	58.6	71.8	83.5	89.3	115.0
Volyn	17.0	19.2	19.8	23.3	30.4	34.3	50.0	58.5	73.3	75.5	90.6
Dnipropetrovsk	42.2	44.7	46.3	53.9	66.1	75.7	97.0	115.3	122.9	127.0	188.1
Donetsk	36.6	39.0	37.8	28.0	27.0	32.4	39.5	46.3	49.6	50.5	69.8
Zhytomyr	17.2	19.6	20.3	23.7	30.8	38.6	49.9	63.1	70.6	76.4	96.6
Zakarpattia	14.4	17.1	17.0	19.2	23.0	25.7	34.2	41.8	48.9	49.7	60.8
Zaporizhzhia	27.6	30.7	30.5	37.4	50.8	60.0	75.6	86.2	92.0	100.4	139.7
Ivano-Frankivsk	19.4	23.4	24.0	27.3	33.2	37.3	46.3	57.2	63.4	66.5	88.5
Kyiv	34.4	40.5	40.0	46.2	60.1	74.2	89.4	112.4	122.8	136.0	162.4
Kirovohrad	20.0	22.2	25.5	29.5	39.5	47.7	55.4	68.6	78.3	82.3	110.2
Luhansk	25.2	26.0	24.5	14.2	10.8	14.3	14.0	16.4	18.9	20.4	24.8
Lviv	20.5	24.4	24.9	28.9	37.4	45.3	58.2	70.8	85.3	95.3	119.5
Mykolaiv	23.5	24.9	27.4	30.4	41.6	50.3	60.7	70.7	82.5	87.3	113.7
Odesa	25.8	27.0	29.1	31.4	41.7	50.2	62.7	73.1	82.9	93.4	115.5
Poltava	35.4	38.5	40.0	48.5	66.6	81.5	106.5	125.0	135.0	138.2	197.2
Rivne	16.7	18.8	19.0	24.8	30.3	33.9	42.0	49.2	58.4	62.7	77.8
Sumy	19.9	21.8	23.5	27.1	37.3	41.9	51.6	63.4	71.0	76.5	101.6
Ternopil	15.1	16.7	16.8	20.3	25.0	29.3	38.7	47.1	55.0	61.0	79.8
Kharkiv	28.0	30.0	31.1	35.6	45.9	57.3	69.5	87.7	93.1	98.5	123.0
Kherson	17.0	18.0	19.3	21.8	30.3	36.7	45.7	53.2	60.3	67.4	88.0
Khmelnytskyi	17.3	20.0	20.2	24.8	31.7	38.0	50.1	60.0	66.2	77.7	97.6
Cherkasy	21.1	24.6	26.2	30.8	40.9	48.3	59.9	77.6	86.8	92.6	113.0
Chernivtsi	13.2	14.5	15.2	16.6	20.3	23.4	31.5	37.6	46.2	50.4	61.3
Chernihiv	19.4	22.2	22.6	26.9	35.4	42.0	55.5	70.8	78.7	86.8	118.3
Kyiv City	79.5	96.9	109.4	125.5	155.4	191.1	238.3	286.4	320.0	347.4	432.3
Sevastopol City	24.5	25.8	28.8	x	x	x	x	x	x	x	x

The highest level of GDP per capita in Ukraine is observed in Kyiv (UAH 432.3 thousand in 2021), Poltava region (UAH 1197.2 thousand in 2021), Kyiv region (UAH 162.4 thousand) as well as in Dnipropetrovsk region (UAH 188.1 thousand in 2021). In turn, the lowest level of GDP per capita in Ukraine in 2021 is observed in Luhansk region (UAH 24.8 thousand), Zakarpattia region (UAH 60.8 thousand), Donetsk region (UAH 69.8 thousand) as well as in Ternopil region (UAH 79.8 thousand).

The gap between the largest and smallest GDP per capita in Ukraine in 2020 is very large - almost 17 times (for comparison in Poland - this gap is 3 times, and in Spain - 2 times). It is obvious that Ukraine is an economically unbalanced country at the regional level as it is difficult not to notice the differences in the economic potential of Kyiv and other Ukrainian regions as well as disparities in economic development between different regions of Ukraine.

As we can see, the analysis of economic inequality in the regions of researched European countries which is based only on a comparison of a regional statistics set, is mostly descriptive and does not explain the probable causes of the situation in each region of the researched country. At the same time, without reliable statistical data, further studies of economic inequality in the development of the regions of Poland, Spain and Ukraine over the past 12 years are significantly limited (Table 11).

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Table 11. Uneven economic development by country, %. *(Source: calculated by the authors [19])*

Country	Indicators	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Poland	Williamson variation coefficient	13.74	13.83	13.87	13.84	14.29	14.42	15.95	15.94	15.93	15.95	15.79	15.87
	Weighted variation coefficient	14.45	14.60	14.66	14.62	14.65	14.82	15.20	15.20	15.22	15.20	15.12	15.22
	Relative mean deviation	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.9	0.7
	Tail index	19.37	19.39	19.41	19.40	19.39	19.42	20.82	20.81	20.80	20.81	21.87	23.08
Spain	Williamson variation coefficient	16.33	16.35	16.35	16.37	16.37	16.37	16.37	16.36	16.36	16.34	16.41	16.41
	Weighted variation coefficient	16.97	17.06	17.05	17.11	17.15	17.19	17.23	17.21	17.21	17.12	17.18	17.03
	Relative mean deviation	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.04
	Tail index	28.25	28.22	28.21	28.18	28.19	28.20	28.20	28.21	28.23	28.26	28.19	29.72
Ukraine	Williamson variation coefficient	25.54	25.94	26.51	25.49	25.85	25.95	25.94	25.95	25.86	25.98	25.87	x
	Weighted variation coefficient	29.80	30.41	31.17	29.56	29.70	29.99	29.98	29.94	29.91	30.06	29.80	x
	Relative mean deviation	23.42	23.40	23.46	22.19	22.56	22.42	22.47	22.53	22.60	22.60	22.55	x
	Tail index	37.33	37.27	37.23	33.48	33.51	33.40	33.40	33.42	33.56	33.55	36.41	x

Thus, the obtained values of the Williamson variation coefficient show the highest level of regional disparities in Poland in 2017 and 2020 (15.95%), Spain in 2021-2022 (16.41%), Ukraine in 2013 (26.51%) when economic growth was observed in the researched countries. This means that as a result of any slowdown in economic growth in the studied countries, the centres of economic activity suffer the most, while less developed regions show relatively lower rates of decline in production. If the values of the Williamson variation coefficient in Poland and Spain during 2011-2022 are within the norm at the level of 15-20%, the virtually unchanged dynamics of changes in the Williamson variation coefficient indicate the persistence of serious disparities in economic development.

Note that the calculated Williamson variation coefficient does not take into account the population in the regions. Given the weight of the regions of the researched countries in terms of local population, the obtained values of the weighted variation coefficient mainly confirm the conclusions about the Williamson variation coefficient. Thus, the obtained values of the weighted variation coefficient show the highest level of regional disparities in Poland in 2020 (16.41%), Spain in 2017 (17.23%), and Ukraine in 2013 (31.17%), when in the studied countries there was an economic boom smoothed out by regional disparities. At the same time, there is a tendency to increase the values of the weighted variation coefficient which may mean an increase in the contribution of services to GDP production compared to the contribution of goods.

To determine the degree of economic inequality in the development of the regions of the studied European countries, the method of calculating the relative average deviation was used. The method takes into account the number of regions and the distribution of the population of Poland, Spain and Ukraine. The values of this coefficient in the case of Poland and Spain are at 0.7-1.04% throughout the analyzed period, while the dynamics of the relative average deviation in the case of Ukraine show the effects of inflation on economic growth in the regions.

In addition, the calculated Tail index, which measures the social inequality of development of the researched European countries' regions, shows an increase in its values, i.e. regional disparities in the Polish economy for 2011-2022, unsustainable reduction of economic inequality in Spain, and persistent reduction of regional disparities of economic development in Ukraine during previous 12 years.

Contradictions in the analysis of integrated indicators of economic inequality in the regions of the researched European countries determine the need to calculate many additional indicators other than regional GDP and population in Poland, Spain and Ukraine over the previous 12 years. The Williamson variation coefficient, the weighted variation coefficient, and the Tayle index indicate an increase in regional disparities in the Polish economy, while the relative mean deviation indicates their stability during the study period.

In turn, the Williamson variation coefficient and the weighted variation coefficient indicate an increase in regional disparities in the Spanish economy in 2011-2022, while the relative average deviation - their stability during the study period, and Taylor's index indicates an unsustainable reduction in economic inequality in the regions of Spain. At the same time, the Williamson variation coefficient and the weighted variation coefficient indicate an increase in regional disparities in Ukraine's economy in 2011-2022, while the relative mean deviation and Tayle index - their reduction during the study period.

We agree that there are factors of direct and indirect effects on the economic inequality of regional development of the studied European countries [32]. Factors of direct influence contribute to the short-term growth of uneven development of the studied European countries' regions, namely, man-made disasters (Chornobyl disaster in Kyiv region, with the consequences felt in Podlaskie Voivodeship, tanker "Prestige" accident near Spanish Galicia), the crisis in Europe (debt crisis in Spain, COVID-19 crisis), military conflicts (Russian occupation of Crimea, Russian military aggression in Donetsk and Luhansk regions), full-scale war (russia against Ukraine), terrorist acts (explosions of electric trains in Madrid, terrorist acts in Catalonia).

In turn, the factors of indirect influence include forced migration, disproportionate development of production and logistics infrastructure, etc., which contribute to the long-term growth of uneven regional development of the studied European countries. For example, population migration caused by uneven regional development in Spain, war in Ukraine, low incomes in Poland, leads to an increase in population in certain regions or countries due to IDPs resulting in changes in regional economic policy of the researched countries etc.

DISCUSSION

Economic inequality of regional development in Poland, Spain and Ukraine can cover various aspects, taking into account the specific context of each country. V. Hryhorkiv, A. Verstiak, O. Verstiak, and M. Hryhorkiv, (2017) focus on the features of convergence or divergence for the regions of the country under study, while D.A. Tirado, A. Díez-Minguela, J. Martínez-Galarraga, (2015) investigate regional GDP per capita inequalities.

Summarizing the results of the study, we will determine the need for the use of integral indicators such as coefficient of variation or Williamson's coefficient of variation, weighted coefficient of variation, relative mean deviation and Theil Index during research of the uneven economic development of the respective country. The use of these indicators, in our opinion, will identify inequalities in regional economic development and justify possible ways to smooth or level them for the integrated development of the state and regions of Poland, Spain and Ukraine.

The study of economic inequality in Poland, Spain and Ukraine is a prerequisite for the development of the national concept of the digital economy, which will create preconditions for improving living conditions in the regions of the researched countries, providing enhanced opportunities for job search, distance education, entrepreneurship and promotion of goods and services.

In addition, the study of anthropogenic factors of the economic development of Poland, Spain and Ukraine will allow to compare their impact on economic inequality of the studied countries.

CONCLUSIONS

Thus, we considered the features of economic inequality in the regions of Ukraine, Poland and Spain. The studied countries combine the experience of local government reform and territorial decentralization of power in general. Spain began the process of decentralization in 1978 to reduce regional and ethnic tensions and preserve the country's unity as all of Spain's autonomous communities differ in history, culture, language, and economic conditions in particular. At the same time, in 1999 in Poland, the territorial communities were united into financially viable voivodships.

At the same time, in 2014 decentralization reform in Ukraine was launched to ensure a comfortable living environment and business activity for the local population, and continues to this day [33]. We agree that decentralization of power in general reduces regional disparities in the economic development of Ukraine, Poland and Spain, but its effect depends on the level of economic development of the researched countries [34]. In addition, countries with significant economic inequalities in regional development should understand what and how to decentralize [35].

It should be noted that the study for Ukraine was conducted before the start of the war which, of course, will significantly affect the economic environment of Ukraine itself as well as Poland and Spain which provided significant financial and military assistance. In the future, it will be interesting to explore the state of economic inequality in the postwar period.

The economic decline of certain regions of any researched country inevitably contributes to the migration of local populations to other developing regions or the migration of local populations outside the country. The regions of the country in decline are left first of all by the economically active population, while the most vulnerable are the socially vulnerable groups of the local population - children and the elderly - remain. Despite the reduction of the region's economic potential and budget revenues, local budget expenditures on social protection are present in the region. In addition, the migration

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of the economically active population to other regions or countries causes not only the relocation of economic activity centres in the region or in the country, in particular, but also creates additional burdens on the housing market and social infrastructure in the region or country where population migrates to.

Poland, Spain and Ukraine have the best developing regions with industrial or post-industrial economic structures, high levels of urbanization, which are also capable of mutually beneficial foreign economic cooperation in investment, trade, and technological cooperation. In turn, the agrarian and industrial-agrarian regions of the researched countries in the conditions of decentralization of Poland, Spain and Ukraine, unfortunately, are less competitive as they are inferior to the regions of Poland, Spain and Ukraine which have comparative competitive advantages. In addition, inequalities in the distribution of benefits from decentralization may exacerbate economic disparities among the regions of the study countries in terms of employment and unemployment, deteriorating living conditions of local households, and slow down socio-economic development as well as reduce the competitiveness of the researched countries in international trade.

ADDITIONAL INFORMATION

AUTHOR CONTRIBUTIONS

All authors have contributed equally.

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CONFLICT OF INTEREST

The Authors declare that there is no conflict of interest.

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ЕКОНОМІЧНА НЕРІВНОМІРНІСТЬ РЕГІОНАЛЬНОГО РОЗВИТКУ ПОЛЬЩІ, ІСПАНІЇ ТА УКРАЇНИ

У роботі аналізується нерівномірність регіонального економічного розвитку Польщі, Іспанії та України. Визначено, що нерівномірність економічного розвитку регіонів досліджуваних країн можна оцінити шляхом порівняння статистичних показників, а саме індексу нерівномірності економічного розвитку країн, динаміки зміни кількості населення досліджуваних країн, порівняння регіональної економічної статистики, зокрема показників валового регіонального продукту. Для виявлення нерівномірності регіонального економічного розвитку та обґрунтування можливих шляхів

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її згладжування чи нівелювання в статті використані такі інтегральні показники як коефіцієнт варіації або коефіцієнт варіації Вільямсона, зважений коефіцієнт варіації, відносне середнє відхилення та індекс Тейла. Дослідження вказаних показників дозволило виявити суперечності в їх аналізі та необхідність розрахунку додаткових показників, а також вплив факторів прямого й опосередкованого впливу на економічну нерівномірність регіонального розвитку досліджуваних європейських країн.

Ключові слова: ВВП на душу населення, регіональна економіка, нерівномірність економічного розвитку

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