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REAL ECONOMIC CONVERGENCE IN THE EUROPEAN UNION

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Abstract: *This paper evaluates real economic convergence (REC) for countries and regions within the European Union. The research aims to gather information about the socioeconomic evolution and development of the EU members and decide if the convergence was successful. Real economic convergence within the EU will be descriptively analysed at the national and regional levels using the real GDP and the GDP/Capita indicators. For a better understanding, the analysis considers the indicator poverty risk and social exclusion, and the two types of convergence will be examined comparatively. The research includes geopolitical maps of the European Union to compare the nations and regions at specific points in time, and the data used for the maps will be used to observe a graph representation of their evolution during the regarded timeframe. The graph evolution will be calculated with a simple regression line to mathematically ascertain the effectiveness of the regression.*

JEL classification: F15, I32, O47, O52.

Key words: analysis, real economic convergence, regional, national, European Union.

1. INTRODUCTION

Real economic convergence at the country level is an increase in the proximity of national economies. However, this approach has only one direction. In other words, the aim is not to bring all the Member States of the European Union closer to the average because the above-average countries would suffer. The goal is to help countries below average grow as fast as possible to get closer to those above average. Countries above the EU average can also

benefit from this convergence, but to a greater extent at a regional level, to reduce the socio-economic gap within the country.

According to Siljak, real economic convergence is defined as the equalisation of development levels (Siljak, 2015), but Matkowski and Prochniak include income equalisation as well as a distinct factor from development (Matkowski & Próchniak, 2004).

More specifically, the concept of real economic convergence can be divided into two aspects: a tendency toward the equalisation of income and development levels, which may be called a growth or income-level convergence; and a trend toward the conformity of business cycles, which may be called cyclical convergence (Matkowski & Próchniak, 2007).

The convergence evolution has been debated over the years because European Union is the most complex integration structure regarded at the highest degree of integration. The need for convergence is significant for a thriving economic and monetary union because poorer countries would have challenges applying European policies. Thus, managing collaboration between 28 nations becomes challenging if the disparities are too high.

Moreover, this type of convergence implies direct effects on the daily life of citizens because equalisation of development level could stimulate access to tertiary education and the income increase, labour expenditure growth, and access to tertiary education stimulation are found (Răileanu Szeles, 2018) significantly improve the self-perceived health of most income quintiles without causing undesirable side effects for the others.

However, EU members before 2004 seemed to diverge instead of converge, and the standard deviation for all EU member states (excluding Bulgaria and Romania) declined. One could hardly conclude that there was any convergence present since the 2008 financial crisis, accompanied by its asymmetric shocks in the different countries caused mature noise (Strielkowski & Höschle, 2016). Although, the founding members of the EU and the countries that have been EU members for a long time had likely converged to some extent before 1995 (Strielkowski & Höschle, 2016).

Considering the union aspects, the most successful way to reduce the disparities between nations is to help the poorer countries to grow faster than the rich ones until they catch up with the rich ones, but the rich ones must not slowed down from growing.

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2. REAL ECONOMIC CONVERGENCE OF EU MEMBER STATES 2007-2019

The analysis involves three time periods six years apart, namely 2007, 2013 and 2019. The reason for choosing this period is explained by the fact that 2007 and 2019 are the first and last years in which data are available on most EU Member States on both the GDP/Capita and the risk of poverty or social exclusion, the period being dichotomized to have a point of comparison in its centre.

In 2007, Eastern and South-Eastern Europe had a lower standard of living than the rest of Europe. This can be caused by a variety of factors, such as geographical, political, social, economic, and perhaps even cultural factors.

Firstly, there is the theory of the centre, which mentions that in the space economy, the centre develops better than the other areas. And this is reflected in the situation of the European Union because Germany and most of its neighbouring countries have a more favourable position in the EU ranking (GDP/Capita).

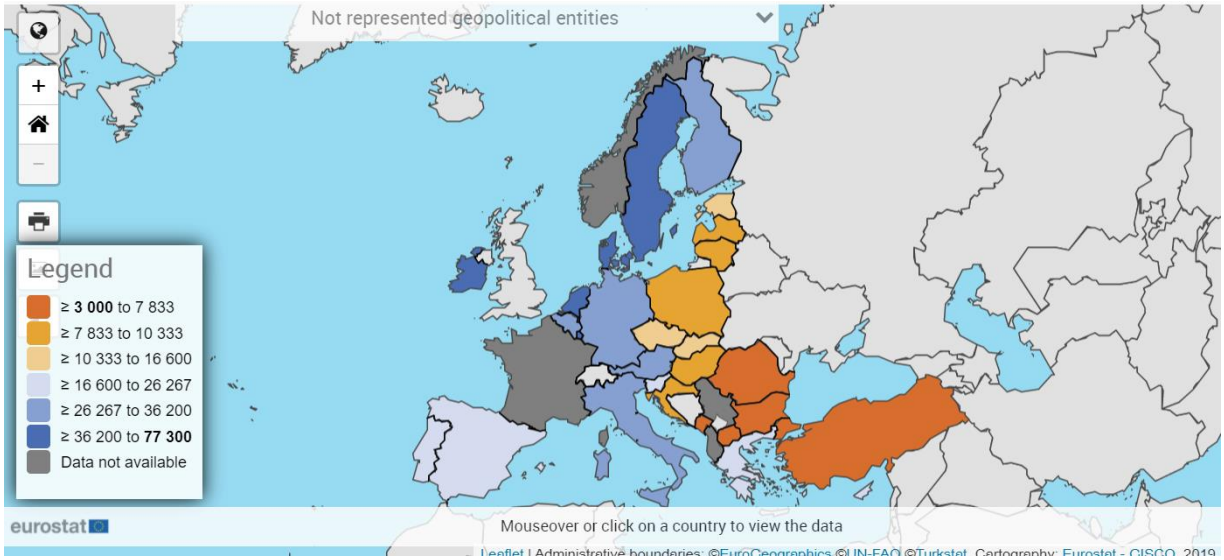

Fig. 1: GDP/Capita in 2007. Source: Eurostat (NAMA_10R_2GDP)

From a geopolitical point of view, Eastern Europe has been under socialist rule in the past, and neighbouring nations have suffered because the geographical location of a country offers economic upsides and downsides. Thus it can be seen in chapter 3), where it can be observed that regional-level areas close to central Europe or an EU Member State perform better than the others.

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Moreover, one can observe the degree of poverty risk or social exclusion. This indicator does not differ significantly from the GDP/Capita indicator on the situation in the EU. Therefore, Member States above the EU average concerning GDP/Capita have a lower poverty risk or social exclusion compared to below-average countries.

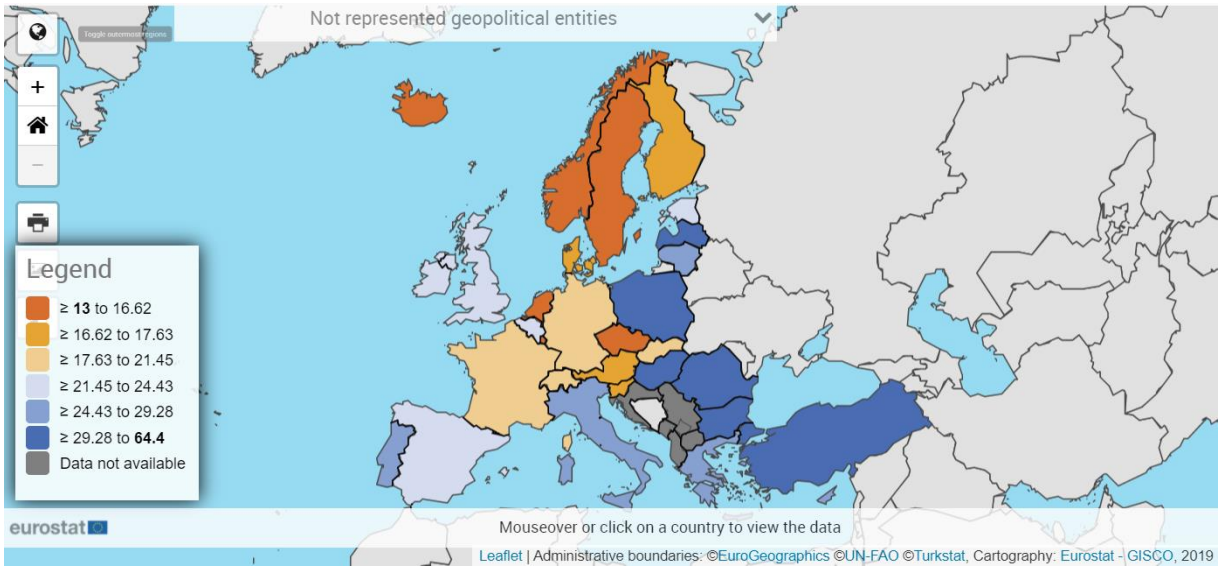

Fig. 2: Percentage of people at risk of poverty or social exclusion in 2007.
Source: Eurostat (ILC_PEPS11)

Observing the evolution from an absolute perspective, six years later, GDP/Capita increased by an average of 10% for the EU member states. From a relative perspective, Lithuania and Turkey had the most to gain because their distance from the European Union average is much smaller than in 2007, with a 25% increase compared to 2007. Contrary to the ranking, Portugal did not benefit from this convergence because, while the EU average rose, it did not stagnate but had a 2% drop in GDP/Capita.

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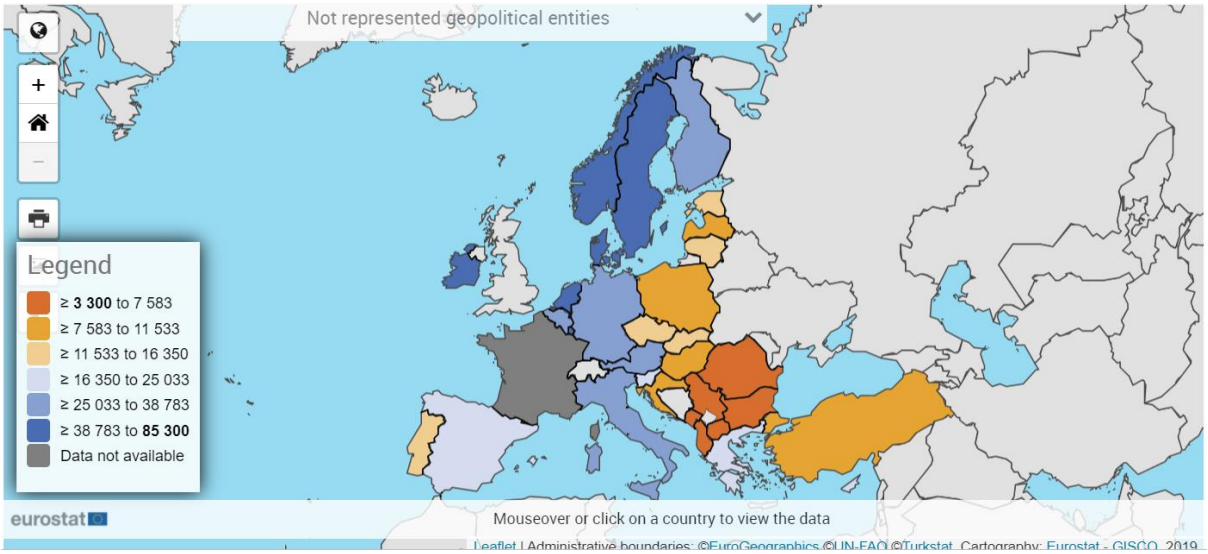

Fig. 3: GDP/Capita in 2013. Source: Eurostat (NAMA_10R_2GDP)

However, if the difference between GDP/Capita and the degree of poverty risk or social exclusion was not considered in 2007, one can see that the evolution of these two indicators is not similar.

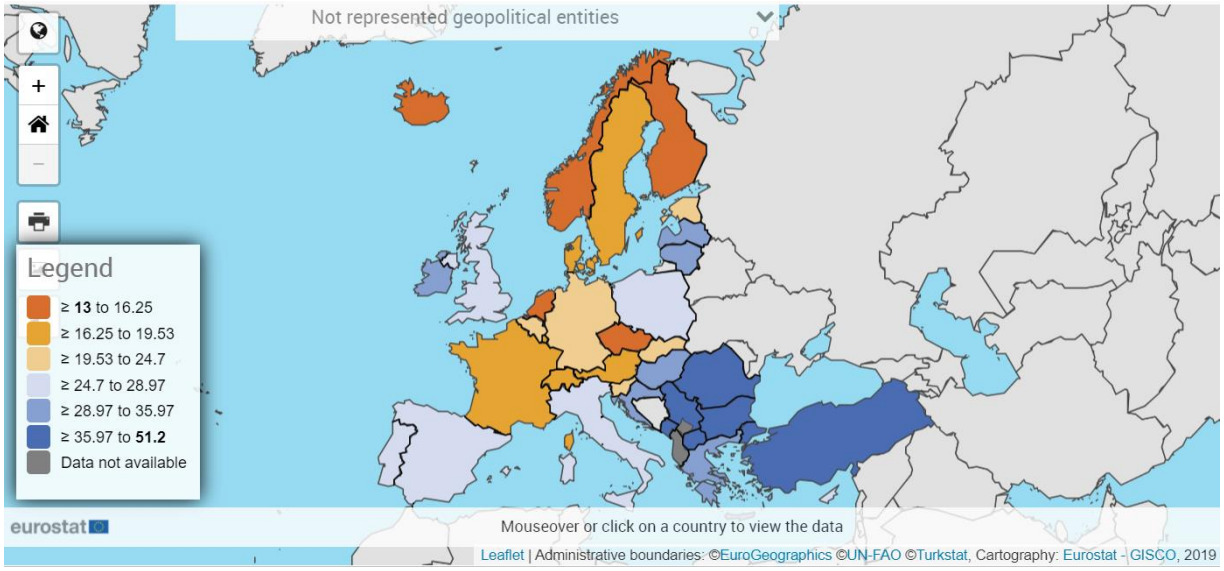

Fig. 4: Percentage of people at risk of poverty or social exclusion in 2013.
Source: Eurostat (ILC_PEPS11)

In terms of GDP/Capita development, Lithuania and Turkey are close to the EU average but remain at the same considerable distance from the average in terms of poverty

risk or social exclusion. Moreover, although Portugal fell by 2% in GDP per capita, it registered a positive change in the poverty risk or social exclusion indicator. More specifically, this risk has increased by 2.5% over the last six years but has grown to a lesser extent than all other countries, thus moving away from the EU average.

While most Member States have seen steady increases in GDP/Capita and were no significant changes compared to the EU average, they have seen more considerable changes in the risk of poverty. More specifically, Belgium, Cyprus, Switzerland, Estonia, Finland, France, Latvia and Hungary have improved their socioeconomic situation by reducing this risk. The overall EU average has declined, and they also managed to move away from the EU average, thus improving their relative position. However, Ireland and Sweden assumed undesirable results as their poverty risk increased by 6.8% and 4.2%.

Six years later, the positive results of the EU member states in GDP/Capita almost doubled. The lower end of the ranking increased by an average of 32% and the upper end by 26%. In this time frame, four countries have improved their position, i.e. Austria, Estonia, Romania and Turkey. While three of them are close to the EU average, Austria is the only one that has moved away, but the change is a positive one, so it is not one to be condemned. But, like the previous interval, one may see a negative repositioning. Greece saw a 5% increase but moved away from the EU average because it had a lower-than-average growth rate.

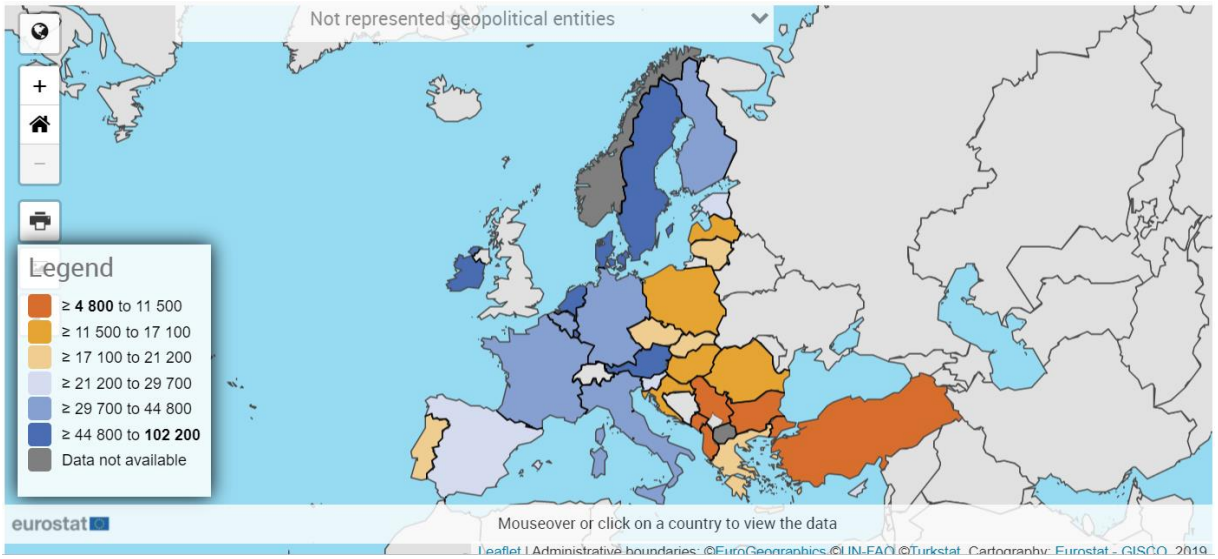

Fig. 5: GDP/Capita in 2019. Source: Eurostat (NAMA_10R_2GDP)

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The degree of poverty risk or social exclusion has shown significant changes in the EU. While the EU average has declined, there have been considerable differences between countries. More specifically, Croatia, Denmark, Germany, Ireland, Montenegro, Poland, Slovakia, Slovenia and Hungary fell well under average, the more developed half of them moved away from the average, and the less developed half approached the mean. On the other hand, Switzerland, Estonia, Italy, Luxembourg, the Netherlands, Spain and Sweden were left behind by the EU average, with a positive growth rate.

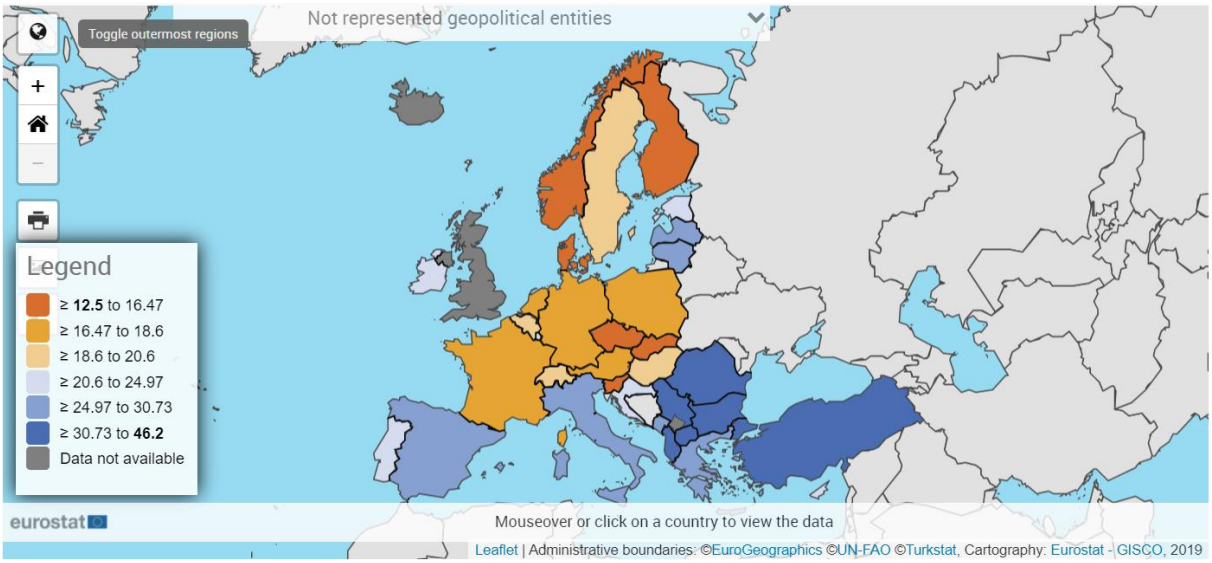

Fig. 6: Percentage of people at risk of poverty or social exclusion in 2019.

Source: Eurostat (ILC_PEPS11)

3. REAL ECONOMIC CONVERGENCE OF EU MEMBER STATE REGIONS FROM 2007 TO 2019

Real economic convergence at the regional level is an increase in the standard of living between the regions of a nation. As in the case of the country level, this approach envisages a single direction, namely that of improving the situation of the less developed regions. As mentioned above, countries above the EU average can benefit from this convergence to a greater extent at the regional level to reduce the socioeconomic gap within the country. The analysis assumes the same three temporal moments at a distance of six years each. If one would look at the GDP/Capita Indicator, the centre's theory remains valid at a regional level, not for that country, but the entire European Union.

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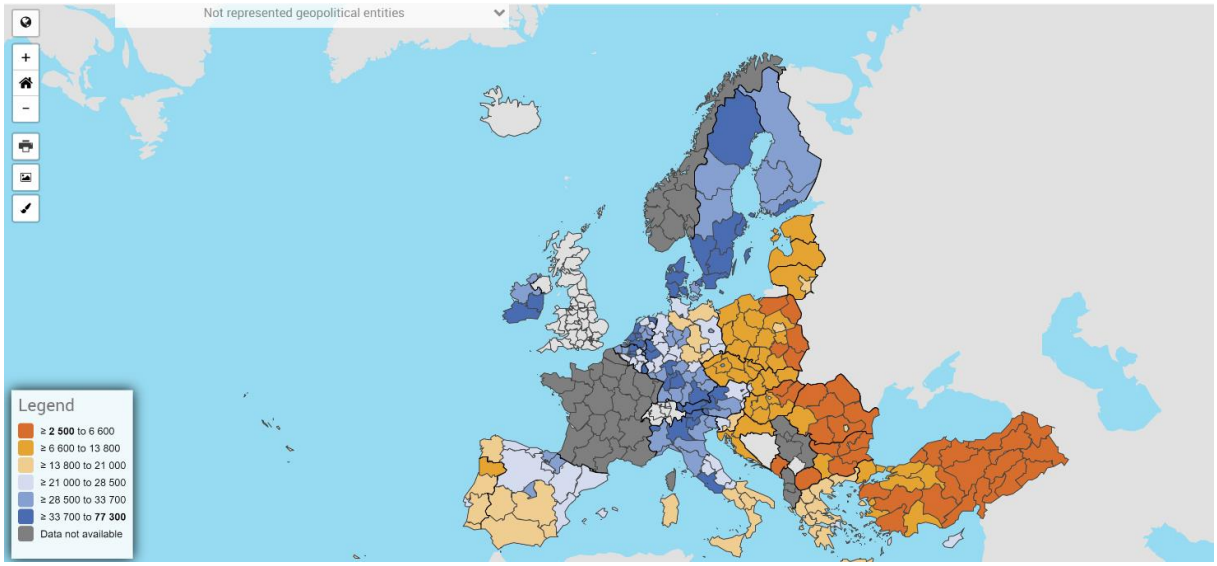

Fig. 7: GDP/Capita in 2007. Source: Eurostat (NAMA_10R_2GDP)

Starting from central Europe, in the case of Germany, one can still see differences between its east and west. Given the historical and political evolution over time, one can consider these differences normal. Continuing the analysis, one can see that countries such as Italy, Poland, Romania, Spain and Hungary have significant differences at the regional level. The common element of these countries is the geographical position of the regions concerning central Europe. More specifically, the territories in the half of the country closest to the centre of Europe have more favourable values than the other half.

Going further with the analysis, one can see a waterfall improvement. More specifically, eastern Germany, Western Turkey and the Western Czech Republic have seen positive changes. While East Germany has levelled off with the rest of the country, West Turkey and the Czech Republic have moved away from the national standard but have moved closer to the EU average. Which would not necessarily be bad if this cascading growth continued over time, and the rest of the country's regions would experience equally favourable changes. However, the northeast of Spain and the north of Italy have experienced unfavourable changes, they have moved away from the EU average, but through this decrease, they have moved closer to the national average. More than that. The regions of Ireland, which were uniform in 2007, have grown in disparities, creating a discrepancy within the country. The worst change was in Hungary, where half of the regions moved away from the national standard and EU averages, falling in both rankings.

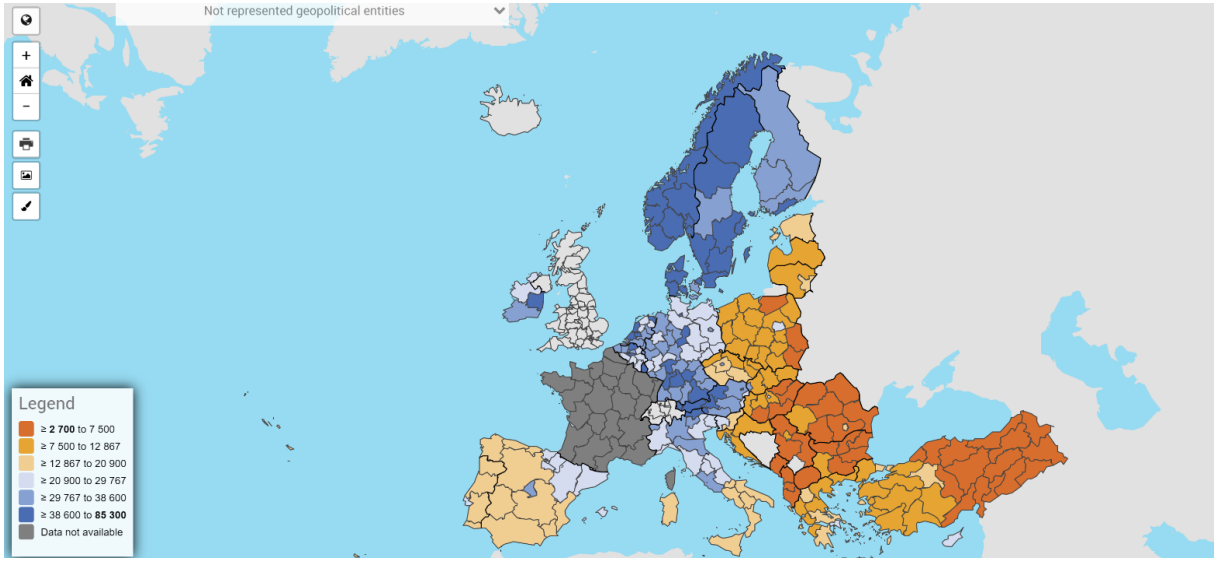

Fig. 8: GDP/Capita in 2013. Source: Eurostat (NAMA_10R_2GDP)

Looking at the same indicator in 2019, one can see that that cascade spilt over into Turkey as the western half, which had moved closer to the EU average, receded further, returning to national uniformity. However, Hungary regained its uniformity, which continued in Romania, where the closest two regions reached the level of the western region.

There is also a possibility of a cascade phenomenon inside Romania because the regions bordering western Romania (and those closest to central Europe) have begun to approach the EU average, thus raising the national average.

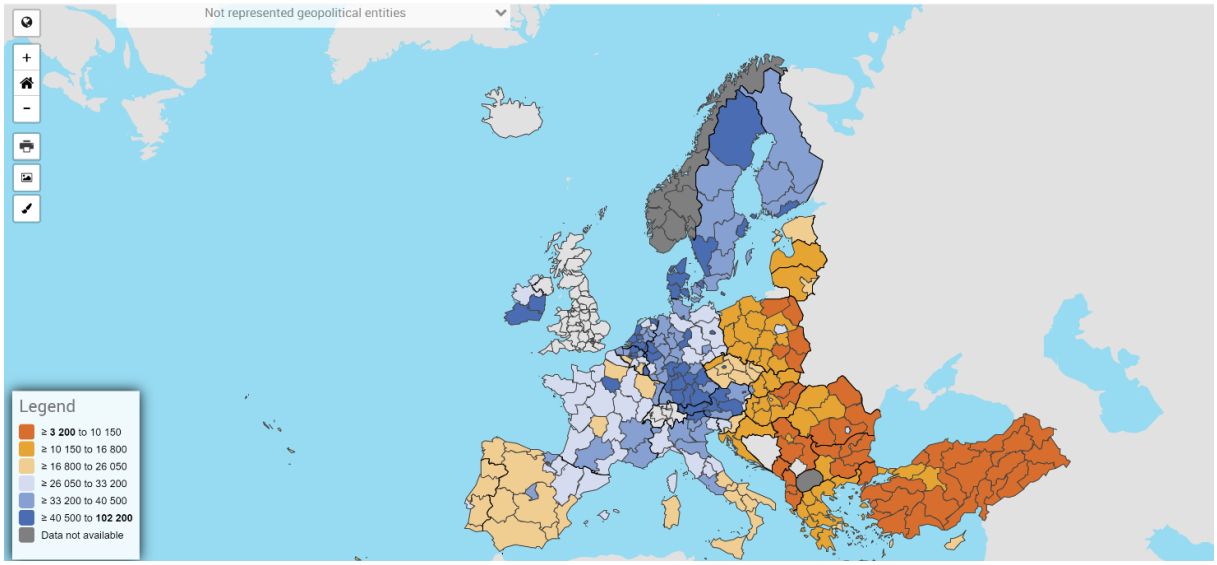

Fig. 9: GDP/Capita in 2019. Source: Eurostat (NAMA_10R_2GDP)

Looking at the poverty indicator, one cannot analyse the EU situation in 2007 and 2013 to a large extent because there is no data available for most Member States. However, one can see in 2019 that the situation is similar to that of GDP/Capita. That is to say that regions with a higher value in GDP/Capita also have a lower value in poverty risk or social exclusion.

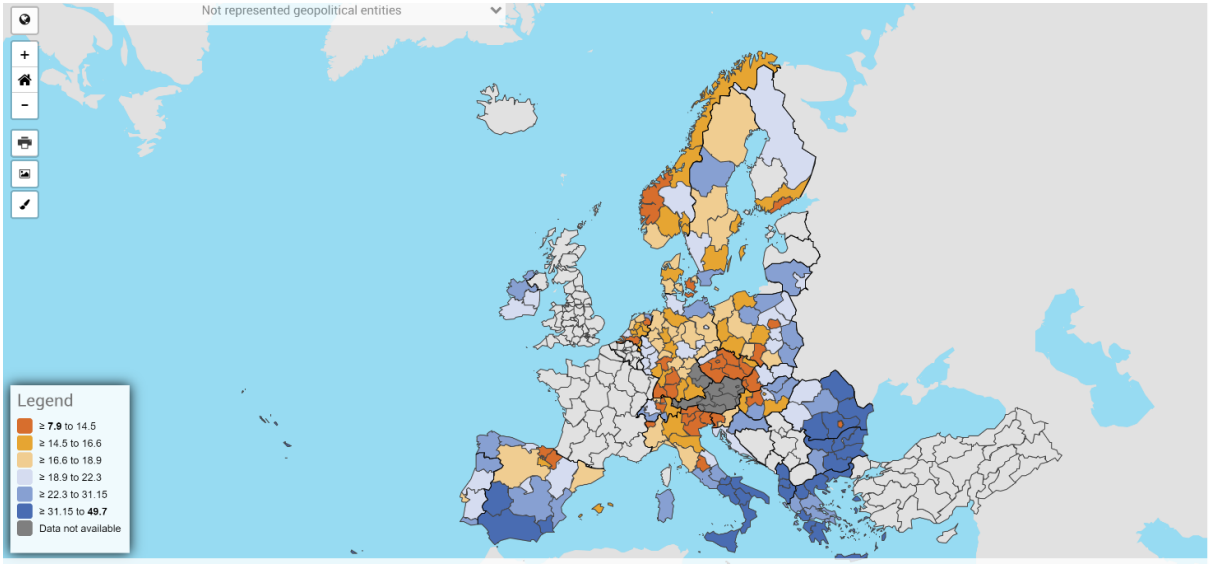

Fig. 10: Percentage of people at risk of poverty or social exclusion in 2019.
Source: Eurostat (ILC_PEPS11)

Using the graphical method, one can observe the relative positioning of the EU member states. For this method, one extended the analysis period from 12 to 14 years, mainly due to the data availability. However, this analysis excludes France due to the lack of data until 2015.

4. GRAPHIC EVOLUTION OF THE REAL GDP AND GDP/CAPITA FROM THE PERIOD 2004-2018

The first analysed graph shows the evolution of GDP/Capita since 2004, and presents a similarity with the previous maps. One may group certain countries according to their position on the chart, which coincides with the geographical position. More specifically, the Member States positioned in Eastern and South-Eastern Europe show unfavourable colour

dynamics compared to the rest of the countries, and their graphical position indicates a small value of GDP/Capita but with a growth rate at least double that of the others.

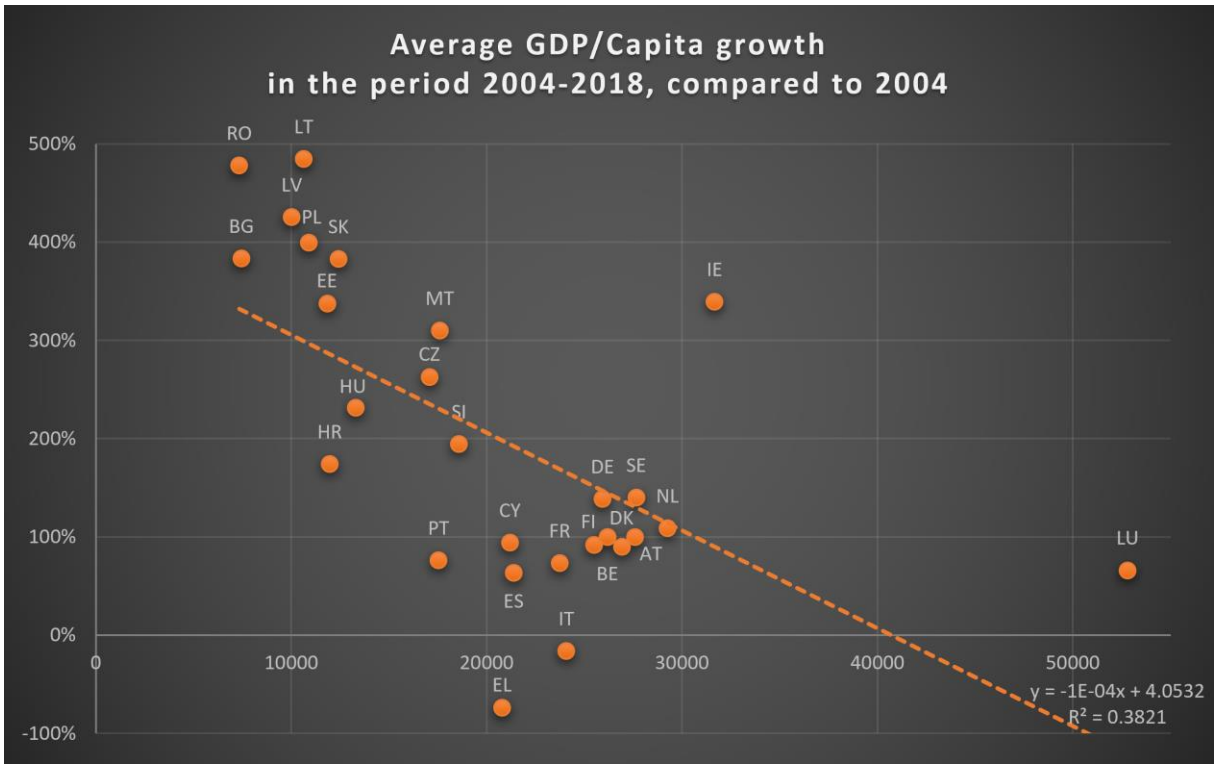

Chart no. 1: Evolution of GDP/Capita in the period 2004-2018 at the national level.
Own processing based on Eurostat Data (NAMA_10_GDP & NAMA_10_PC)

However, there are two exceptions. Greece and Italy are the only ones with a negative growth rate. The convergence did not work for them, and both declined in absolute and relative terms to any other EU country.

On the other hand, the countries in the north, centre and proximity to the centre have a more considerable value on GDP/Capita, Even if the growth rate is lower. One can conclude that the theory of the centre is also present in the graph.

Luxembourg and Northern Ireland are the only positive outlier points. Ireland has an average value of GDP/Capita but a significant value of the average growth rate, similar to that of the Eastern countries. Luxembourg has a GDP/Capita but an average growth rate comparable to that of the central, western and northern countries.

The second graph analysed shows the evolution of real GDP since 2004. This graph does not show significant differences from the previous one, but there are a few exceptions.

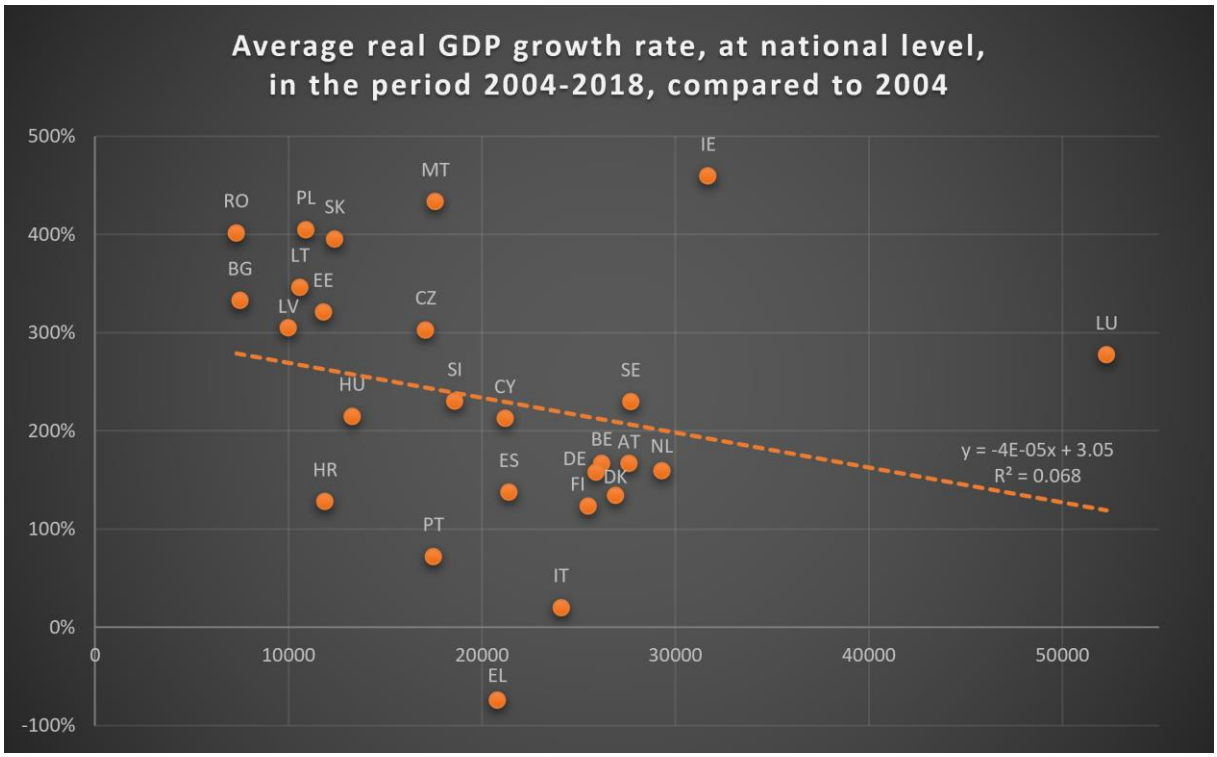

Chart no. 2: GDP evolution in the period 2004-2018 at the national level.
Own processing based on Eurostat Data (NAMA_10R_2GDP & NAMA_10R_2GVAGR)

On the one hand, the positive outlier points are positioned one step higher. Northern Ireland had an average GDP/Capita growth rate situated at the lower end of the eastern countries, but, regarding the average growth rate of the real GDP, it is positioned above the upper end of the eastern countries, with a real GDP of medium level, but with a higher growth rate in the EU.

Moreover, comparing the first two charts, one may see that Luxembourg has a high value of GDP/Capita, which is similar to the value of the real GDP. However, in the second chart, the growth rate is no longer average (comparable to the central and northern countries) but is significantly high, being close to the beginning growth rate level of the eastern countries.

On the other hand, the negative outlier points show another kind of difference. More specifically, Greece is in the same position here, but Italy no longer has a negative growth rate but a low positive one. Poland is also the only country that can be placed in the same category as Italy because it also has a growth rate of less than 100%.

Continuing the analysis at the regional level, one may see the evolution of the real GDP chart, starting with 2004. At first impression, one can see that most of the points are positioned in the centre, and their minority are spread, with about 10 outliers. However, one cannot draw too many conclusions if he cannot differentiate them.

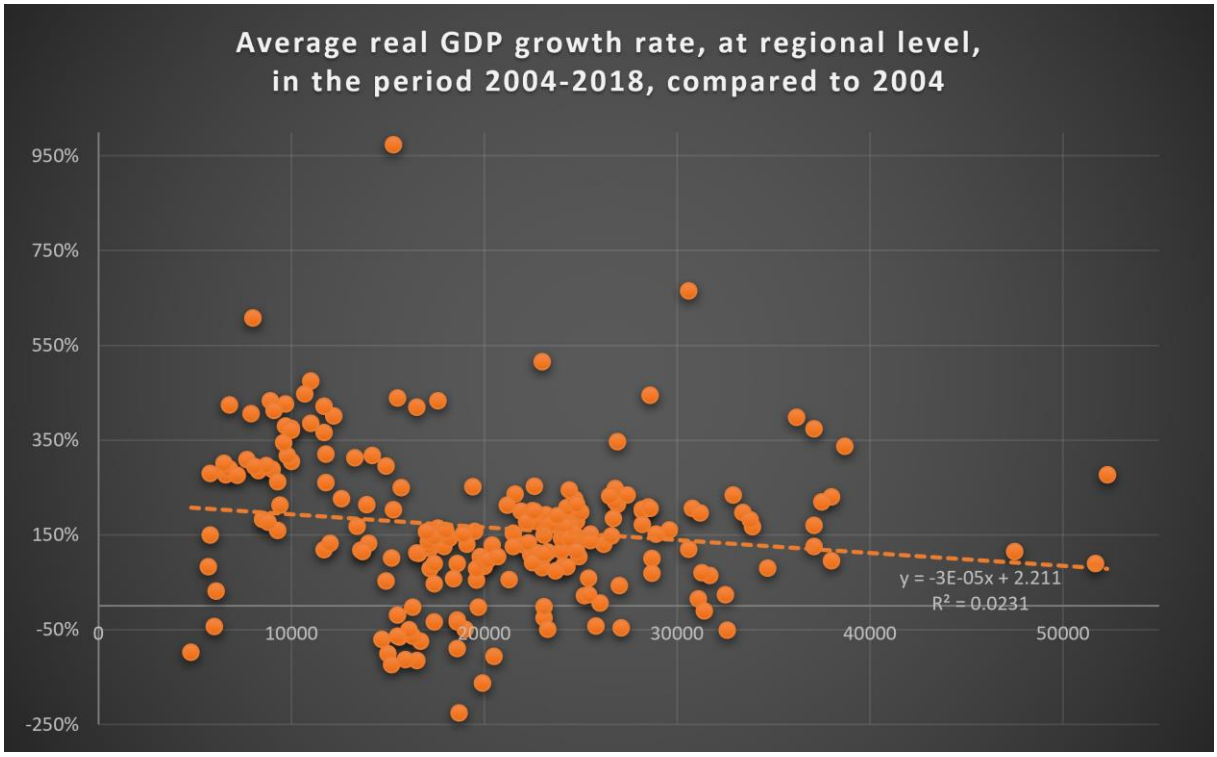

Chart no. 3: Evolution of GDP/Capita in the period 2004-2018 at the regional level.
Own processing based on Eurostat Data (NAMA_10R_2GDP & NAMA_10R_2GVAGR)

The following graph shows the same evolution but is differentiated by country.

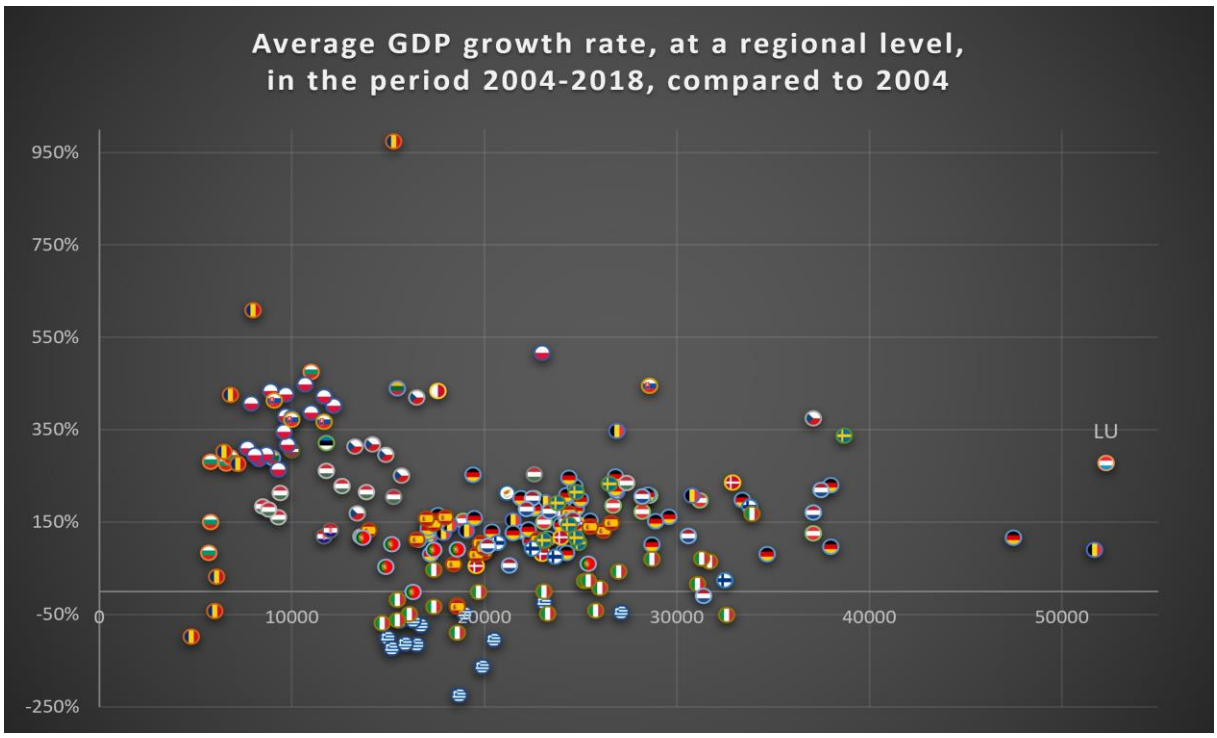

Chart no. 4: Evolution of GDP/Capita in the period 2004-2018 at the regional level.
Own processing based on Eurostat Data (NAMA_10R_2GDP & NAMA_10R_2GVAGR)

First of all, although the regions within Romania show similar values of real GDP, they have significant differences in the average growth rate. Specifically, the northeastern part of Romania has an average growth rate of about 98%, while the capital region has the highest average growth rate in the European Union, i.e. 974%. The ends of the range are far too large to make economic or political decisions at the national level. The spectrum of -100% and + 1000% includes all regions of EU countries except a few territories in Greece.

Secondly, one may see that Poland is dichotomized in the previous figures, but Poland's regions in the fourth chart are not that far away from each other compared to the rest of the EU parts. From a relative point of view, Poland presents uniformity regarding socioeconomic development at a regional level. However, from an absolute point of view, some parts of Poland have a lower real GDP but a considerable average growth rate. On the other hand, the other part of Poland's regions has a medium-level real GDP with an average growth rate that is also average. One may conclude with two explanations for the current situation. From a geopolitical point of view, half of Poland is located near the Central European countries, and the other half is situated near Russia and the former socialist

countries (the Iron Curtain). From a historical point of view, during World War II, half of Poland was occupied by Germany and the other half by Russia, and this event has left its mark until now. These two hypotheses are confirmed by Poland's region's colour dynamic, where the areas with low values of GDP/Capita have higher values of poverty risk or social exclusion.

Finally, one can see that the regions in most EU Member States have a level of GDP close to the national GDP but with considerable differences in the average growth rate; or an average growth rate comparable to the national mean but with significant differences in the level of real GDP.

5. REGRESSION LINE ANALYSIS OF THE REAL ECONOMIC CONVERGENCE FROM 2004 TO 2018

After the realization of the regression line regarding GDP/Capita in 2004 (X) and the average growth rate of GDP/Capita in the period 2004-2018 at the national level, one observe the following results:

Variables	Coefficient	Standard Error
Initial GDP/Capita (A)	-5,54***	1,02
Intercept (B)	25,67***	4,36
No. Obs.		27

Table no. 1: REC regression at the national level.

Own processing based on Eurostat Data (NAMA_10_GDP & NAMA_10_PC)

The right of regression is a negative one, and this negative slope proves the existence of a real economic convergence because this convergence aims to bring economies closer and reduce social discrepancy, but without negative implications on above-average countries. More specifically, poorer countries need to have a higher growth rate to catch up with rich countries, and developed countries need to continue to grow and develop, but their growth rate needs to be slower than poorer countries so as not to widen the socioeconomic gap. At the national level, convergence is statistically significant because it has a high level of significance: 99.99%. The GDP/Capita coefficient is negative, with a value of 5.5. However,

the sample is not representative because only 27 observations are insufficient for this regression.

Variables	Coefficient	Standard Error
Initial GDP/Capita (A)	-1,60***	0,51
Intercept (B)	8,50***	2,18
No. Obs.		213

Table no. 2: REC regression at the regional level.

Own processing based on Eurostat Data (NAMA_10R_2GDP & NAMA_10R_2GVAGR)

At a regional level, convergence has a high significance level of 99.99%. However, the GDP/Capita is -1.6, and this sample is more representative because it includes 213 observations. Within the regression line for the GDP/Capita analysis at the national level, one can notice that the standard error is almost double that at the regional level. Comparing the two regressions, one may conclude that the analysis of the real economic convergence at the regional level is much more representative because it provides a broader picture of the current situation. On the one hand, one may observe the colour dynamic of the GDP levels within each country and can critically analyse the present differences. On the other hand, the regression line offers more credibility for the regions due to a large number of observations and a lower standard error. Given the representativeness of regression at the regional level and the demonstration of a weaker real economic convergence than at the national level, one can assume that the introduction of several representative factors of the analysis may lead to results that show a less efficient convergence than considered at the moment.

6. COMPARISON OF THE TWO TYPES OF CONVERGENCE

At the national level, most EU Member States have increased in GDP/Capita, some of which are close to the EU average but have remained the same in terms of the poverty risk or social exclusion, which means that it was raised by the upper strata of society, and the poorer regions grew but remained at the same relative distance from the rich. More specifically, the analysis of the first two graphs shows that Northern Ireland and Luxembourg have a much higher average real GDP growth rate than the average GDP/Capita growth rate. This

demonstrates how this discrepancy is manifested at the national level. Moreover, the disparity can be confirmed in the case of Northern Ireland using the region map and can be assumed in the case of Luxembourg because it has only one region. One can also conclude that Greece, Italy and Poland do not benefit from real economic convergence because Greece and Italy are far too distant from the EU average in terms of real GDP growth and GDP/Capita growth, and Poland suffers from a socio-economic gap at the regional level. However, there are positive examples, such as Portugal, where the GDP/Capita growth was negative, but the poverty risk remained much lower than the EU average. In this case, one can conclude that the socio-economic discrepancy is reduced.

After the two comparisons, one can conclude that GDP/Capita and poverty risk or social exclusion have different causes and effects because they do not evolve in the same direction or pace. Moreover, although national situations have improved over the period under review, the regional circumstances of the countries are undesirable. Member States can also be divided into groups of countries (Eastern + South-Eastern Europe, Western Europe and Central + Northern Europe) on their current levels, and the differences are low within the group but significant if they are compared to one another. Thus, the theory of the centre in the spacial economy can be considered a central factor for economic development. However, their geographical distribution presupposes the existence of regional integration and development blocs, but not of a single Union.

CONCLUSIONS

From a graphical point of view, although the national differences within a group are low, the differences between the regions of most countries are considerable because they have similarities in either real GDP or growth rate, but not in both. Which would not necessarily be undesirable if the higher growth rate were present in the case of more disadvantaged regions, which is not the case in Romania.

Since the analysed indicators do not show evolutions or changes with similar meanings or rhythms, one can assume that they highlight different classes at the country level. More specifically, one may assume that the value of GDP/Capita can be determined to a greater extent by the upper class of society, and the poverty risk or social exclusion can be defined to a greater extent by the lower class of society. Thus, an economic policy which

focuses on reducing the poverty risk can lead to better results in real economic convergence because the rise of the upper class of society leads to an increase in the gap, while the growth of the lower class of society leads to a reduction of this gap. However, the most favourable scenario is the middle class being the strongest because this leads to economic stability.

Even if the national economic situation has improved, the regional one leaves much to be desired. For this reason, one can assume that this convergence strategy was intended for countries in a standardized format, and only the regions capable of adaptation could benefit from it, all of which were those that raised the national average. However, the situation as a whole may lead to a risk of socio-economic discrepancy at the national level because each country has different needs.

This is also demonstrated by the regression method. Both regression lines, nationally and regionally, are downward and have a high significance of 99.99%. However, the GDP/Capita is -1.6 for regions and -5.5, which means that the real economic convergence at the national level is at least three times stronger than at the regional level. And this depends to a large extent on their geographical location. For these reasons, one can conclude that the more developed regions benefited greater from this convergence because they had either the necessary resources, the necessary experience, or even both, and this allowed them to bear fruit in as far as possible the benefits of membership of the European Union, thus raising national averages. Moreover, the regions most in need of convergence lagged. Thus, one can assume that federal policies have focused more on national development and the absorption of European funds than on their central purpose, namely their destination and long-term effects.

Although this strategy of real economic convergence may produce socio-economic discrepancies between the regions of a country, this may be positive as long as it manifests itself in the short term. More specifically, if the developed territories moved closer to the EU average, thus moving away from the national average, the less developed regions within the country would have a more considerable opportunity to follow suit (with the help of well-managed national policies).

Analysing the colour dynamics in terms of cohesion, one can see that there is no uniformity at the country level, and the national averages that have improved have done it from a few regions but not from all of them. However, if one were to compare the differences between regions and countries, one can see that at the regional level, the disparities are at

most two levels and national differences are much more considerable. But this phenomenon is manifested because the countries with a high growth rate and a low value of GDP/Capita are framed in a different colour dynamic than those with a slower growth rate but a GDP/Capita bigger.

CONFLICTS OF INTEREST AND PLAGIARISM: The authors declare no conflict of interest or plagiarism.

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