# INCOME DISPARITIES, POVERTY, AND REGIONAL CONVERGENCE IN EUROPE. A SPATIAL APPROACH

**POP Teodora-Mădălina**
Babeș-Bolyai University, Faculty of Economics and Business Administration,
Cluj-Napoca, Romania
Clermont-Auvergne University, LEO-UCA Laboratory,
Clermont-Ferrand, France
*teodora.pop@econ.ubbcluj.ro*

*Abstract: Given that the studies conducted so far reveal a wide range of conflicting results concerning the potential transmission channels of income inequality, the following questions arise: Is there a β-convergence process at the European level that is influenced by financial and social inequalities? What is the relationship between economic growth and inequality in Romania and other emerging Eastern European countries, given that there is mixed evidence in the literature? Therefore, in carrying out this research, we aim to assess the specificity of the economic growth-income inequality nexus in 5 ex-communist CEE states over the period 2010-2019 using spatial econometric techniques. On one hand, the main results support the existence of a β-convergence process in Europe that is conditioned by absolute poverty phenomena. This argues for considering poverty as an additional channel that may hamper the economic performance of EU members. On the other hand, our findings reveal a predominantly negative relationship between variables that is determined by variations in the initial income level and the degree of poverty. Additionally, by conducting sub-national analyses, we observe that, in Romania, the growth-poverty-inequality triangle is influenced by severe socioeconomic disparities. From a policy perspective, economic growth can be a useful instrument in reducing regional poverty in Romania if it is supported by consistent increases in the population's revenues (i.e. the case of North-West and Centre regions), while a higher pace of income growth compared to the regional productivity growth rate tends to foster future rises in poverty.*
*Keywords: income distribution, economic growth, poverty, convergence, Europe, spatial econometrics*

## Introduction

While the theoretical foundations concerning the interdependence between income inequality and economic growth date back to the 50s with the launch of Kuznets' hypothesis (1955) that assumes a positive relationship between concepts, recent studies lean towards a significantly negative impact of inequality on growth (Breuning and Majeed, 2020; Marco et al., 2020; Lakner et al., 2022). Also, contemporary literature notes the importance of socioeconomic factors such as initial national income, financial development, education or poverty that can significantly influence this connection (Bourguignon, 2004; Bergstrom, 2020; Marrero and Servén 2022). Therefore, given that the initial level of development influences a country's potential in terms of income, and the equitable distribution among individuals is considered to have a positive influence on economic growth, several works have begun to return to the issue of convergence over time (Anselin, Le Gallo and Jayet, 2008; Pietrzykowski, 2019). If the least developed countries tend to follow the developed ones in terms of economic growth, then we can debate the emergence of a convergence process. In this regard, there have been optimistic theoretical models (i.e. neoclassical theories) as well as pessimistic ones (in general, endogenous growth theories) that tried to explain the implications of convergence. Furthermore, taking into account certain observed

deficiencies of linear regression models, various works have started to expand to other techniques belonging to spatial econometrics to verify the process of absolute and conditional convergence. In the same vein, some authors have argued that regions are interrelated by their proximity in space and the connections that globally emerge between different variables cannot be estimated using regular econometric tools (Panzera and Postiglione, 2020).

Thus, this paper aims, on one hand, to assess the β-convergence process at the European Union (EU) level in the last decades and the impact of absolute poverty on this phenomenon, and on the other hand, to analyse the specifics of the economic growth – inequality link in Romania and other emerging Central and Eastern European (CEE) countries, namely Bulgaria, Hungary, Poland and Croatia. Following the work of Fingleton and Lopez-Bazo (2006), and Kuc (2017), this research supports the inclusion of spatial effects in the econometric analysis because spatial heterogeneity allows us to correlate and understand the degree to which a unit (country) is similar to neighbouring units (countries). As regions have nearer or more remote neighbourhoods, this is assumed to have an impact on different regional characteristics, including income distribution and the level of economic development. From an empirical point of view, our preliminary results denote a negative relationship between growth and income inequality in the analysed economies, and a predominantly adverse influence of inequality on growth, except for Romania, which has lately registered an upward trend in both economic performance and income inequality. In addition, cumulating these results with the impact of poverty at the regional level, we note that the countries that experienced the highest degrees of inequality, namely Bulgaria and Romania, recorded severe levels of poverty, while countries with a lower degree of inequality (Poland, Croatia and Hungary) had moderate poverty degrees. Concerning economic growth, we observe that countries with lower levels of inequality and poverty have managed to secure higher GDP growth rates.

Therefore, the contribution of this research to the empirical literature consists in investigating the connection between the two concepts conditioned by the absolute dimension of poverty in 5 former communist states from East-Central Europe. Moreover, keeping in mind the fact that there is a diffuse association between economic growth and income inequality at the level of Romanian regions, which can be positively or negatively influenced by the degree of poverty, the present paper will also focus on studying these internally conditioned relationships.

**Literature review**
Historically, the impact of income inequality on economic growth has been brought to attention by several authors, notably Lewis (1954), Kuznets (1955), and Kaldor (1956), their theories placing the phenomenon of income distribution at the centre of discussions that argue for a compromise between factors. The linkage between economic growth and inequality can be tackled from different perspectives: differences in income distribution can explain a certain degree of macroeconomic development, but the influence of growth on income distribution can materialize distinctly at the individual level. Kuznets' (1955) theory was developed based on this assumption, arguing that economies will face higher levels of inequality in the first stages of their development, but it will gradually diminish as a certain degree of economic development is achieved, leading also to poverty reduction (i.e. "Kuznets inverted U-shaped hypothesis").

In the past decades, new studies have focused on disentangling the inequality-growth nexus (Cingano et. al, 2014; Berg et. al, 2018). Cingano et. al (2014) highlighted that a rise in inequality harms economic growth by studying the case of the Organisation for Economic Co-operation and Development (OECD) members. Their analysis showed that inequality negatively influences human capital and hinders economic growth when controlling for the influence of initial national income, educational attainment and investment. Berg et. al (2018), using compiled data drawn from Solt's (2009) model, observed that lower income inequality is correlated with rapid and sustainable economic growth, and unequal societies tend to redistribute more, but this redistribution does not have a major impact on growth. Also, Grundler and Scheuermeyer (2018) used the GMM (Generalized Method of Moments) system developed by Arellano & Bond (1991) to examine the effect of unequal income distribution in countries at different phases of development. They illustrated a negative effect of inequality in poor and emerging countries attributed to poor public infrastructure and financial market imperfections, but did not find a significant impact in the developed ones.

Likewise, the national literature supports the idea that inequality has manifested a strong negative influence in the emerging states of Eastern Europe since the '90s, especially in Romania with the removal of the communist regime, considering that increasing inequality is due to the transition to capitalism, macroeconomic changes and the adopted stabilization policies (Anghel, 2017; Oancea, Tudorel and Pîrjol, 2017). The study conducted by Anghel (2017) aimed at testing Kuznets' hypothesis over the period 1989-2015, providing an overview of the inequality level in Romania. On the other hand, researchers such as Ravallion (2011) and Brueckner et. al (2015) discuss the role of socioeconomic drivers in explaining the connection between economic growth and inequality. This debate starts from a fundamental model that has focused on studying poverty in both developed and developing countries, namely Bourguignon's model (2004) known as the "Poverty Triangle". His theory states that inequality and growth influence each other, and they simultaneously influence poverty. This influence has been thoroughly analysed during the last decades, exploring the role of economic growth in combating poverty and inequality, arguing that the relationship between inequality and poverty can be positively or negatively associated depending on the level of economic development, investment in human capital and macroeconomic stability (Edward and Sumner, 2018; Leow and Tan, 2019).

Looking from another methodological perspective, Paas and Schlitte (2009) were the first to observe that the spatial structure of the national income level of European countries is marked by an East-West directionality with higher regional growth rates in the East, supporting the presence of β-convergence. In addition, Pietrzykowski (2019), and Panzera and Postiglione (2022) highlighted the existence of multiple interdependencies between European states, including a spatial dependence that implies that regions with similar values of GDP per capita tend to cluster in space (i.e. positive autocorrelation). In conclusion, these results emphasize the impact of spatial interactions, and the need to implement regional development policies to achieve a stable convergence process in the EU.

**Methodology and data**

First, to answer the proposed research questions and to test the hypothesis of a negative connection between income inequality and economic growth that can be influenced by

variations in different socioeconomic factors, we considered a sample of 5 emerging countries from East-Central Europe, namely Romania, Bulgaria, Poland, Croatia and Hungary, whose macroeconomic evolution was observed between 2010 and 2019. We restricted this study to 2019 to avoid imbalances caused by the COVID-19 pandemic and Brexit. These countries were selected to investigate the pattern of this highly debated nexus in some of the ex-communist CEE countries by illustrating the overall evolution of these economies. Although they are currently at different stages of economic development, these states show similarities in terms of development trends and the process of European integration, as well as differences regarding their macroeconomic framework, arousing the interest for deeper research (Wan, 2002).

Second, the instruments used in this analysis aimed to evaluate countries' economic performance reflected by the GDP per capita expressed in PPPs, which is the most common method to compare living standards by reducing differences in price levels. The degree of inequality in income distribution will be illustrated by employing the Gini coefficient. To reflect the social dimension of our countries, we will calculate specific indicators highlighting the degree of absolute poverty, including the Headcount index and the poverty gap. These indicators capture the proportion of individuals living below the poverty line in the total population, but especially the rate at which the income of the poorest falls below this threshold, providing a broader perspective of poverty phenomena depth.

Our data was collected from various sources including the World Bank (http://data.worldbank.org; https://pip.worldbank.org/poverty-calculator), the European Commission (https://ec.europa.eu/eurostat/data/database), the National Institute of Statistics of Romania (http://statistici.insse.ro:8077/tempo-online), and the International Monetary Fund (https://www.imf.org/en/Publications/WEO) databases, given that they provide relevant quantitative data to our research. Moreover, given that the study of the growth-inequality link using spatial econometrics techniques is quite quantitatively limited in the literature, our contribution to this area involves the use of spatial tools such as cartograms and spatial panel analyses at the European level. The advantages of employing spatial econometrics methods include modelling the contingency and territorial interactions between sets of "neighbours" for various observations based on the spatial weighting matrix. The spatial effects captured are based on two major characteristics: dependence (autocorrelation) and spatial heterogeneity. The starting point of these analyses is represented by the Moran test (1950) which indicates the sign of the global spatial autocorrelation. In addition, the applicability of the above-mentioned instruments implies the visualization of the spatial distribution of the statistical units considered (especially through mapping) and the possibility of emphasizing atypical observations, i.e. statistical units with extreme values such as those observed in the case of Romanian regions (for example, the growth poles Bucharest and Cluj). Also, with the help of spatial analyses, potential clustering processes can be identified according to certain macroeconomic indicators as a result of the typology and specialization of the sampled economies.

## Results And Discussion
### *EU level*
First, since we assume a positive influence of equitable income distribution on economic growth, our objective is to investigate the specifics of the economic growth-inequality connection using different spatial econometric tools. In this regard, we conduct a brief

analysis concerning the convergence process of the GDP per capita at the EU level during 2010-2019 to verify the hypothesis of countries' clustering trend in the East-Central region, claimed by authors like Paas and Schlitte (2009), Pietrzykowski (2019), and Michálek and Výbošťok (2019). We will also check the conditioning of this process by certain composite variables relevant to the studied sample, such as the poverty gap. Descriptive statistics are provided below in Table 1.

**Table 1. Main variables used in the convergence analysis**

| Variable type | Variable name | Explanation | Mean | Standard deviation | Median | Min | Max |
|---|---|---|---|---|---|---|---|
| Factor | LPIB10 | GDP per capita in 2010 (logs) | 10.050 | 0.382 | 10.085 | 9.305 | 11.077 |
| Dependent | RPIB | Average annual GDP growth rate | 0.027 | 0.015 | 0.022 | -0.001 | 0.059 |
| Control variable | RGAP | Average annual growth rate of the poverty gap | 0.004 | 0.248 | -0.021 | -0.693 | 0.693 |

Source: Own calculations in GeoDa 1.20.0.36

**Figure 1. GDP per capita growth rate in the EU**
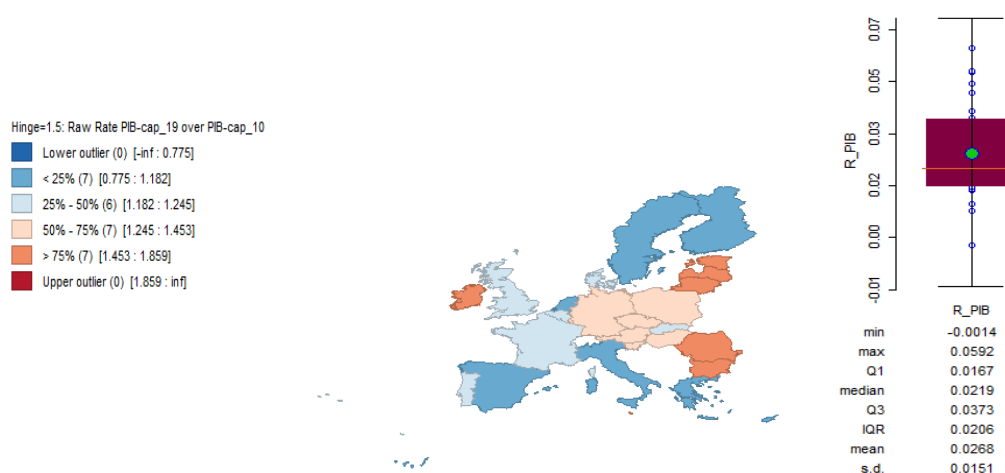


Source: Own calculations in GeoDa 1.20.0.36

Figure 1 shows that Western and Northern countries with higher initial GDP levels recorded lower growth rates, while Eastern countries with lower income levels experienced higher growth rates. These phenomena mark the premises of the convergence theory, according to which space units with lower initial levels will have higher growth rates than the others, and vice-versa, if convergence occurs. From a descriptive point of view based on cartograms, the existence of a convergence process at the Union level is confirmed, reinforcing us to expect that spatial regressions will also support the presence of this process.

On one hand, by verifying the significance of initial income by comparing the calculated value with the significance threshold, we see that the probability of the variable LPIB10 is $0.009 < 0.01$ (Table 2). Therefore, we claim the existence of a statistically significant relationship between the initial value of the GDP and the 10-year growth rate at the 1%

significance level. The regression coefficient is negative and ranges between (-1; 0), indicating that an economy with a lower level of income had a higher growth rate, confirming the occurrence of β-convergence at the EU level in terms of GDP per capita.

**Table 2. Results of the β-convergence analysis for R_PIB**

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| CONSTANT | 0.222 | 0.069 | 3.220 | 0.003*** |
| LPIB10 | -0.019 | 0.007 | -2.834 | 0.009*** |

Source: Own calculations in GeoDa 1.20.0.36). ***, **, *, denotes significance at the 1%, 5%, and 10% level.

On the other hand, this preliminary analysis has been extended and conditioned by the poverty gap growth rate to capture its potential effect on economic productivity. The results obtained in Table 3 illustrate that the convergence process remains active in the presence of this control variable since the statistical probability calculated for the baseline level is less than 1%. Moreover, we may argue that, at the European level, β-convergence persists and is significantly and negatively conditioned by the poverty gap rate.

**Table 3. Results of the conditional β-convergence analysis**

| Variable | CONSTANT Coef. (Prob.) | LPIB_10 Coef. (Prob.) | Control variable Coef. (Prob.) |
|---|---|---|---|
| RGAP | 0.228*** (0.001) | -0.020*** (0.004) | -0.021** (0.042) |

Source: Own calculations in GeoDa 1.20.0.36). ***, **, *, denotes significance at the 1%, 5%, and 10% level.

Starting from these findings and employing the research methodology approached, we will analyze the typology of the growth–inequality link in the selected emerging states from Eastern Europe, taking into account the additional implications of poverty at the regional level. In this regard, concerning the impact of the social dimension of inequality in the CEE group, we deepened this study by calculating and illustrating some absolute poverty indicators recorded in 2019 (Table 4).

**Table 4. Poverty Indicators in 2019**

| Country | Headcount index (%) | Poverty gap (%) | Squared poverty gap |
|---|---|---|---|
| RO | 2.16 | 0.76 | 0.58 |
| BG | 0.92 | 0.35 | 0.12 |
| PL | 0.06 | 0.03 | 0.0009 |
| CR | 0.26 | 0.16 | 0.03 |
| HU | 0.30 | 0.13 | 0.02 |

(Source: Own calculations based on https://pip.worldbank.org/poverty-calculator?src=BGR)

The Headcount index and the poverty gap are components of the Foster-Greer-Thorbecke poverty measurement technique developed by economists Foster, Greer, and Thorbecke (1984), and are derived by the following equation (Figure 2):

**Figure 2. Foster-Greer-Thorbecke measure**

$$P_\alpha = \frac{1}{N} \sum_{i=1}^{H} \left( \frac{Y_p - Y_i}{Y_p} \right)^\alpha$$

Source: https://www.fao.org/3/am381e/am381e.pdf

where N represents the population of a country, H is the number of individuals in the population, and Yp and Yi are the absolute poverty line and the income per capita, respectively. The higher the indicator, the deeper will be the poverty level. According to these indicators, we observe that in Romania and Bulgaria, the poverty degree is significant given the high proportion of the poor living below the threshold of USD 2.15/day set by the World Bank reflected by the Headcount index, and the ratio by which the average income of the poor falls below the poverty line captured by the poverty gap and the poverty deficit (i.e. squared poverty gap). For the other countries, the first two indicators show a lower degree of poverty compared to that recorded in Romania and Bulgaria, although similar values of the poverty gap in all countries, except for Poland, indicate a depth of this phenomenon at the national level, highlighting an average distance of about 28.60% from which the income of the poor depart from the poverty line.

Regarding the degree of income distribution in these states, the evolution of the Gini coefficient indicates that the inequality level is considerable, ranging between 28-40.80% (https://ec.europa.eu/eurostat/databrowser/view/tessi190/default/table?lang=en). We also note that the countries with the highest economic growth rates (Poland and Hungary) recorded lower income inequality compared to the others, while Bulgaria and Romania, which recorded lower but positive growth rates, occupied leading positions in terms of unequal income distribution. With a much lower initial income, Bulgaria has the lowest economic growth rate, but also the highest degree of inequality and poverty. Therefore, we expect the negative impact of income inequality and poverty to diminish the economic performance of these countries, confirming the hypothesis that there is a negative relationship between growth and inequality that is influenced by national income and poverty levels. However, despite a high degree of inequality and poverty, Romania has recorded a higher GDP growth rate than Croatia in the last period, a country where inequality and poverty were significantly lower, which makes us believe that under certain conditions, a positive linkage between concepts can also exist.

**Romania's case**
The contradictory results obtained in Romania's case led us to conduct an in-depth analysis at the macroeconomic level, especially due to the possibility of a positive association between variables. Therefore, using the database of the National Institute of Statistics of Romania (INS), we collected data on its national and sub-national evolution concerning economic productivity, population income and absolute poverty degree.

Keeping in mind that in the majority of the sampled countries, high inequality corroborated with poverty manifests a negative impact on growth, we analyzed the potential conditioning of the association between economic growth (LPIB) and income distribution of the population (LVenit) by poverty at the regional level. Moreover, although we have seen that poverty has a considerable influence on the macroeconomic framework, it also tends to be significantly influenced by the interdependence between the two concepts, supporting the "Poverty Triangle" hypothesis (Figure 3). Thus, economic growth can be an instrument for combating poverty, but its effectiveness is influenced by income distribution. At the zonal level, the cartographic results indicate that poor economic performance along with low-income levels lead to a major increase in poverty (e.g. in Eastern and Southern regions). Likewise, an increment in household incomes unaccompanied by an increase in economic productivity conducts to a deepening of

absolute poverty. In contrast, even if the population records modest earnings, as GDP increases, the poverty level tends to decrease (from East and South to West and Northwest). If both local GDP and income levels gradually increase, poverty is reduced, being much more homogeneously distributed among individuals (e.g. in North-West and Centre regions).

**Figure 3. Conditional poverty map in 2019**
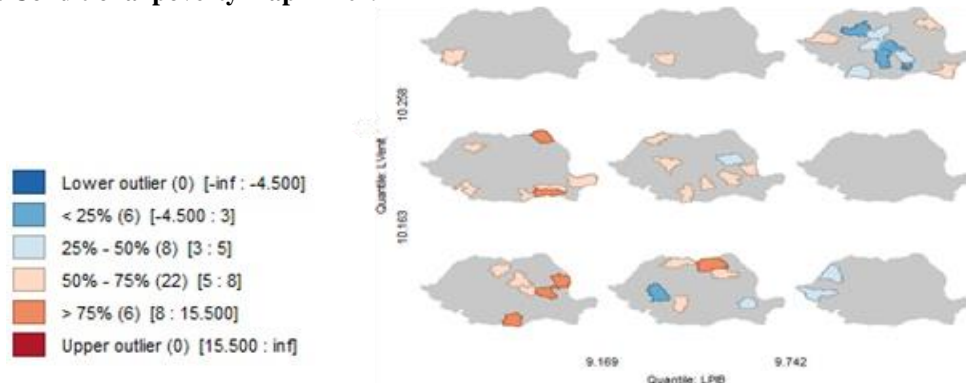


Source: Own calculations in GeoDa 1.14

**Conclusion**

The comprehensive study of theoretical and empirical literature has given us the possibility to extend our perspective and better reflect the pattern of the growth-inequality nexus among EU members, with a special focus on CEE countries.

To answer the proposed research questions, we started our analysis by testing the existence of a β-convergence process at the EU level conditioned by the degree of absolute poverty. Then, we focused on evaluating the development trend of 5 CEE countries between 2010-2019 in terms of economic growth, income distribution, and poverty level. Methodologically, various indicators belonging to the structural dimensions of inequality were collected to explore the pattern of the relationship between economic growth and income inequality, such as the Headcount index, the poverty gap, and the poverty deficit.

In a research area characterized by theoretical uncertainties and empirical contradictions, our results reflect a potential positive association between the main variables just in the particular case of Romania. Moreover, our analysis denotes a significant impact of sub-national disparities on this linkage. In this regard, by employing spatial econometrics techniques, we observe a considerable degree of inter-regional discrepancy in terms of economic growth and income distribution, with some areas being more economically developed, while others are significantly poorer. In the same vein, we show that poverty can positively or negatively influence this connection, depending on the specificity of the regional macroeconomic framework. In this regard, policymakers should pay more attention to the degree of absolute poverty when targeting inequality-reduction strategies. Therefore, the contribution of our study to the empirical literature involves a deeper evaluation of the growth-poverty-inequality trilemma in a general common group, considered quite homogeneous across Europe, but which stands out for its distinct evolutionary trends and conditioned by different socioeconomic drivers, including the presence of a β-convergence process at the Union level.

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