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INCOME INEQUALITY CONVERGENCE IN EUROPEAN UNION COUNTRIES – THE IMPORTANCE OF EMPLOYMENT STRUCTURES

| Abstract

- ▶ *Goal* – the objective of the paper was to empirically identify the existence of income inequality convergence between EU countries over the period from 2009 to 2021 and the importance of structural change in this process (where structural change is understood as shifts in the sectional distribution of workers).
- ▶ *Research methodology* – for this objective, panel models of income inequality convergence considering the 27 EU Member States were estimated.
- ▶ *Score/results* – the obtained results provided a strong basis for confirming the existence of income inequality convergence between the European Union countries, which confirmed the growing similarity of these countries in this respect. The convergence also means that the level of inequality is rising across the EU. The carried out research did not allow the structural change to be explicitly recognised as a significant factor influencing changes in the level of income inequality, but it did reveal specific relationships in terms of the importance of institutional arrangements in this channel of influence.
- ▶ *Originality/value* – the research undertaken in this paper on the problem of inequality convergence in the context of serious economic perturbations allows to assess the sustainability of these processes and the strength of cohesion trends in the European Union. Identifying the convergence at the international level with increasing intra-country inequalities, they point to failures in the implementation of social cohesion policies.

| **Keywords:** income inequality convergence, structural change, the EU countries.

1. Introduction

The economies integrating within the European Union should gradually reduce the disparities which divide them in terms of the average level of production and income, as well as their distribution. This implies the expected emergence not only of a classically understood convergence in the level of GDP per capita, but also of a convergence in income inequality, which is understood as a reduction of differences in the division of produced value. In doing so, the development objective in the European Union is to reduce the level of income inequality both between and within individual countries of the EU. An optimal model of inequality convergence implies a reduction in its level across the economies, while bridging the gap between the EU countries.

Income inequality convergence will, however, emerge when disparities in the determinants of income inequality are reduced. These factors can be institutional, resource-based, as well as structural (understood as the ratios of production, consumption and commitment of productive factors in different economic activities). Despite the considerable research into the impact of resource and institutional determinants on convergence processes, relatively less attention has been paid to the importance of the structural underpinnings of economic processes. Furthermore, while the convergence of average income levels is a frequently addressed issue, the convergence processes of income inequality are relatively rarely studied. Meanwhile, differences in the generic structure of production generate differences in the commitment of resources (including labour) between activities and, as a result, translate into the distribution of income in society and the structure of consumer demand, which, in turn, determines the structure of production. The relationship between income inequality and the structural characteristics in an economy is therefore an important area of development processes to ensure increasing wellbeing.

The objective of the paper was to empirically verify the existence of income inequality convergence in EU countries and the importance of structural change in this process (where structural change is understood as shifts in the sectional distribution of workers). Answers were sought to the questions: Is there a convergence in inequality between EU countries? Does this convergence imply an increase or decrease in the average level of within-country income inequality? Are the changes in the level of inequality influenced by structural changes?

To meet the research objectives, this paper estimated income inequality convergence models for EU countries over the 2009–2021 period. These were

beta convergence models, estimated with the use of panel models with fixed effects. The research period was a period of severe crisis-like disruption, initially induced by the financial, debt and institutional crises, and in recent years, by the pandemic crisis. Thus, the undertaken research made it possible to identify the occurrence of convergence of inequalities in the context of serious economic perturbations, and consequently, to determine the sustainability of these processes and the strength of cohesion trends in the European Union.

2. Literature review

Research into the processes of income inequality convergence (distributional convergence) began at the end of the 20th century, when Bénabou [1996] proposed extending the neoclassical approach to convergence analysis, which takes into account the average income levels, to an analysis of the convergence of the entire income distribution as reflected by income inequality. According to the beta convergence model [see e.g.: Bénabou, 1996; Ravallion, 2001; Solarin, Erdogan & Pata, 2023], income inequality convergence occurs when income inequality increases faster or decreases slower in countries with initially lower levels of income inequality. Sigma convergence [see e.g. Solarin, Erdogan & Pata, 2023] instead assumes a reduction of the income inequality gap over time. At the same time, these models do not assume a reduction in income inequality in converging economies, but only an approximation to a similar income distribution. Hence, further research has been attempted to verify the existence of income inequality convergence, and to identify a target level of income inequality.

Research into income inequality convergence between economies in the world at different stages of development has mostly identified the existence of such a phenomenon. Convergence for 30 countries was confirmed by the pioneering analysis of Bénabou [1996] as well as by Ravallion's [2001] studies – one of the first ever to achieve this – for 66 countries. Bleaney & Nishiyama [2003], in a study of 79 countries, and Chambers & Dhongde [2016], who rated 81 countries, in addition to confirming convergence, further indicated that the dynamics of convergence were much higher in the developed countries than in the developing countries. Analysing 21 OECD countries, which are highly developed economies, Solarin, Erdogan & Pata [2023] also confirmed the existence of convergence.

Verification of the existence of income inequality convergence in advanced economies also applied to a group of EU countries and was mostly positive. The phenomenon of income inequality convergence was confirmed by Alvarez-Garcia, Prieto-Rodriguez & Salas [2004], as well as Kvedaras & Cseres-Gergely [2020]. Similarly, Ari, Cergibozan, Demir & Yetkiner [2022] focused on 15 EU countries and identified convergence, which, however, led to a higher income differentiation. In contrast, Suárez-Arbesú, Apergis & Delgado [2022] found divergence in income inequality across EU countries, distinguishing four ‘clubs’ and four ‘diverging countries’.

Research into income inequality convergence is also carried out at the regional level in intra-country comparisons or, as in the case of the EU, intra-Community comparisons. Concerning Europe, convergence was again confirmed in the research by Ezcurra & Pascual [2005], Tselios [2009], as well as Savoia [2019]. However, income inequality convergence was also observed in other regional systems, e.g. Gomes [2007] and Gomes & Soave [2019] identified the existence of income inequality convergence in regions of Brazil, while Panizza [2001], Ezcurra & Pascual [2009], Lin & Huang [2011], and Lin & Huang [2012] identified it in the United States.

Although the research to date tends to discover and confirm income inequality convergence, this does not mean that the phenomenon is universal and absolute. Such results can be obtained due to the selection of the analysed economies, which tend to be a relatively coherent group with similar structural characteristics, resource features, or institutional arrangements. The similarity in the characteristics of the bases of economic activity is the rationale for the existence of convergence in both the level and distribution of income. The consideration of common determinants provides a foundation for the inference of the existence of what is called ‘conditional convergence’ and, consequently, the identification of ‘convergence clubs’.

In the study of the determinants of income inequality and, consequently, the convergence of its level, the most often considered factors include: the level of economic development (determined by GDP per capita, which follows the classical relationship described by the Kuznets curve), the openness of the economy (assessed in terms of foreign trade, as well as the flow of capital, migration, or technology), human resources (their level and usage, determined by the level of education and the situation on the labour market), and the scale of public intervention in the economy (reflected by the level of public spending, the tax burden and the limits of civil liberties and public rights). Suárez-Arbesú,

Apergis & Delgado [2022] indicated that the main factors reducing inequality in EU countries are the level of openness of the economy, public intervention and education. Similarly, in the analyses presented by Ari, Cergibozan, Demir & Yetkiner [2022], the decrease in inequality in the EU-15 is due to an increase in GDP per capita, but also to an increase in population, investment or civil liberties, while an increase in inequality is contributed to an inflow of foreign investment.

Despite the conceptual basis formed by the structural convergence hypothesis [Wacziarg, 2001], according to which income convergence coexists with the convergence of economic structures; structural characteristics of economies are relatively rarely considered among the determinants of income inequality and its changes. If they are included in the models, it is in the form of shares of selected sectors in the economy [see e.g. Behera & Viswanathan, 2021], rather than the overall structural specificity and its changes. In the context of the complexity of the structure of foreign trade, these relationships have been studied by, e.g., Lee & Vu [2019], who declared that an increase in the complexity (diversity) of the economy reduces the level of inequality. So far, however, the impact of the scale of inter-sectional labour transfers on inequality has not been studied. In the context of the research gap discussed above, the relationship between income inequality and structural change was an important aspect of the analyses presented in the following section.

3. Research methodology

This work used statistics available in the Eurostat database for the period 2008–2021, compiled on an annual basis. They allowed for a model-based analysis of the phenomenon of income inequality convergence in the EU27 and identification of the importance of structural change.

To determine the extent of income inequality as measured by the Gini coefficient, statements on the inequality of the distribution of alternative income categories were used, like so:

- Gini coefficient of the equivalised disposable income before social transfers (which include pensions), called the ‘market income’ [www 1] – Gini variable;
- Gini coefficient of the equivalised disposable income after social transfers [www 2] – Gini variable.

Data on employment by economic activity conforming to the NACE Rev.2 activity classification sections A-S [www3] were also included, which formed the basis for determining the sectional structure of employment and its changes.

Structural change was measured on an annual basis using the NAV measure defined by the following equation [Kukuła, 1996]:

$$\text{NAV} = \frac{\sum_{i=1}^k |\alpha_{it} - \alpha_{i(t-1)}|}{2}$$

with:

α – share of sections in the employment structure

i ($i = 1, \dots, k$) – section

t – period.

It was required to identify structural transformations as a measure of the dynamics of the phenomenon, with the time range of the variables included in the model limited to the years 2009–2021.

Descriptive data was also sourced from the Eurostat database and were as follows:

- value of real GDP per capita at market prices in EUR (base year 2010) [www 4] – variable ‘GDPpc’;
- percentage of population aged 15–64 with tertiary education (ISCED 2011 levels 5–8) [www 5] – variable ‘edu’;
- total general government expenditure as a percentage of GDP [www 6] – variable ‘gov’;
- total of exports and imports as a% of GDP [www 7] – variable ‘op’.

These statistics provided the basis for assessing the impact on changes in income inequality of the underlying socio-economic and institutional features that are most often identified as determinants of inequality convergence. They acted as control variables to verify the stability of the results in terms of the existence of income inequality convergence.

The concept of beta convergence was used to identify the existence of income inequality convergence across the EU countries, which can be represented by the model:

$$\Delta \text{Gini}_{it} = \alpha + \beta \text{Gini}_{i(t-1)} + \varepsilon_{it}$$

with:

β – parameter of convergence.

Convergence occurred when the parameter β was negative and statistically significant.

The models estimated in this form also provided the basis for determining the target level of income inequality convergence according to the equation: $-\alpha/\beta$, and for the inequality variable in logarithmic form according to the equation: $\exp(-\alpha/\beta)$ [see e.g. Gomes, 2007: 2].

The inequality convergence model also took into account a number of variables that determine the course of income inequality convergence. Due to the objective of this work, structural change as measured by NAV was taken as such a variable, which was included in further modelling. Complementary estimation was also performed for models that featured individual control variables introduced in subsequent model forms. The estimated models took the general form:

$$\Delta Gini_{it} = \alpha + \beta Gini_{i(t-1)} + \delta NAV_{i(t-1)} + \gamma Z_{it} + \epsilon_{it}$$

with:

NAV – structural change as a determinant of convergence;

Z – control variables, for which GDPpc, edu, gov, op were taken, in turn.

The individual models were estimated as panel models with fixed effects after prior statistical verification of the validity of this procedure. The verification consisted of panel diagnostic tests for the choice between using the panel OLS model, introducing random or fixed effects.

4. Research results

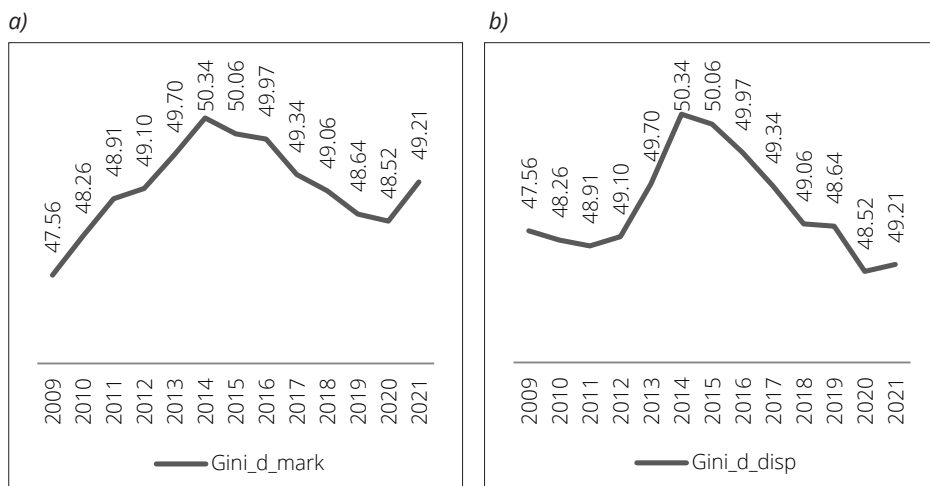
4.1. Level and changes of income inequality in EU27 countries

In the EU27 over the period 2009–2021, the level of market income inequality was clearly higher (with an average of 49.13) than for disposable income after transfer payments (average 29.79) (Table 1). This demonstrated the significant extent of the welfare state's influence on income distribution and the role of social arrangements in this group of countries.

The level of inequality also fluctuated quite considerably over time as a result of cyclical changes (Chart 1). Clear trends of increasing inequality were discovered during the period of overcoming the effects of the global financial crisis until 2014 (although this trend emerged much faster in relation to market income than disposable income). In the post-2014 years, the level of inequality decreased as the economy improved. This trend was again interrupted by crisis phenomena triggered by the Covid-19 pandemic. The fluctuations also showed a higher amplitude in terms of market income, indicating a stabilising effect of public benefits on income inequality in EU countries.

Between 2009 and 2021, an increase in average market income inequality was noticed, with a reduction in income after transfers. Thus, there were tendencies in the EU, typical of market economies, to increase social disparities, which were, however, largely corrected by public intervention.

Chart 1. Changes in market (a) and disposable (b) income inequality in the EU27 from 2009 to 2021



Source: the author's own work based on Eurostat data.

The trends of the values of average measures of income inequality over time, however, did not allow for an assessment of differences between particular countries. In the period of interest, the highest levels of income inequality without social transfers were found in Sweden, Greece, Portugal and Germany, which were relatively advanced economies, while the lowest disparities concerned Slovakia, Slovenia, Malta and the Czech Republic, which are countries with

a relatively short period of membership of EU structures. By contrast, in terms of income after transfer payments, the highest inequalities were found in Bulgaria, Lithuania, Latvia and Romania, relatively poor countries with a post-Socialist history, while the lowest inequalities were again found in Slovakia, Slovenia and the Czech Republic. Thus, it can be seen that some wealthy EU member states, by implementing social policies, were able to reduce significant market inequalities, while others discounted the social benefits of relatively undifferentiated market structures. Significant differences in inequality mainly concerned the group of 'new' EU member states that are adopting different welfare state development paths.

4.2. Income inequality convergence in EU27 countries

The carried out research allowed the existence of income inequality convergence to be verified by estimating alternative models for both measures of disposable income (before and after social transfers), using different solutions in terms of the form of the inequality measure (original or logarithmic form) (Table 1).

All estimated models confirmed the existence of income inequality convergence, as indicated by statistically significant, negative parameter β values. These parameters retained their sign both under the assumption of absolute convergence (models 1 and 7 for both income measures) and after including structural changes as determinants of this process, which were introduced as a lagged NAV measure (in models 2 and 8), and after adding various control variables (in models 3–6 and 9–12). The results of the work thus provided strong support for the thesis of a progressive convergence existing in the level of income inequality among the 27 member states of the EU. This observation may be indicative of progressive integration processes within the grouping, ensuring the liberties of the common market and the similarity of systemic solutions.

The estimated models of absolute income inequality convergence also made it possible to determine a target level of convergence, which is a common perspective of converging countries (Table 2). Research shows that in the EU27, income inequality both in terms of income before and after social transfers will increase. Despite the increasing similarity between the EU member states, income differences are therefore to be expected to increase in terms of national communities and therefore between individuals.

Models for incomes after social transfers:												
	d_Ginidis						d_InGinidis					
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9	Model 10	Model 11	Model 12
const	9.47***	9.42***	11.41***	9.87***	8.10***	9.85***	1.10***	1.10***	1.21***	1.13***	1.05***	1.12***
Ginidis_1	-0.32***	-0.32***	-0.33***	-0.32***	-0.32***	-0.32***	—	—	—	—	—	—
InGinidis_1	—	—	—	—	—	—	-0.33***	-0.33***	-0.34***	-0.33***	-0.32***	-0.33***
NAV_1	—	4.90	2.42	3.46	1.01	4.29	—	0.20	0.11	0.14	0.07	0.17
GDPpc	—	—	-0.00***	—	—	—	—	—	-0.00***	—	—	—
edu	—	—	—	-0.01	—	—	—	—	—	-0.00	—	—
gov	—	—	—	—	0.03	—	—	—	—	—	0.00*	—
op	—	—	—	—	—	-0.30	—	—	—	—	—	-0.01
LSDV R2	0.19	0.19	0.21	0.19	0.20	0.19	0.18	0.19	0.22	0.19	0.20	0.19
Within R2	0.16	0.16	0.18	0.16	0.17	0.16	0.16	0.16	0.19	0.16	0.17	0.16
AIC	876.90	878.47	869.75	879.49	876.18	880.01	-1327.18	-1325.83	-1335.88	-1325.44	-1328.28	-1324.51
BIC	982.76	988.11	983.18	992.91	989.60	993.43	-1221.32	-1216.19	-1222.46	-1212.02	-1214.86	-1211.09
HQI	919.16	922.23	915.03	924.76	921.45	925.28	-1284.93	-1282.07	-1290.61	-1280.17	-1283.01	-1279.24
DW	1.92	1.91	1.95	1.92	1.95	1.92	1.96	1.95	1.99	1.97	2.00	1.97
p for F test	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Statistical significance at a level: *** 0.01; ** 0.05; * 0.1

Source: the author's own work base1d on Eurostat data.

Table 2. Target income inequality levels vs. the year 2021

	Income inequality before social transfers	Income inequality after social transfers
The average level in year 2021	49.21	29.43
Target level in a model, considering:		
• the original variable	49.55	29.76
• the logarithmic variable	49.35	29.51

Source: the author's own work based on Eurostat data.

The convergence of market income inequality was found to be conditioned by changes in the structure of the workforce by section of economic activity. The parameters of the NAV variable in models 2 and 8 were found to be statistically significant and positive. This means that the acceleration of structural change had its effect in the form of an accelerated increase (or slowed decrease) in income inequality without considering social transfers. Greater shifts of the workforce between spheres of economic activity lead to a wider economic division in the society. The beneficiaries are mainly individuals capable of joining the latest processes of economic change, ready to retrain and adapt to technological innovations.

However, the stimulus effect from structural change was no longer observed with regard to income inequality once transfer payments were considered. The parameters proved to be statistically insignificant in this case. This observation once again draws attention to the equalising nature of public interference in income distribution.

The introduction of control variables in successive models confirmed the existence of clear income inequality convergence phenomena, as their inclusion in the models did not lead to a change in the sign of parameter β . However, not all of them were found to significantly condition changes in inequality.

The GDP per capita variable was found to be a significant destimulant of income inequality growth, and higher levels of this variable reduced changes in inequality (models 3 and 9), consistent with the Kuznets hypothesis for countries in advanced development. Thus, it should be expected that the processes of growing inequality should be weaker in wealthier countries than in poorer ones.

The problem of social disparities is thus shifting towards countries that are less advanced in terms of economic development, which often reduce the pursuit of social objectives in favour of economic growth dynamics. At the same time, the inclusion of this variable in the models weakened the impact of structural change as a result of the complex interdependencies between these economic phenomena.

The scale of state interventionism, as measured by the share of government spending in GDP, was found to be an important driver of income inequality before transfers. The estimated models that included this variable (5 and 11) indicated that an increase in state participation in the economy accelerates the growth of market inequality. It appears that it was in economies with a significant public sphere that economic disparities increased. This could be due to a base effect (the initial low level of inequality in economies with significant interventionism occurs with faster growth in inequality) or the reduced performance of overly state-controlled economies. Nevertheless, this score could also be the result of interdependencies with other variables, including structural changes, which became insignificant once the variable gov was taken into account. Similar relationships – albeit with much lower statistical significance – also applied to the model with income after transfers.

Despite the theoretical indications, none of the models in which the variable edu was introduced as a control (4 and 10) confirmed the significance of the effect of population education on changes in income inequality. This may be due to both the mutual coupling between the analysed variables and the inadequacy of the measure of education in the form of the percentage of people with university education. In countries with advanced development, a group to which EU members belong, human resources may not be adequately reflected by formal education levels. Both the profiling of education and the practical skills and competences not associated with education in standard education systems could have a significant impact. In today's knowledge-based economies, innovation skills and the capacity for continuous development are increasingly important. The adaptability of the workforce also determines the potential for structural change and, ultimately, for raising society's incomes.

Similarly, the variable of the openness of the economy proved to be insignificant (models 6 and 12). This could be conditioned by the different nature of the competitive advantages of individual EU economies in international markets and, consequently, the different nature of the impact of the economy's openness on inequality levels. It is also possible that the impact of globalisation processes

on inequality is more along to the factor of the exchange dimension than in terms of trade in goods, which would require further verification using alternative measures (indicators) of participation in the global economy.

5. Conclusions

The research carried out on income inequality convergence processes in the EU27 countries allowed to discern several important phenomena:

1. In the EU27, there is a significant range of welfare state influences on income distribution, resulting in a marked reduction in the level of income inequality after social transfers relative to their market level. Changes in income inequality also revealed a strong pro-cyclical pattern, increasing during crisis phenomena.
2. There was an income inequality convergence found between EU countries. This trend was confirmed for income before and after social transfers. The phenomena of income inequality convergence testified to the increasing cohesion of the grouping countries associated with multidimensional integration within the EU. The differences between the member states are gradually decreasing.
3. The level of income inequality is increasing across the European Union. The exacerbation of intra-country economic disparities resulting from the models is a phenomenon indicative of the lack of success of EU policies geared towards reducing inequalities and increasing social cohesion. Despite the progressive integration and convergence of inequalities between the countries of interest in this work, further prospects suggest increasing social disparities in each economy. While differences between the countries are gradually disappearing, intra-social disparities are also increasing in the income domain.
4. The completed research as discussed in this paper did not clearly identify the structural change as a significant factor influencing changes in the level of income inequality in the EU27. Their significant stimulating effect relates to market income inequality but not to disposable income. The income differentiating effects of the transformation of economic structures are offset by the impact of government social policy. Such results are a positive indication of the effectiveness of redistributive policies.

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