

Real Convergence in the European Union – the Social Dimension

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Abstract

Real convergence is a multidimensional process of drawing European Union (EU) member states closer together, which takes place in many aspects, including economic and social ones. In social terms, it means improving living conditions and reducing social inequalities. Real individual consumption in EUR per capita with purchasing power parity was used as the variable informing about the level of social development. The main objective of the article is to verify the existence of social convergence between EU member states (including the United Kingdom – UK) between 2004 and 2023. Two methods of convergence measurement were used to analyse convergence: beta and sigma types. Convergence calculations were based on data from Eurostat. In the case of missing data (UK), projections were made using growth rates from the previous period. The analysis was supplemented by the Shannon entropy index. The study's application objective was to assess whether the scale of the reduction in the gap in individual consumption (well-being and quality of life) is narrowing, including identifying periods when convergence has been slower. This can help guide future economic policy and measures to further narrow the gap. In addition, the authors distinguish countries that have managed to improve their position to the greatest extent in terms of the analysed measure of social development.

Key words

social convergence, catching up, Actual Individual Consumption per capita, European Union, Shannon entropy index.

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Introduction

The European Union's cohesion policy aims to ensure economic, social and territorial cohesion, promoting sustainable territorial development. In 2015, UN member states adopted the world development strategy to 2030, Transforming our World: The 2030 Agenda for Sustainable Development, containing 17 Sustainable Development Goals. The resulting development priorities reflect the three dimensions of sustainable development: economic, social and environmental. While promoting economic growth (and productivity) has always been an objective of EU policy, there is now a strong orientation towards the social dimension of development in member countries. The

elimination of poverty in all its forms and dimensions has been identified as the greatest global challenge and a necessary requirement for sustainable development (UN, 2015).

The global challenges of the past two decades, including the financial crisis, the COVID-19 pandemic and the war in Ukraine, have impacted individual EU countries to varying degrees, revealing large income disparities. Between 2006 and 2021, the share of people living below the poverty line increased in two-thirds of the member states and income inequality increased in about half of the countries (especially in the “old” member states) and decreased in the other half (especially in Central and Eastern Europe) (Eurofound, 2024).

In the context of high social inequalities, the harmonisation of living standards between EU countries and the strengthening of socio-economic growth as well as convergence become essential. Economic convergence should be accompanied by social convergence (Moscovici, 2017). These two dimensions of convergence are complementary and lead to sustainable development. The prerequisite for building social well-being is economic well-being. Convergence is therefore a multidimensional process of convergence between EU countries in many areas. In addition to the economic and social dimensions already mentioned, the institutional, environmental, or cultural dimensions are also important. In the most general terms, social convergence is understood as the improvement of living conditions and the reduction of social inequalities. It may relate to poorer countries catching up with more developed economies or to economies becoming more similar in the long term in relation to the indicator analysed (Wójcik, 2018).

The overall intention of the authors is to verify the existence of social convergence within EU member states (including the UK) between 2004 and 2023. Two types of convergence are considered: beta (less developed countries show faster growth rates than more developed countries) and sigma (differentiation decreases over time). In addition, the analysis was enriched by the Shannon entropy index. The study of social convergence was performed on the basis of changes in real private consumption at purchasing power parity, equating it with a measure of household material well-being. This indicator, estimated by Eurostat, refers to all goods and services actually consumed by households in EU countries. It therefore includes not only goods and services purchased directly, but also services provided by the state, such as those relating to health care or education.

The analysis consists of two stages. In the first, the hypothesis of an equalisation of welfare and quality of life (measured by the real private consumption index) between EU countries was verified based on the concept of sigma convergence. In the second, using the convergence beta and the Shannon entropy index, the divergence in development between EU member states was assessed, identifying the countries that managed to improve their position to the greatest extent in terms of the measure of social development analysed.

1. Literature review

1.1 *Economic Background*

In general, the term convergence is used to describe the process by which initially dissimilar phenomena (objects) become similar in terms of some studied characteristic. In the economic sciences, this concept has become established since the 1990s with the development of economic growth theory. Real convergence concerns permanent structural changes in a given economy (region, group of countries) and the equalization of real values (Wójcik, 2018). Real social convergence is understood as the equalisation of the population's standard of living (material well-being) measured by Actual Individual Consumption (AIC) with purchasing power parity (PPS) – AIC per capita (PPS).

The starting point for the analysis of the relationships between the member states are the differences in AIC per capita in relation to the EU average (EU=100) in 2004 and 2023, which are presented in Table 1.

Table 1. Real individual consumption per capita and its evolution (considering purchasing power parity) of the EU countries and the UK in 2004 and 2023, (in % of EU average, change in percentage points – pp.).

Countries	2004	2023	Change 2004-2023	Countries	2004	2023	Change 2004-2023
Belgium	116.3	120.0	3.8	Lithuania	55.4	89.1	33.7
Bulgaria	40.2	65.1	24.9	Luxembourg	181.5	155.5	-26.0
Czechia	71.0	81.5	10.5	Hungary	61.6	67.0	5.4
Denmark	121.9	119.3	-2.6	Malta	88.4	91.8	3.3
Germany	124.3	115.5	-8.8	Netherlands	129.1	122.3	-6.8
Estonia	53.5	80.7	27.3	Austria	124.4	118.9	-5.6
Ireland	120.1	115.9	-4.2	Poland	56.1	81.7	25.6
Greece	103.1	80.6	-22.6	Portugal	92.2	87.0	-5.2
Spain	101.3	90.4	-10.9	Romania	39.1	82.4	43.3
France	113.2	107.5	-5.7	Slovenia	83.1	88.3	5.2
Croatia	61.0	77.8	16.8	Slovakia	53.4	75.9	22.5
Italy	116.5	102.0	-14.5	Finland	111.2	110.3	-0.9
Cyprus	101.1	105.3	4.2	Sweden	125.7	109.4	-16.3
Latvia	47.9	70.6	22.6	UK	139.6	101.5	-38.2

Source: own elaboration on the base of Eurostat (2023).

Meanwhile, Figure 1 illustrates the changes in individual consumption per capita of the EU countries and the UK in the period 2004–2023.

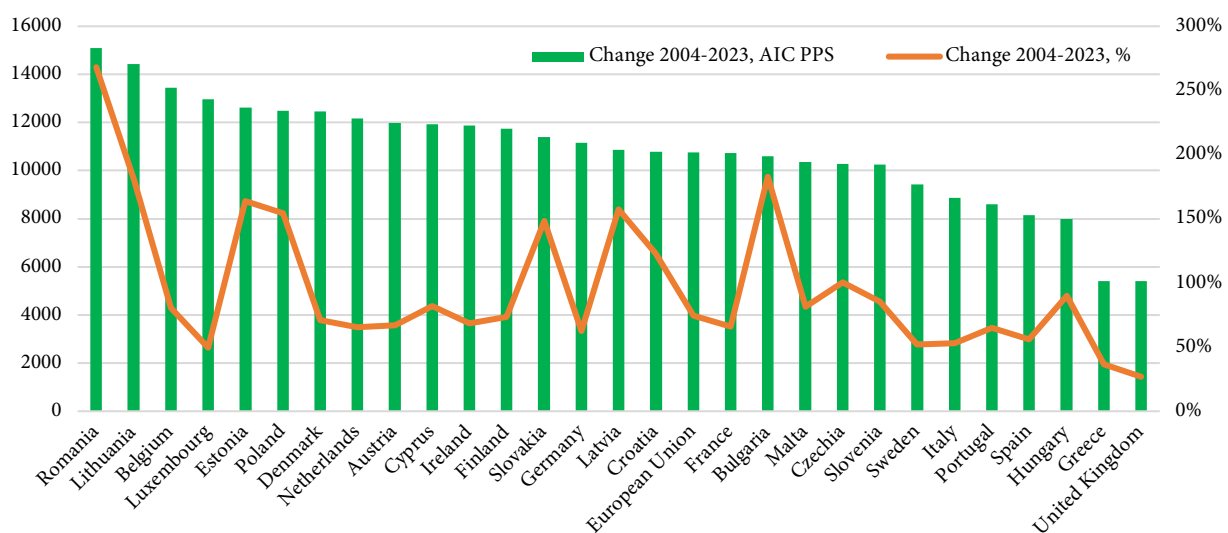


Figure 1. Change in private consumption per capita in EU countries and the UK in the period 2004–2023, (AIC per capita, euro PPS and %).

Source: own elaboration on the base of Eurostat (2023).

The empirical picture emerging from the above information allows us to note that:

1. Taking real individual consumption into account, Luxembourg is still the wealthiest country in the EU, but is now not as far ahead of the others as it was at the beginning of the period under review. In 2023, the country's AIC per capita exceeded the EU average by 55.5%, compared to 81.5% in 2004. A similar situation is characteristic of many wealthier countries.
2. The group of countries that exceed the EU average in terms of consumption has decreased. AIC per capita was above the EU average in 2004 in 15 countries - from Luxembourg (81.5%) to Cyprus (1.1%). In general, this group included the "old" EU countries, except for Portugal (92.2%). Of the "new" countries, only Cyprus was classified in this group. Meanwhile, in 2023, AIC per capita was above the EU average in only 13 countries, including the UK, but these values were much lower - from 55.5% (Luxembourg) to 1.5% (UK). Two "old" countries - Spain and Greece -

moved to the group below the average. Meanwhile, the "new" member states, except for Cyprus, are still in the group below, but are quickly approaching the average level of the entire group.

3. The fastest real convergence process took place between 2004 and 2023 in Romania and Lithuania, with increases of 43 and 34 percentage points (pp.) respectively, as well as in Estonia (27 pp.), Poland (26 pp.), Bulgaria (25 pp.), Latvia and Slovakia (23 pp.), as well as Croatia (17 pp.). In contrast, negative changes in the ratio of the national AIC to the EU average were recorded for several countries - the UK (down 38 pp.), Luxembourg (26 pp.), Greece (23 pp.), Italy (15 pp.) and Spain (11 pp.) - which (from their point of view) would imply a slowdown in the pace of convergence.
4. Worthy of separate mention is the spectacular success of Romania, which in almost two decades was able to reduce the development gap with the EU by more than 43 p.p., and the consumption of the average Romanian increased by 15,089 euros (in PPS). In the pre-accession period (2004-2007), a significant upward trend was already visible, and in three years it managed to reduce the gap with the EU average by 9.5 pp. (a similar result was achieved by the Czech Republic in the whole 2004-2023 period). On joining the EU, Romania was approaching 50% of the Community level, and in 2023 the country's individual consumption level was 82.4%. Romania's performance has been the subject of a number of studies, which also highlight the significant regional disparities in the country's socio-economic development, as real convergence at regional level is not progressing at the right pace (Munteanu, 2015; Chilian et al., 2016). While this is characteristic of most EU countries, research shows that less developed countries, such as Romania, have higher levels of regional disparities (Fitekova et al., 2021).

On the basis of the data presented, it is possible to see large differences in the initial level of real individual consumption and in the rate of closing the gap in material well-being, the living standards of EU residents. At the same time, the preliminary analysis of the changes taking place suggests the existence of a clear social convergence between the EU member states (including the UK) in the period 2004-2023. It is also worth noting that after the EU enlargement the pace of convergence of the "new" countries accelerated, which can be treated as a positive impact of membership in the integration grouping. In this case, European integration acts as a "motor of convergence", accelerating progress (Stojkov et al., 2024). It therefore makes sense to analyse in greater depth the processes of social convergence taking place, using selected methods to measure it.

1.2 Real social convergence

Most common in the economic literature are studies of real economic convergence. These concern studies of how countries are becoming more similar in terms of economic development, most often income convergence based on changes in GDP per capita or labour productivity. Less frequently, convergence analysis is also concerned with other factors of economic growth (output of different sectors of the economy, public finances, inflation, trade balance, the role of institutions, sustainable production and others) (Rapacki&Próchniak, 2019; Holobiuc, 2021; Matkowski et al., 2016; Józwick, 2017; Lungu, 2024; Bobeva, 2021; Cabral&Castellanos-Sosa, 2019; Markowski et al., 2023; Toplu, 2022; Fedajev et al., 2021).

Much less frequently, convergence analysis concerns social phenomena. However, assuming that GDP per capita is a rather unreliable measure of well-being or standard of living, because a high level of economic development measured by GDP does not mean a high level of consumption and does not indicate the material well-being of residents (Stiglitz et al., 2009), researchers increasingly often refer to real social convergence.

The approach to this issue is characterised by great diversity both in the context of the choice of variables studied, the territorial and temporal scope of the conducted research, and the results of the analysis. The existence of various approaches to measuring social convergence results from the lack of a single, universal definition of the standard of living of the population (Kuc, 2014). Most often, empirical analyses devoted to real social convergence focus on income, individual consumption or other socio-economic phenomena, such as human and social capital, unemployment and poverty,

education and health care, and other variables. In this case, convergence is examined for each of the selected variables or a synthetic variable constructed on the basis of several partial factors is used.

The review of studies on the above-mentioned topics showed that the assessment of the convergence of social development between Member States is most often made on the basis of an assessment of the social dimension and problems of inequality in European countries in the context of the assumptions of the EU cohesion policy. Dubra (2016) analyses a number of indicators characterising the social situation in EU countries, as well as GDP growth, population income levels, unemployment rates and welfare in relation to the targets. Finding the existence of convergence in terms of the areas studied, the author concludes that the speed of convergence depends on the initial disparity in the level of development in EU countries, and that the European convergence policy needs to be improved through an appropriate selection of country-specific social measures.

Similarly, the article by Lafuente et al. (2020) assesses the poverty and social exclusion pillar of the Europe 2020 strategy, analysing whether it has contributed to convergence between EU countries between 2005 and 2018. The authors conclude that convergence occurs in heterogeneous clubs and through a catch-up process among Eastern European countries. In contrast, convergence within each club is not accompanied by a trend towards club convergence. This indicates, according to the researchers, a multi-speed Europe, which casts doubt on the sustainability of the entire convergence process in the EU.

This framework includes the research by Wnorowska et al. (2019) seeking an answer to the question of whether social convergence occurred in the EU-28 in the context of implementing the recommendations and objectives of social policy formulated within the framework of the "Europe 2020" strategy in the years 2010–2016. A few indicators for material deprivation, education level and employment were selected for analysis. The authors conclude that within the analysed indicators it cannot be unequivocally stated that convergence in the EU-28 countries occurs in the social area. Positive changes were noted in the level of education, while at the same time there was divergence on the labour market.

Kramkowska & Mikiashvili (2021) studied the convergence of post-socialist countries (11 EU countries, seven Eastern European countries and seven Asian countries) between 2000 and 2018 in terms of economic, social and environmental well-being, as well as economic freedom based on selected indicators, such as: Human Development Index, Environmental Performance Index, Economic Freedom of the World. The research showed that the countries included in the study are definitely converging in terms of socio-economic well-being, environmental performance and economic freedom. However, the speed of convergence varies, with post-socialist EU countries scoring higher on these three indices than other post-socialist countries.

An analysis of the social convergence of the Baltic countries for the period 1995-2015 in the context of catching up with the "old" member states, in particular the Scandinavian countries, can be found in the work of Masso et al. (2019). Another interesting research thread is the search for the relationship between economic and social convergence. The authors indicate that the convergence process takes place within the examined social and labour market indicators at different speeds. In addition, it is very likely that not all differences between European countries will decrease only due to income convergence. Individual mechanisms by which convergence can occur may also pose certain challenges, e.g. social dialogue. Similar studies were conducted for individual Baltic countries - Lithuania (Grynja, 2018) and Latvia (Dubra, 2014).

A noteworthy study is that of Kluth (2023), in which the author set the objective of determining the level of social and economic convergence of the European Union countries and its changes in the period 2000-2022. To achieve the objective, a synthetic measure of social and economic development was constructed using various methods of normalisation and a ranking of countries was created. Changes in the ranking positions of individual economies allowed conclusions to be drawn about the existence of convergence in the group of 28 countries studied, with a weakening of the pace during periods of economic, financial and military crises.

2. Methodology

Social convergence refers to the changes taking place in the societies of the countries being compared in terms of improving their living conditions and reducing social inequalities. For the purposes of this article, real social convergence is understood as the narrowing of the gap between countries in terms of the level of social welfare as measured by a selected indicator. For the analysis, the index of real individual consumption per capita in euro estimated by Eurostat with purchasing power parity was chosen, which allows for a comparison between countries (AIC per capita in PPS). Unlike other measures characterising the degree of satisfaction of consumption needs (e.g. the Household Final Consumption Expenditure indicator), it expresses the value of goods and services actually consumed by households regardless of the source of their financing. They may be covered by household disposable income or financed by the state, local government or other institutions. It thus makes it possible to compare the actual standard of living in different countries, disregarding differences in the activity of governments as providers of certain services. We equate this indicator here with the material well-being of Europeans.

There are a number of methods for measuring convergence that correspond to different theoretical concepts of convergence, but the most recognised and most widely used by researchers are beta (β) and sigma (σ) type convergence. They represent the classical approach to convergence analysis and the concept of beta convergence originated from neoclassical economic growth models (Mankiw et al., 1992; Sala-i-Martin, 1996; Barro & Sala-i-Martin, 2004). In the most general terms, the first one (β) refers to a faster growth of the analysed indicator in a country with a lower initial level, while the second one (σ) denotes a reduction in the variation of levels between countries. Initially, these research methods were used to analyse economic convergence, but later they were adapted to analyse social convergence (Hobijn, 2001; Mazumdar 2002; Neumayer 2003; Berbeka, 2006; Kusideł, 2013; Kuc, 2014; Grynia, 2018).

The aim of the study in this article is to simultaneously verify two types of social convergence: beta and sigma type for the period 2004-2023 in the European Union countries based on a variable reporting the level of social development (AIC per capita in PPS). β -convergence occurs when less developed countries show a faster growth rate of the variable than more developed countries. To verify β -convergence, the following regression equation was estimated:

$$\frac{1}{T} \ln \frac{y_T}{y_0} = a_0 + a_1 \ln y(0) + \varepsilon_i \quad (1)$$

where $y(T)$ – individual consumption per capita at purchasing power parity in the final year of the i -th country; $y(0)$ – individual consumption per capita in PPS in the initial year of the i -th country; T – number of years between the final and initial years; ε_i – random component. Convergence β occurs when the evaluation of the parameter α_1 is negative and statistically significant. In such a situation, the rate of convergence coefficient β can be calculated from the formula:

$$\beta = -\frac{1}{T} \ln(1 + a_1 T) \quad (2)$$

A so-called half-life index was also estimated, which determines the time needed to reduce existing developmental differences by half according to the formula:

$$T_{0,5} = -\frac{\ln(0,5)}{\beta} \quad (3)$$

Meanwhile, σ -convergence occurs when the differentiation of a variable (AIC per capita in PPS) decreases over time. Variability can be measured:

a) the standard deviation of the natural logarithms of the variable according to the formula:

$$sd(\ln y(t)) = \alpha_0 + \alpha_1 t + \varepsilon_i \quad (4)$$

where $sd(\ln y(t))$ - standard deviation of the natural logarithms of the variable in year t .

b) coefficient of variation, i.e. relative standard deviation according to the formula:

$$V_s = \frac{sd}{\bar{X}} = \alpha_0 + \alpha_1 t + \varepsilon_i \quad (5)$$

where sd - standard deviation, $\bar{X}$ - arithmetic mean of the variable in year t .

The variable t on the right side of the equation is the time variable (a linear regression is assumed), and ε_i is a random component. The standard deviation of the variable is not used to measure sigma convergence because of its tendency to increase with time.

The article simultaneously verifies both types of social convergence due to the links between them: the condition for sigma convergence is beta convergence, while beta convergence can occur in a country where there is a development gap in relation to the reference group of countries. Additionally, the analysis was extended by estimating the Shannon entropy index.

Shannon's entropy theory (Shannon, 1948), derived from thermodynamics, has been applied in many fields of science, including economics. There are examples of the application of the entropy method both in the analysis of regional development (Czyż & Hauke, 2015; Liang et al., 2017), as well as in the analysis of spatial differences for a group of selected countries (Villas-Boas et al., 2019) or for all European Union member states (Fedajev et al., 2021).

A similar approach in the study of social convergence was also used in this article. The entropy index is used here as a measure of the divergence between EU countries in terms of real individual consumption in euro per capita. The countries studied were divided into 4 groups based on the value of AIC per capita in PPS in a given year (thresholds: 0.8; 0.6; 0.4 of the maximum value in a given year). The following formula was used to calculate entropy:

$$H(X) = -\sum p(x) \ln(p(x)) \quad (6)$$

where $H(X)$ denotes the entropy of variable X , and $p(x)$ denotes the probability of occurrence of value x .

Shannon entropy has the following features:

1. It takes a non-negative value.
2. It takes the value 0 when there is no differentiation (the variable takes one value, all countries are in one group).
3. The entropy index takes the highest value (1.386). The size of each group is equal (7 countries each).
4. The higher entropy index is due to the greater variety of categories that the variable adopts and the frequency of their occurrence in relation to all observations.

3. Research results

The analysis of β -convergence enables us to answer the question - whether the initially poorer countries experience a higher rate of AIC growth compared to the initially richer countries, which in the long run should have the effect of closing the gap between them. The β -convergence of the 27 EU countries and the UK over the period studied is depicted in Figure 2.

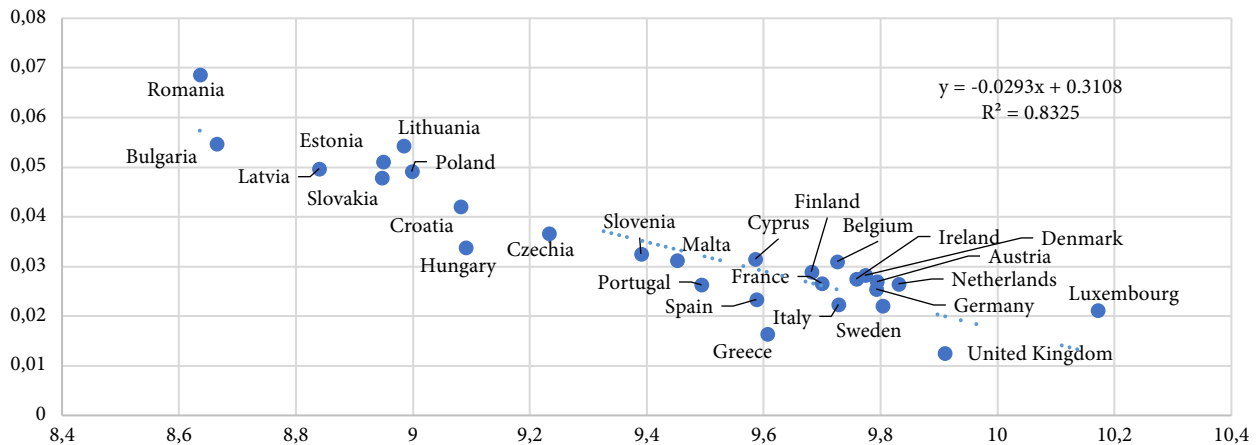


Figure 2. Beta (β) convergence of European Union (EU28) countries 2004–2023.

Source: own elaboration.

The results of the study indicate the existence of β -type convergence, meaning that less developed countries show a faster rate of growth in real individual consumption per capita than more developed countries. The evaluation of the parameter α_1 in the econometric model is negative (-0.0293) and statistically significant. The dispersion of points representing individual countries is not large, the coefficient of determination is 0.8325, which means that the natural logarithm of the average AIC growth rate is 83% explained by the initial state (the AIC value in 2004). The speed (rate) of convergence coefficient β , which informs what percentage of the distance to the long-run equilibrium state the economy covers in one period, was 4.3% and the half-life index was 16.2. This implies that, if countries approach equilibrium at a rate of 4.3% per year, it will take more than 16 years to halve the distance separating them from a common hypothetical long-run equilibrium state.

The analysis of sigma convergence makes it possible to determine whether the differentiation of economies in terms of AICs is decreasing over time, i.e. whether the distribution of consumption is becoming more even. The σ convergence of the EU member states (and the UK) in the years under study is presented in Figures 3 and 4.

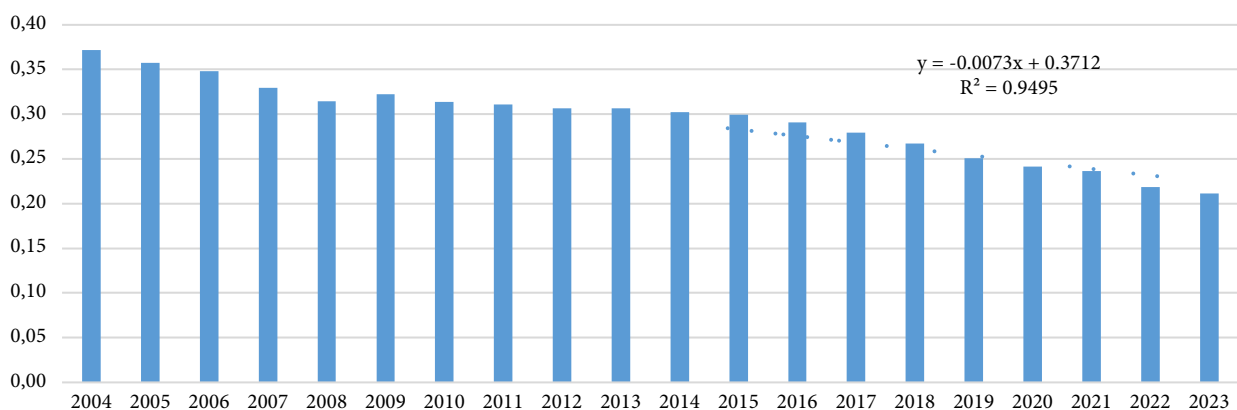


Figure 3. Sigma (σ) convergence of European Union (EU28) countries in 2004–2023 (coefficient of variation).

Source: own elaboration.

The analysis of sigma convergence performed on the basis of coefficients of variation and standard deviations of logarithms of the variable indicates the occurrence of a decrease in the diversity of the AIC level. Negative values of parameters and a high value of the coefficient of determination indicate the occurrence of sigma convergence in the European Union area in the years 2004–2023. The varying intensity of this process is also noticeable. Three periods can be distinguished: 2004–2008, with an

apparent decrease in the AIC coefficient of variation (from 0.37 to 0.31); 2008–2015, with a decrease in convergence (coefficient of variation oscillating around 0.3); and 2015–2023, with a renewed increase in convergence (decrease in coefficient of variation to 0.21). The situation is similar with the standard deviation of the AIC logarithms: the periods of increased decline are 2004–2008 and 2015–2023.

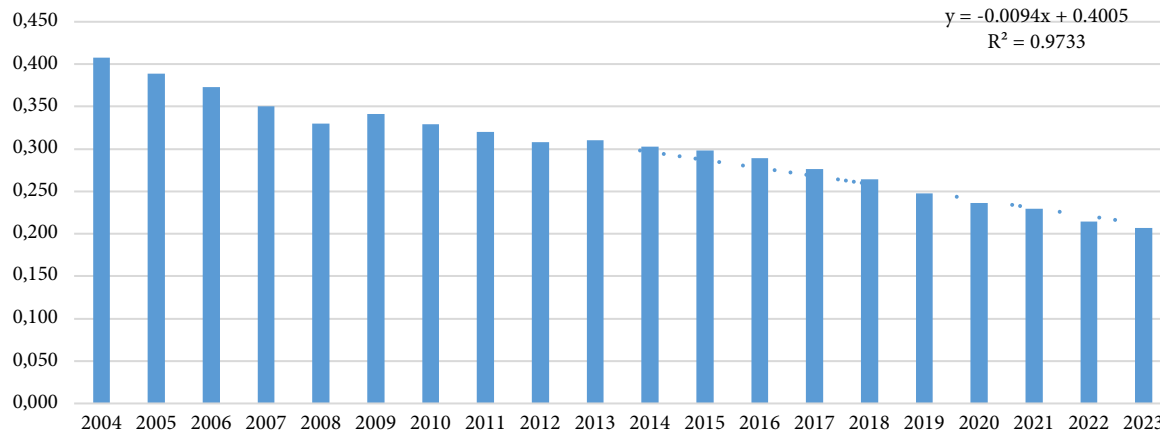


Figure 4. Sigma (σ) convergence of European Union (EU28) countries in 2004-2023 (standard deviation of logarithms).

Source: own elaboration.

Subsequently, the Shannon entropy index was used to assess the disparity in the development of EU member states, identifying those economies that have managed to improve their position to the greatest extent in terms of the measure of social development analysed. Table 2 contains information on the change in the value of the Shannon entropy index between 2004 and 2023 and the number of countries assigned to each group according to the results obtained.

Table 2. Shannon entropy index and number of countries in the group.

Rok	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Entropia	1.18	1.18	1.18	1.15	1.19	1.18	1.19	1.20	1.18	1.18	1.16	1.16	1.18	1.18	1.16	1.03	0.95	1.02	0.95	0.82
Grupa 4	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Grupa 3	11	11	11	13	12	12	12	11	11	11	10	10	11	11	11	12	12	11	12	12
Grupa 2	6	6	6	5	7	6	7	7	10	10	12	12	10	10	11	13	14	14	14	15
Grupa 1	10	10	10	9	8	9	8	9	6	6	5	5	6	6	5	2	1	2	1	0

Source: own elaboration.

The entropy index was slightly different from its highest value of 1.386 until 2018. Such high entropy rates indicate very large discrepancies between EU countries due to actual individual consumption (dispersion of countries between different groups). We can only observe a notable decline in its value to 0.82 in 2023 over the last five years. If we look at the membership of countries in the different groups, we find an explanation for the relatively constant value of the entropy index between 2004 and 2018 (with sigma convergence taking place during this period - especially between 2004 and 2008).

In all analysed years, Luxembourg is included in group four as the only country, the undisputed leader. Group three in 2023 includes 12 countries: Belgium, Denmark, Germany, Ireland, France, Italy, Cyprus, the Netherlands, Austria, Finland, Sweden and the UK. The biggest changes occurred in terms of countries' membership of Groups 1 and 2, with the largest changes observed in countries with the lowest levels of AIC. Especially in the early period, a gradual outflow of countries from group one to group two is observed. Bulgaria was the last to leave group one. Table 3 compares the AIC of

individual countries in relation to the ranking leader and their affiliation to groups in the first and last year of the period under review.

Table 3. Country's AIC share compared to leader and group membership, (share in %; change in pp.).

Countries	Share in 2004	Group	Share in 2023	Group	Change 2004-2023
Belgium	64	3	77	3	13
Bulgaria	22	1	42	2	20
Czechia	39	1	52	2	13
Denmark	67	3	77	3	10
Germany	68	3	74	3	6
Estonia	29	1	52	2	22
Ireland	66	3	75	3	8
Greece	57	2	52	2	-5
Spain	56	2	58	2	2
France	62	3	69	3	7
Croatia	34	1	50	2	16
Italy	64	3	66	3	1
Cyprus	56	2	68	3	12
Latvia	26	1	45	2	19
Lithuania	31	1	57	2	27
Luxembourg	100	4	100	4	0
Hungary	34	1	43	2	9
Malta	49	2	59	2	10
Netherlands	71	3	79	3	8
Austria	69	3	76	3	8
Poland	31	1	53	2	22
Portugal	51	2	56	2	5
Romania	22	1	53	2	31
Slovenia	46	2	57	2	11
Slovakia	29	1	49	2	19
Finland	61	3	71	3	10
Sweden	69	3	70	3	1
UK	77	3	65	3	-12

Source: own elaboration.

The last column of the table indicates the relative change in the country's AIC compared to the leader (Luxembourg). The largest change is observed in the following countries: Romania, Lithuania, Poland, Estonia and Bulgaria, Latvia, Slovakia. These are the countries with the lowest AIC in 2004, confirming the existence of convergence (Figure 2). Even in this group of countries, a distinction is made between faster and slower convergence - the first four countries mentioned are above the regression function, the last three are below the graph of the function. For the other "new members" of the EU, a change in the relative value of the AIC from 0.09 (Hungary) to 0.16 (Croatia) was observed (Table 3). Almost all of these countries (except Cyprus) have lower AIC growth rates than those derived from the regression equation (Figure 2). In particular, Hungary's AIC growth rate is surprisingly low.

Among the "old members" of the EU, the greatest change in the relative value of the AIC was observed in Belgium, Denmark, Finland, i.e. countries that had relatively low AIC values in 2004. Another group of countries with a slightly lower rate of convergence (an increase in relative value of around 0.06-0.08) are Germany, Ireland, France, the Netherlands and Austria. Countries whose position relative to the leader due to the AIC changed very little are Portugal, Spain, Italy and Sweden. A negative change in the relative value was recorded for Greece and the United Kingdom (although in this case it is necessary to remember the forecasted AIC values from 2020). In the case of Southern European countries as well as Sweden and the United Kingdom, a position below the convergence function is observed (Figure 2).

4. Discussion

The authors' main intention was to verify the existence of social convergence between EU member states (including the UK) between 2004 and 2023. Real social convergence is understood as an equalisation of the population's standard of living (material well-being). Real individual consumption in euro per capita at purchasing power parity - AIC per capita in PPS - was used as the variable informing the level of social development. The study uses different approaches to measuring the AIC convergence of EU countries in the years 2004-2023 - beta convergence, sigma convergence and the Shannon entropy index. Although these are, in a sense, complementary methods, their combined use allows for a comprehensive assessment of convergence. The analysis shows:

1. A statistically significant beta convergence was observed. Evaluation of the α_1 parameter (-0.0293) indicated a convergence rate coefficient of 4.3% and a half-life index of 16.2. It takes more than 16 years to halve the distance separating them from a common hypothetical long-run equilibrium state. This shows that the process of social convergence is a long-term phenomenon.
2. The periods in which an increased intensity of the AIC sigma convergence process was observed were 2004-2008 and 2015-2023. During the crisis and post-crisis years of 2008-2015, convergence occurred at a slower pace. Meanwhile, the negative impact of the phenomena of recent years (the pandemic and the war in Ukraine) on the convergence process has not been observed. This may be due to a short time frame and insufficient data, because in the social sphere, a longer period makes it possible to identify certain trends. In addition, our study considers the indicator of actual individual consumption per capita, which expresses the value of goods and services actually consumed by households and can be financed both from household's disposable income and financed by the state. It is therefore possible that during the crises (health and military) the state's participation in household expenditure increased to such an extent that their overall consumption expenditure did not fall, or even increased. The question of a relatively constant propensity to consume, i.e. the desire to maintain consumption at the level of previous periods and to finance it with savings, is also not insignificant. A more accurate diagnosis of this situation is possible on the basis of future analyses.
3. The highest growth rate of the AIC index is visible for countries that had the lowest real individual consumption indicators in 2004. Although the higher the AIC values observed in 2004, the lower the AIC growth rate was on average (which is in line with the idea of convergence), significant deviations can also be observed (e.g. Hungary as a country with a much lower convergence rate than that implied by the AIC in 2004, or Belgium as a country with a much higher convergence rate).

In summary, there has been a convergence in the living standards of population in the EU (and UK) countries across the 28 countries studied throughout the 2004-2023 period. The speed of convergence depends on the initial divergence in the level of development across EU countries. In general, for countries with a higher level of welfare in the starting year, the rate of convergence was slightly lower, while stronger processes took place among countries starting from a lower level of social development. These processes are consistent with both sigma convergence and beta convergence. Nevertheless, deviations from the general beta pattern of convergence were also noted. For example, Hungary, whose AIC in 2004 was only 61.6% of the EU average, increased this indicator to 67% in 2023 (5.4 pp.), indicating a low rate of convergence. Belgium, on the other hand, started with a consumption level more than 16% higher than the EU average, maintaining a high pace throughout the period under review. By the way, the high rate of real convergence of per capita consumption in countries such as Romania, Lithuania, Bulgaria, Estonia or Poland ("new" member states) may result from the significant scale of emigration and the decline in the number of inhabitants, characteristic of this group of countries, especially in Central and Eastern Europe. In addition, the number of deaths in relation to births also increased significantly in some of these countries after the pandemic outbreak. These factors meant that the growth rate of AIC per capita in these countries was significantly higher than the growth rate of consumption in absolute terms.

Conclusions

The importance of this study is that it provides important information on the degree of social convergence between European Union member states. There is no doubt that all EU countries have benefited directly and indirectly from EU accession, as revealed by the analysis of real social convergence carried out, but these benefits must be assessed on the basis of the specific characteristics of the individual regions or countries of the Community. For example, despite the relative similarity between the "new" EU countries, there are different social and economic development models, and the factors determining this development are also different. Nor is there a single, optimal model of development and convergence that can be applied to the entire study population. Other researchers also come to similar conclusions (Landesmann & Székely, 2021). Given the noted deviations from the general trend, further analysis should be conducted at the level of a group of countries (e.g. Central and Eastern European countries or "new" members of the grouping) or even individual countries.

The applied aim of the study was to assess the extent of the reduction in the gap in individual consumption (well-being and quality of life). This can help guide future economic policies and measures to further reduce the gap. In addition, the authors distinguished the countries that succeeded most in improving their position in terms of the measure of social development analysed in relation to the other EU countries. However, the question remains open as to whether these results are actually translated into the well-being and quality of life of their citizens, i.e. whether success at the level of EU member states is accompanied by sustainable regional development at the national level. This question requires further in-depth analysis.

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