Inequality in the European Union in the First Quarter of the 21st Century: Nontrivial Tendencies

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Abstract
The article demonstrates the disparity of economic growth in the European Union from 2000 to 2023. Countries within the European Union are divided into three geographical and historical groups: the North, the South, and the East. The post-socialist East has considerably narrowed the gap in GDP per capita at PPP (in constant 2021 prices) with the South, thereby generating an overall convergence in per capita GDP levels across the EU. At the same time, the noticeable growth in the East group countries has been accompanied by a decline in population. The gap between the North and the rest remained, as did significant variation in country levels, although it narrowed compared to the period of large-scale EU

expansion. Concurrently, all groups exhibited a decline in performance relative to the US benchmark during the period under review.

The article also researches changes in the income levels of social groups within countries. This phenomenon suggests a consolidation of the economic dominance of the wealthiest (10 decile) of the population. In this case, disparities among country groups in the scale of tax redistribution of income exert a substantial influence on this phenomenon. Moreover, differences between country groups in the scale of tax redistribution of income have a significant impact on this: it is greatest in the developed North, less in the South, and even less in the East. The specific nature of redistribution, in conjunction with disparities in pre-existing conditions, has resulted in a discernible convergence of income levels among the affluent 10th decile in Eastern countries and its corresponding group in Southern countries. Upon initial observation, the parameters of convergence among EU countries appear to defy expectations. It is evident that the convergence process is more pronounced among the affluent segments of society compared to the overall population or the nations as a whole.

Introduction

More than 20 years have passed since the large-scale expansion of the European Union.[1] During this period, the development of the EU in the 21st century has been focused on addressing significant strategic objectives, including the consolidation and integration of a growing number of countries, as post-soviet states joined the EU.[2] This expansion resulted in a notable increase in inter-country income inequality, as the level of economic development among the fundamental EU members significantly surpassed that of the new member countries. The present study focuses on the economic growth of EU countries and the convergence of their levels of development. The investigation encompasses the analysis of the economic growth of EU countries from 2000 to 2023, as reflected in the income dynamics of various social groups. The countries are divided into three historical and geographical groups: the North (comprising the highly developed economies of Europe), the South (consisting of Mediterranean countries), and the East (comprising the post-socialist developing economies of European countries). The primary objective of the present study is to undertake a comprehensive analysis of income inequality, employing the GDP per capita in PPP terms (in 2021 prices) as the primary metric.

The initial section delineates the prevailing contemporary theories and approaches employed in the study of inter-country inequality and the issues associated with catching-up development. The works of T. Piketty and R. Solow are of particular value to us. The

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[1] In 2004, Hungary, Cyprus, Latvia, Lithuania, Malta, Poland, Slovakia, Slovenia, the Czech Republic, and Estonia (the "Eastern Bloc" countries are highlighted) joined the EU. Bulgaria and Romania joined in 2007, followed by Croatia in 2013.

[2] 15 countries: Austria, Belgium, United Kingdom (until 2020), Germany, Greece, Denmark, Ireland, Spain, Italy, Luxembourg, the Netherlands, Portugal, Finland, France, Sweden.

article discusses, among other things, the concept of sigma convergence of income based on Solow's theorem, as well as the effects of tax redistribution noted in Piketty's book *Capital in the Twenty-First Century*. The second section delineates the methodology employed in the present study, while the third and fourth sections analyze the dynamics of inter-country (average income) and intra-country (share of income before and after taxation) inequality in the 21st century according to the authors' calculations for three historical time periods: 2000–2008, 2009–2019, and 2020–2023. The initial period, despite concluding with the global financial crisis of 2008–2010, was unmistakably a period of "success" accompanied by intense economic growth in the EU. The subsequent years were marked by the complication of global regulation, a slowdown in growth, and low inflation. In the 2020–2023 period, the global economy, and to a significant extent the European Union, encountered substantial macroeconomic turbulence, precipitated by the repercussions of the ongoing pandemic and a precipitous deterioration in the global geopolitical landscape. The present study analyzes the EU's relative lag in development compared to the US by breaking it down into the three country groups mentioned above. Additionally, it considers the issue of convergence between EU countries in terms of their level of development.

In the final section, we recommend analyzing the income dynamics of the wealthiest 10th decile of the population. This is significant for two reasons. Firstly, it is essential for evaluating inequality itself. Secondly, it is crucial for comprehending the role and position of social inequality in the development and performance of the European Union over the past two decades.

1. Intercountry inequality: Contemporary approaches

We propose a comprehensive examination of contemporary theories that explore the underlying causes and dynamics of international and income inequality. This examination will utilize the European Union as a case study, focusing on its development in the current century. We will not undertake a comprehensive examination of the foundational works of the Industrial Revolution of the 18th–19th centuries, which were authored by D. Ricardo, K. Marx, F. Engels, M. Weber, and other prominent scholars in the field. In the post-war period, American scientist S. Kuznets summarized empirical data on economic growth and inequality and put forward a hypothesis about the growth of inequality in countries in the early stages of economic development and its decline as income grows further (Kuznets curve) [Kuznets 1955]. A multitude of issues pertaining to growth are thoroughly discussed in the work of M. Doroshenko [2013]. The evolution of theoretical ideas about inequality is outlined in our 2022 publications: on inter-country inequality in Chapter 1 [Grigoryev, Pavlyushina 2022a] and on social inequality in Chapter 14 [Grigoryev, Pavlyushina 2022b]. In the recent past, these issues were revisited in a study on the specifics of economic growth [Grigoryev, Maykhrovich 2023]. Additionally, we will draw on recent research [Grigoryev, Lyakhova 2025] that explores the factors contributing to the European Union's lag behind the United States.

Conventional economic theory utilizes empirical analysis of long-term economic growth through structural changes occurring in the economy, accounting for variations

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in the profitability of different areas of activity (low- and high-productivity sectors of the economy) [Kuznets 1955]. In response to the limitations of the Harrod–Domar model (1939, 1946) [Solow 1956], Solow proposed a neoclassical growth model. Solow conceptualizes economic growth as contingent upon capital intensity, population growth rates, and technological progress. The conclusion from the model that countries with the highest economic growth rates are far from equilibrium, according to Solow (points of stationarity at which capital intensity is constant), is useful for our purposes [Solow 1956]. This finding suggests that developing countries may experience higher economic growth rates compared to developed countries. Consequently, the conclusions derived from Solow's theorem served as the foundation for the assumption of income convergence in both developed and developing countries. Contemporary economists have proposed two types of such convergence: As posited by Paprotny (2021), the phenomenon of "sigma and beta convergence" merits consideration. The first scenario suggests a gradual equalization over time (i.e., a reduction) of the dispersion of income logarithms between developing and developed countries, while the second scenario pertains to the problem of catching up: poor countries with higher economic growth rates catch up with developed countries, reducing income gaps [Maykhrovich 2025 (in press)]. Despite employing Barro's methodology, which incorporates the smoothing of intra-cycle growth fluctuations, the analysis reveals the presence of "beta effects" that are modest in strength for 147 countries during the period from 1992 to 2022 [Maykhrovich 2023]. The Solow theorem, in its own right, as well as the concepts of convergence derived from it, are valid and can be applied within a large regional association. It is important to acknowledge the significant impact of institutional factors on development inequality, in addition to capital and technology [Grigoryev, Lyakhova 2025].

F. Bourguignon and K. Morrison conducted an analysis of the dynamics of intra-country and inter-country inequality for 33 groups of countries aggregated into six regions from 1820 to 1992. Their findings demonstrated that historical and geographical differences between countries influence income distribution [Bourguignon and Morrison 2002]. They demonstrated that since the onset of the 19th century, global inequality has been predominantly influenced by disparities among nations, a consequence of prolonged imbalances between geographical regions (recall the phenomenon of European colonialism). Building upon the contributions of Bourguignon and Morrison, Milanovic initiated an examination of the global inequality structure across income groups. In doing so, they presented the scientific community with the "The Elephant Curve" a graph depicting income growth by global percentiles [Lakner and Milanovic 2013]. It is imperative to acknowledge that the pivotal element in Milanovic's Curve paradigm pertains to the "Asian phenomenon," particularly China. A more thorough examination of the "Chinese phenomenon" can be found in our other articles [Grigoryev, Zharonkina 2024; Zharonkina 2025 (in press)].

Piketty's primary focus is on the growth of inequality within countries during the late 20th century and early 21st century, which contradicts Kuznets' hypothesis of a reduction in inequality with income growth [Piketty 2014]. Piketty expounded on the proliferation of income inequality within nations, attributing this phenomenon to higher returns on capital relative to economic growth rates. This dynamic, he posited, culminates in

the accumulation of wealth by the affluent segments of society. Piketty's approach to addressing inequality involves the redistribution of income from high-income groups to low-income groups by the state, facilitated by a progressive tax scale. Subsequently, it will be demonstrated that taxation exerts a substantial influence on income redistribution within the European Union.

One impediment to the alleviation of social inequality is the limited mobility of the population between social classes. A discernible distinction emerges among the various groupings of countries. Anglo-Saxon countries are distinguished by pronounced vertical social mobility, while Europe is marked by a more rigid social stratification. According to the observations of the American economist A. Krueger, social inequality will be more stable in countries with a stricter social hierarchy than in countries with free movement between social classes [Krueger 2012]. This notion is corroborated by calculations based on The Great Gatsby curve, which illustrates the relationship between inequality and intergenerational social mobility [Corac 2013].

It is evident that the scientific community has persistently endeavored to ascertain empirical evidence substantiating the efficacy of theorems in mitigating inequality. Given their status as established principles, these theorems are presumed to be true. The actual situation is more intricate. Sophisticated econometric methods occasionally enable the identification of effects that mitigate the disparity between countries. However, these effects are challenging to observe in practice and in conditions of macroeconomic instability. Goal 10 of the United Nations Sustainable Development Goals, entitled "Reduce inequality within and among countries," is notable for its lack of specific metrics or target indicators. In principle, the theories formulated in the mid-1950s should have demonstrated their efficacy with relative clarity over the past seven decades. However, the stylized facts reveal no such evidence [Grigoryev 2025].

To conclude this brief review of the literature, we note a relatively new work [Blanchet et al. 2022]. This is an extensive statistical study of inequality in the European Union (EU) compared to the United States (US) for the period 1980–2017, covering many types of redistributed income (pensions, unemployment insurance, etc.). Notably, the authors employ country groupings within the European Union that are analogous to those utilized in this study. Their calculations extend from 1980 onwards, yet there is a conspicuous absence of any reference to the transformation associated with the transition to a market economy in Eastern Europe. However, the turning point in the graphs around 1990 is evident in the literal sense of the word.

2. Grouping of countries within the EU

The scientific community has developed a multitude of approaches for the classification of EU countries. For instance, a conditional division into the "fundamental" and "new" EU [Grigoryev, Golyashev, Pavlyushina 2017] or a geographical division into the North, the South, and the East [Grigoryev, Popovets 2023], etc. Quantitative methods can exhibit significant variability; however, they are predominantly rooted in cluster analysis, which involves the classification of EU countries into convergence clubs [Suárez-Arbesú, Apergis, and Delgado 2023], the implementation of clustering based on per capita GDP,

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with the objective of maximizing the distances between cluster centers for the base year [Grigoryev and Pavlyushina 2022a], and other approaches. In addition to per capita income, the studies utilize groups of indicators, including the openness of the economy, the share of the service sector, financial market development indicators, labor market indicators, demographic indicators, and the quality of human capital. The correlation between these indicators and income inequality, including in EU countries, has been substantiated in prior studies [Perugini and Martino 2008; Roine et al. 2009; Huber and Stephens 2014, etc.].

The absence of ideal classifications in the field necessitates an examination of the behavior of economies with divergent historical backgrounds, levels of development, and quality of socio-economic institutions during the period under review. The objective of this study is to examine the dynamics in modern conditions, specifically in the 21st century. It is important to note that the year 2000 was selected as the starting point, as the European Union was significantly less "populated" at that time compared to the present. The present study utilizes arithmetic means, which are influenced by individual countries with elevated or diminished parameters. However, this does not substantially alter the conclusions' intrinsic nature.

The present study focuses on comparing three groups of countries within the European Union (EU): the North, the South, and the East (see Table 1 on p. 11 and Appendix A). As a tool for analyzing economic inequality between groups and countries, we use GDP per capita in PPP terms at constant 2021 prices (international dollars per capita), calculated by the World Bank in May 2024 [World Development Indicator Database 2024]. Hereinafter, we use this parameter to refer to per capita income. The efficiency of this instrument has been previously documented in the research, which examined the global landscape of price inequality in 2017 [Grigoryev, Pavlyushina 2022a]. Given the limited sample size and heterogeneity of the EU (n = 27), we aggregated the per capita incomes of the groups. The following three periods of the 21st century are presented: the pre-crisis period of 2000–2008, the EU debt crisis and subsequent economic recovery of 2009–2019, and the era of four macroeconomic shocks [Grigoryev 2023] to the global economy in 2020–2023. The results obtained graphically are shown in Figure 1 (p. 13).

Table1. Economic indicators of country groups within the EU, 2000–2023

Group	Average annual GDP (PPP, 2021 prices) growth rate, %			Government expenditures on education and healthcare, % of GDP				Average GDP (PPP, 2021 prices), thousand international dollars per capita			
	2000–2008	2009–2019	2020–2023	2000	2008	2019	2023	2000	2008	2019	2023
The North	1.3	1.5	1.6	10.9	12.9	12.2	12.4	51.2	57.8	64.7	6.3
The South	1.0	0.6	3.2	10.6	11.7	10.7	11.5	43.8	47.8	48.5	50.1
The East	4.7	3.1	3.2	10.0	10.8	10.2	10.7	18.8	28.4	38.3	42.2

Source: compiled by the authors based on data from the World Bank and Eurostat. Country parameters are provided in Appendix A.

The Northern region constitutes the pre-World War I industrial core of Europe. The following countries were selected for further analysis: Austria, Belgium, Germany, Denmark, Finland, Ireland, Luxembourg, the Netherlands, and Sweden. The per capita GDP in 2000 (rounded) for these countries ranged from $48,000 to $57,000 PPP/capita, with an average of $51,200. The northern group is predominantly composed of mature economies, characterized by lower average growth rates compared to the other two groups. However, these economies exhibit greater stability in their GDP, the highest share of government spending on human capital, and a progressive tax scale, with the average marginal income tax rate being the highest among the groups. It is noteworthy that the proportion of R&D expenditures to GDP in the North exceeds the EU average [Grigoryev, Lyakhova 2025]. The northern countries constitute the economic and demographic core of the EU, with Germany, the EU's largest industrial economy, playing a pivotal role (22% of EU GDP in 2023). Prior to the United Kingdom's exit from the European Union in 2020, Germany and the United Kingdom collectively accounted for over one-third of the bloc's GDP and population, thereby concentrating the Union's economic potential.

From 2000 to 2023, the North demonstrated a marked enhancement in its economic performance, attaining an average GDP per capita of $66,000 in PPP terms. However, it is imperative to note that this calculation encompasses the exceptional performance of Ireland and Luxembourg (see Appendix A). In fact, this most developed group of countries managed to maintain its position, although it lagged behind the US in terms of growth rates (see Appendix A).

The Mediterranean group, also referred to as the South, encompasses eight nations: Greece, France, Spain, Italy, Portugal, Croatia, Malta, and Cyprus have a GDP in 2000 ranging from $21,000 to $51,000 per capita, with an average of $44,000. Within the southern group, France, Italy, and Spain are the most economically significant countries. The economies of the Southern countries were at the epicenter of the 2010 European debt crisis. Consequently, a decline in average annual GDP growth rates for the group was observed even prior to the advent of the pandemic. This dynamic resulted in a state of stagnation in the southern region with respect to the population's overall well-being. This group has a higher share of services (e.g., tourism), which led to a deeper crisis during the pandemic in 2020 [Grigoryev et al. 2021].

A rigorous examination of the circumstances reveals that the situation in the South group is of a dramatic nature. The region experienced a significant impact from the global financial crisis of 2008–2010, which originated in the European Union and subsequently spread to southern countries. This was followed by the global COVID-19 pandemic and the subsequent economic crisis of 2022. This phenomenon can be attributed, in large part, to the prevailing economic vulnerabilities of the nations within this group. These vulnerabilities encompass a range of issues, including the presence of negative current accounts, significant losses in income from Mediterranean tourism, mounting pressures from external migration, and the escalating burden of public debt. The average GDP per capita exhibited a modest growth of $44,000 to $50,000 PPP during the period under review. Concurrently, the economic disparity with the donor North region increased. Indeed, the slow growth of this group of countries (which account for 45% of the EU

population) with greater weight hindered the European Union during this period.

The Eastern European countries, otherwise known as the East, represent the third group of EU countries. These countries have a rich historical tapestry, having been part of the Eastern European empire, the socialist camp, and even the USSR. The countries in this group include Hungary, Poland, the Czech Republic, Slovakia, Slovenia, Romania, Latvia, Lithuania, and Estonia. In 2000, the average income in this region ranged from $20,000 to $31,000 PPP, with an average of $19,000. Following the implementation of an eastward expansion policy in the early 21st century, countries with transitional economies became members of the European Union. Presently, this demographic constitutes approximately one-fifth of the total population of the European Union.

The 21st century has been a noteworthy era for Eastern countries, characterized by their progress in the post-socialist transformation. Eastern countries have largely preserved their human capital as part of their planned economy legacy and have made a relatively smooth transition to a market economy with the help of the EU. This assertion is substantiated by the dynamics of per capita income, which is exhibiting the most rapid growth in comparison to the other two EU groups. Prior to the 2008 economic crisis and even preceding the European Union's accession in 2004, income exhibited particularly rapid growth.

Figure 1. GDP per capita income growth rates by country group, based on GDP per capita (PPP, constant 2021 prices), as a percentage of the previous year, 2000–2023
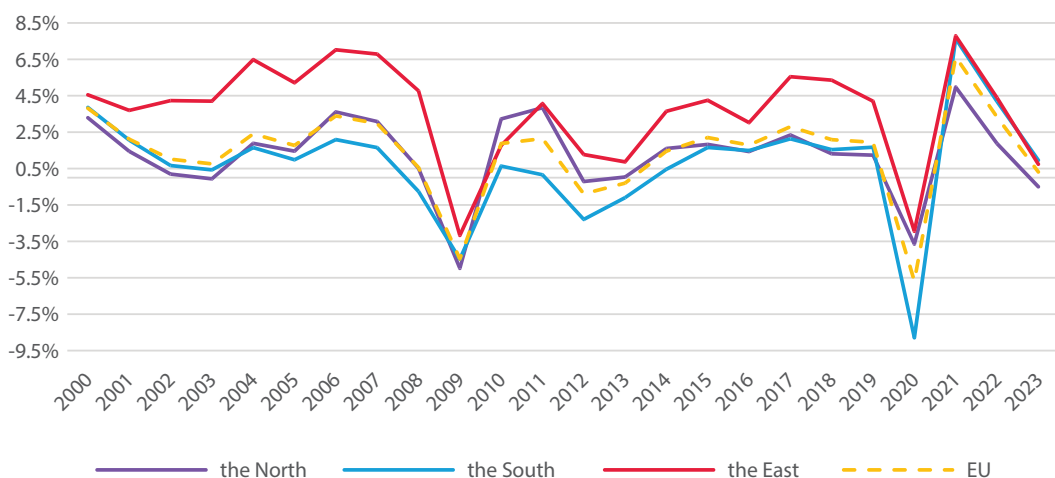
Source: compiled by the authors based on World Bank data.

Their growth trajectory commenced from a modest initial level and, by the year 2023, had attained an average of $43,000 per capita in PPP terms. However, this economic development did not fully counterbalance the impact of the South's persistent underperformance. The scientific community attributes this growth to Eastern European countries' ability to capitalize on economic and political integration with the

EU. The successful integration of the Baltic states (Latvia, Lithuania, and Estonia) has been documented [Dabrowski 2022]. In countries such as Poland, the Czech Republic, and Slovenia, the extent of inherited structural distortions in the planned economy was comparatively less pronounced compared to other post-socialist nations. This advantageous condition facilitated the implementation of rapid and consistent reforms with greater efficacy [Dabrowski 2024]. The challenges associated with market transformation in other Eastern European countries are examined in the works of Dabrowski et al. (2025) and Dabrowski (2023). Specifically, the failed attempts to establish stable and democratic institutions in Moldova, Georgia, Azerbaijan, and other regions are highlighted.

The alteration in the weights and roles of the three groups within the bloc is both a question of the growth of the bloc as a whole and of the distributional effects of integration—whether there is convergence between the members of the union. A comparative analysis of EU economic growth in relation to that of the US will be conducted, with particular attention to the dynamics exhibited by the three aforementioned groups. This approach is instrumental in elucidating the distinctive characteristics of transatlantic competition, a subject that is further explored in [Grigoryev, Lyakhova 2025]. In the present analysis, the focus is directed toward the countries that contribute most significantly to the EU's GDP and population: Germany (the North), Italy, France (the South), Poland, the Czech Republic (the East).

## 3. Intercountry inequality in the EU—dynamics by period

The dynamics of intercountry inequality reflect both the collective and individual successes of countries in their development and, concomitantly, indicate trends toward convergence or the absence thereof. At the beginning of the 21st century, the North and South began from relatively equal levels of per capita income (2000: the South lagged behind the North by $7,400 PPP). The disparity in income between the East and the old EU countries has reached unprecedented levels in the 21st century (in 2000, the gap was $25,000 PPP per capita). Prior to the global financial crisis of 2008, all three regions experienced income growth. However, the South lagged behind the North due to the higher base in the North, while the East rapidly caught up, exhibiting a significant increase in income (by 2008, the income gap between the North and the South was $10,000 per capita; between the South and the East, it was $19,400 per capita).

During the global crisis of 2008, the North experienced a steeper decline than the other groups (see Figure 2 on p. 15). However, the economies of the Southern states were adversely affected by the 2010 debt crisis and did not fully recover before the advent of the pandemic caused by the COVID-19 pandemic (See Table 1 on page 11). In contrast, the Northern and Eastern regions demonstrated a robust recovery from the repercussions of the crises, as evidenced by their swift return to pre-crisis levels in 2014. The divergent behaviors exhibited by the North and South groups at this stage confirm the rationale behind the division of the "old" EU and underscore the heterogeneity of the bloc.

In the future, per capita incomes in the East and the South converged even more. Since 2013, per capita income in the East has surpassed that of Croatia, Greece, and Portugal, with the gap widening since 2015 and 2020, respectively. By 2019, the Czech Republic's

per capita income had surpassed that of Spain, and it was now converging with that of France. The hypothesis that there is a trend between the North and the South is invalid; the data show that none of the southern countries (with the exception of the island of Malta) exceeds the income of a northern country (see Appendix A).

Figure 2. GDP per capita (PPP, 2021 constant prices), thousand international dollars, by EU country group, 2000–2023
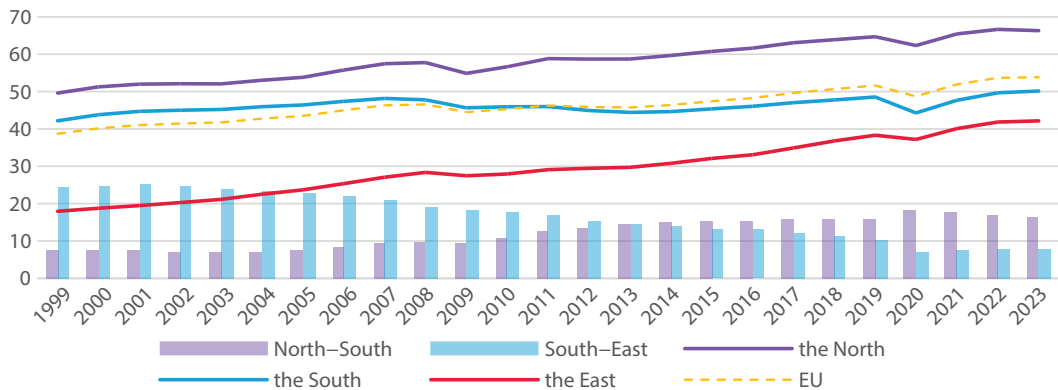
Source: compiled by the authors based on World Bank data.

The robust economic foundation of the North was established in part during the 20th century, as evidenced by the data presented in Table 2 on p. 16. To that end, the present study has examined historical data on GDP per capita in PPP terms in 2011 prices [Madisson Project Database 2023]. It is evident that the Northern region exhibited higher mean incomes during the 20th century, with the distribution maintaining its integrity throughout the century. While in 1900 the disparity in per capita income between the North and the South was 36% of the North's income, by 1980 the difference had narrowed to 33%. In the 21st century, however, a different dynamic emerged. This outcome is noteworthy, as it suggests that, despite the numerous challenges faced during the 20th century, the Southern region possessed the capacity to achieve economic convergence with the Northern regions. However, the debt crisis of 2010, which had the most significant impact on Southern countries, led to a deviation from this trend. The crisis resulted in either a stagnation or a perpetuation of the economic disparity between the Southern and Northern regions. In the 20th century, there was a notable convergence between the East and the South. As illustrated in Table 2, the ratio of the income disparity between the groups to the income of the South remained at 20% throughout the 20th century. The 1990s witnessed a transformational crisis in the countries of the East, accompanied by a marked increase in the gap. However, by 2023, the data indicates a reversion to previous values. This development signifies a substantial accomplishment for Eastern European countries, which have capitalized on the human capital accumulated during the socialist era and the benefits of a sizable regional market characterized by comparatively lower initial wages.

Table 2. GPD per capita (PPP) in European countries in the 20th century (in 2011 prices) and in the 21st century (in 2021 prices), thousand international dollars/capita

Country	GDP per capita (PPP, 2011 prices)				GDP per capita (PPP, 2021 prices)	
	1900	1938	1950	1980	2000	2023
Germany	4.8	8.0	6.2	22.5	50.3	63.6
United Kingdom	7.6	10.0	11.1	20.6	44.9	54.5
Spain	2.7	2.6	3.5	14.0	27.0	34.1
France	4.6	7.1	8.3	23.5	33.4	39.1
Italy	3.3	5.0	5.6	21.0	32.7	36.2
Czech Republic	-	-	-	12.3	17.1	32.2
Poland	2.7	3.5	3.9	9.1	12.7	32.5
The North	**4.5**	**7.2**	**8.6**	**22.0**	**51.2**	**66.3**
The South	**2.9**	**4.4**	**4.0**	**14.8**	**43.8**	**50.1**
The East	**2.3**	**2.9**	**3.1**	**12.3**	**18.8**	**42.2**
Δ1 (Δthe North – the South)	1.6	2.8	4.6	7.2	7.4	16.2
Δ2 (Δthe South – the East)	0.6	1.5	0.9	2.5	25.0	8.0
Δ1/the North	36%	39%	53%	33%	14%	24%
Δ2/the South	21%	34%	23%	17%	57%	16%

Source: compiled by the authors based on data from the University of Groningen (20th century) and the World Bank (21st century).

The occurrence of sigma convergence within each group and across the entire European Union (EU) can be ascertained through the evaluation of income dispersion within these groups. By 2019, the coefficient of variation within the North had fallen to a threshold level of 33.3%, yet this does not permit the designation of the North as homogeneous. The group remains characterized by a considerable degree of data dispersion in comparison to the rest. During the period of the ongoing global pandemic and the energy crisis that began in 2022, the group lost its momentum toward convergence (see Appendix A). It is only in 2018 and 2019 that the North group can be considered to be statistically homogeneous; therefore, it can be assumed that sigma convergence is absent in the North group. This phenomenon can be attributed to the remarkably high per capita incomes observed in Luxembourg and Ireland, which serve to amplify the variability within the data set.

The South exhibits distinct characteristics from the North, manifesting in its low and declining variation coefficients. The indicator demonstrated a decline from 25.0% in 2000 to 16.1% in 2023. It has been observed that per capita incomes in the South are converging, which suggests that the group is becoming moderately homogeneous. Convergence is observed due to the levelling of indicators in the lagging countries of Croatia, Malta, and Portugal, accompanied by a slowdown in the growth rates of the leading countries in terms of per capita income—Italy, France, and Spain.

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The most significant fluctuations in the dynamics were observed in the eastern region, where the variation decreased from 31% in 2000 to 11% in 2023. A discernible convergence has emerged among European countries that emerged from the Russian and Austro-Hungarian empires. The sigma convergence of per capita income by 2023 is attributable to a slowdown in income growth in the leading Czech Republic and its convergence with Slovenia, Lithuania, and Poland, which are demonstrating catch-up growth. In this group, the most important trend is catching up—approaching the countries of the South while maintaining distance from the group of the North. Recent developments indicate that Eastern countries are beginning to demonstrate comparable levels of progress with Southern countries on an individual level, particularly in the case of Slovenia, Lithuania, and the Czech Republic.

A notable decline in the coefficient of variation, from 56% in 2000 to 40% in 2023, signifies sigma convergence within the EU-27. While we do confirm the persistent heterogeneity, it would be premature to assume otherwise. Difficulties in achieving income convergence within the EU compared to the US remain [Grigoryev, Lyakhova 2025]. Following the accession of the Eastern EU member states, the coefficient of variation increased by 2008. However, by the second major crisis of the 21st century, it had stabilized at a minimum of 40% by 2019.

Despite the declining coefficient of variation, it is premature to conclude that inter-country inequality in the EU-27 has decreased over the past 23 years. A salient division of the EU into a "rich" North and a converging South and East can be noted. In order to illustrate the impact of EU enlargement on the convergence of member states in terms of per capita income, a calculation of the variation in per capita GDP was conducted for the EU-15: 15 countries in the North (excluding the UK) and the South (excluding Croatia and Cyprus, which joined later). The economic development of the "old" EU—the central bloc of developed countries—was fairly stable during the period under review. Average GDP per capita grew from $47,400 to $57,300 in PPP terms between 2000 and 2023. The coefficient of variation for the "fifteen" remained stable at 38% over two decades, with the exception of the post-crisis year of 2021. This finding suggests that the overall proportions within the original core of the EU have remained constant within the expanded bloc (see Appendix A).

Given the recent salience of the issue of the widening economic gap between the EU and the US, the key points in this saga of transatlantic competition for prosperity will be highlighted. It is evident that key European Union countries have experienced a substantial decline in their performance relative to the United States, particularly during the period following the global financial crisis that transpired from 2008 to 2010. Consequently, the North, South, and the EU as a whole have also experienced a decline (see Appendix A). The countries of the East, with their former affiliation to empires before World War I and the socialist experiment in the period after World War II, made a leap forward before joining the EU, until 2008 and even until 2019 (before the COVID-19 pandemic). However, in the 2020s, this momentum experienced a slight decline, although several countries continued to make progress in catching up with their neighbors. The disparities among the three aforementioned groups within the EU and the US increased during the period under review.

In the context of studying inter-country convergence during market development, it can be posited that in 21st-century Europe, we are witnessing a large-scale experiment in Solow convergence. The European Union project, a successful endeavor in its own right, has been further enriched by the incorporation of ten countries with disparate histories and levels of development, primarily for political reasons. These countries, depending on their human capital and EU markets, the institutional conditions of a large union, and some financial assistance, were able to capitalize on these factors to make significant progress in their development. The EU, as a whole, encountered numerous external shocks while exhibiting heterogeneity in its national levels of development and institutional systems. Consequently, it is not unexpected that the EU, in its entirety, and the three groupings of countries, each in their own manner, have been disadvantaged in the transatlantic competition with the more homogeneous Anglo-Saxon nation, the United States.

4. Intra-country inequality in the European Union and tax redistribution

The impact of internal inequality on socio-political processes is significant [Piketty 2014]. The convergence of countries' levels of development can be regarded as a desirable benefit, particularly within a unified political bloc such as the EU. Nevertheless, social inequality within nations persists as an intractable problem, irrespective of whether it is regarded as a catalyst for development or a social threat. Therefore, it would be a mistake to consider trends in economic inequality in isolation from the broader context of inequality within countries. First, it should be noted that intra-country inequality has developed historically in the countries of the North and South for a very long time, and in the countries of the East relatively recently. Contemporary trends in internal inequality are determined by processes occurring within the market economy, such as privatization, and within the system of institutions, including the high income taxation factor previously discussed.

In order to analyze the actual stratification, the national income of EU countries is to be broken down into three components: the share of the poorest 50% of the population, or deciles 1–5 (hereinafter referred to as the poor); the share of the middle 40%, deciles 6–9 (hereinafter referred to as the middle class); and the share of the richest 10%, or decile 10 (hereinafter referred to as the rich). This breakdown is also employed by the World Inequality Lab (established in 2017 under the direction of Piketty) [World Inequality Database 2023]. The arithmetic mean shares for each social group in the North, South, and East were calculated, and a comparison will be made between them and over time. The World Inequality Lab has information on income shares before and after taxes, which allows for the observation of the extent to which income is redistributed (cf. Piketty's basis for the promotion of equality: progressive taxes on capital, inheritance, and property) [Piketty 2014].

Table 3 (p. 19) presents the income structure by social class and EU country group in two states—before and after taxes—in key years of the 21st century. It is noteworthy that the shares of income by social stratum have stabilized, particularly the high shares

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of the 10th decile. After taxes are factored in, these shares remain relatively constant and do not undergo significant changes during the period under review. Consequently, the present study will prioritize an examination of the nature and scale of income redistribution before and after taxes, as opposed to a focus on the dynamics of these processes.

The findings indicate that the middle class, constituting 40% of the population, receives approximately 44% of the income across all country groups, both prior to and following redistribution through the tax system. The lowest-income 50% of families receive approximately 26–28% of the income after the implementation of redistribution policies in the South and East regions, and 31% in the North. It is noteworthy that 5 percentage points of income are subject to redistribution in the East, 8 percentage points in the South, and 9 percentage points in the North. In other words, an increase in total per capita income is accompanied by a significant redistribution of income, constituting an established European tradition. The result is a surprising picture in which the wealthiest 10% of the population in less developed countries receive 30% of income, 27% in the South, and 26% in the North. Indeed, a multifaceted system of regional disparities in inequality exists, influenced by both the level of development and the extent of redistribution. The parameters for the key countries in all three groups—Germany, the UKain, France, Italy, Poland, and the Czech Republic (see Figure 3 on p. 20)—are provided in Appendix B. This approach provides a more concrete picture of inequality that is not diluted by averages.

Table 3. Shares of pre-tax and post-tax national income by deciles in the EU-27, 2000–2022

	Before	After	Before	After	Before	After	Before	After
	2000		2008		2019		2022	
The North								
Top 10% (10th decile)	0.33	0.25	0.33	0.25	0.33	0.25	0.33	0.26
average 40% (6th – 9th deciles)	0.44	0.43	0.44	0.43	0.45	0.43	0.45	0.43
lower 50% (1st – 5th deciles)	0.23	0.32	0.23	0.32	0.22	0.32	0.22	0.31
The South								
Top 10% (10th decile)	0.35	0.28	0.34	0.27	0.34	0.27	0.34	0.27
average 40% (6th – 9th deciles)	0.46	0.45	0.46	0.45	0.45	0.45	0.46	0.45
lower 50% (1st – 5th deciles)	0.19	0.27	0.20	0.28	0.21	0.28	0.20	0.28
The East								
Top 10% (10th decile)	0.33	0.29	0.35	0.31	0.34	0.31	0.34	0.30
average 40% (6th – 9th deciles)	0.46	0.45	0.44	0.44	0.45	0.44	0.45	0.44
lower 50% (1st – 5th deciles)	0.21	0.26	0.21	0.25	0.21	0.25	0.21	0.26

Source: compiled by the authors based on the World Inequality Database (WID).

The data presented in Table 3 generally indicates the rigidity of inequality within the statistical database under consideration. The aforementioned study [Blanchet

et al. 2022] obtained more pessimistic results, but on a more complex and detailed statistical basis, namely the growth of social inequality in the EU by 2017. In the six leading countries, the share of the 10th decile (after taxes) is marginally lower than the group averages, the share of the middle 40% of the population is stable at 45% of gross income, and the share of the bottom 50% of the population is relatively "high" at 29–30% (with the exception of Italy and Poland). France exhibits the most pronounced disparity in after-tax income shares, with a 22-percentage-point gap between the poor and the middle class, and an 11-percentage-point discrepancy between the middle class and the wealthy. This assertion is substantiated by the highest marginal income tax rate in the South group (in 2022, the marginal tax rate in France will be 55.2% [OECD 2024]). The most pronounced disparities in income inequality are observed among the sample countries of Italy and Poland, where the wealthiest segments of the population exhibit the highest levels of income accumulation.

Figure 3.   Shares of pre-tax and post-tax national income in the selected EU countries, %, 2022
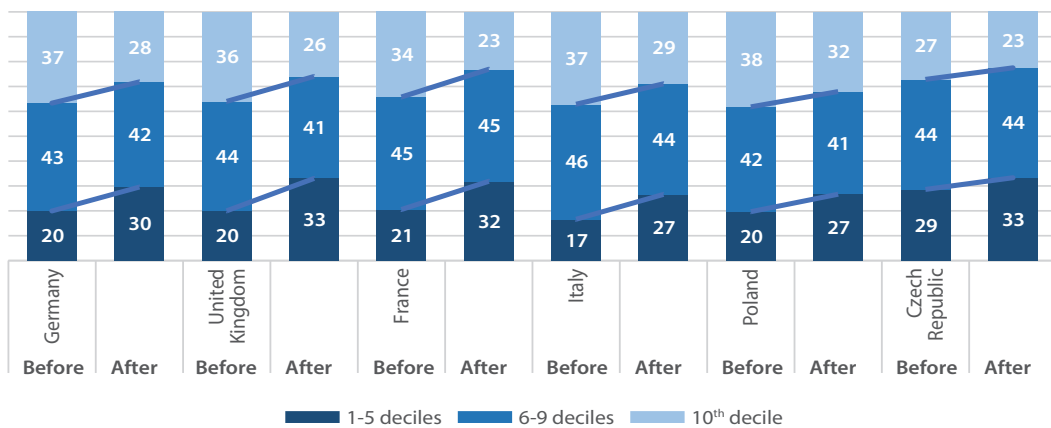
Source: compiled by the authors based on the World Inequality Database (WID).

It is imperative to understand not only the immediate consequences of tax redistribution, but also the underlying mechanisms that underpin it. The utilization of taxation as a means of addressing internal social inequality has become a prevalent practice in the 21st century. As of 2024, 23 out of 27 EU countries have implemented a progressive taxation system [Hammer, Christl, and De Poli 2021], and there is a growing body of evidence supporting the efficacy of this tool in European countries compared to countries in other parts of the world [Inchauste and Karver 2017].

According to the findings presented in Table 4 on p. 21, a concise overview of the key differences between EU groups in terms of tax systems is provided. The format of this article precludes an exhaustive examination of each nation's tax system. Consequently, we offer statistics concerning the number of countries implementing progressive and proportional income tax scales, in addition to the average marginal income tax rate,

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for the purpose of comparison. A comparison of the tax policies of the "new" and "old" (North and South) EU reveals significant discrepancies. In the northern countries, a significant redistribution of income has occurred over the period under review. This redistribution has had a positive impact on reducing social inequality, though it has not yet overcome it, through fiscal instruments as an integral part of social policy. In the southern countries, the progressive tax scale demonstrates less significant results, accompanied by larger budget deficits. In Eastern countries, the redistribution effect is less pronounced than in the other two groups, and there are specific reasons for this. For the purposes of further analysis, it is important to note that certain countries within the group have maintained a fixed tax rate. These countries include Bulgaria, Hungary, Romania, and Estonia. It is noteworthy that other countries, including Slovakia (until 2013), Latvia (2018), and Lithuania (2020), have also implemented a proportional scale [Barrios et al. 2020; Hammer, Christl, and De Poli 2021]. Consequently, affluent groups in Eastern countries are less encumbered by transfers to the economically disadvantaged than their counterparts in the Global North and South.

Table 4.   Comparative characteristics of tax systems, 2024

Parameter	The North	The South	The East
Number of countries with a progressive income tax scale, units	9	8	6
Number of countries with a fixed income tax scale, units	-	-	4
Average marginal income tax rate, 2024, %	51	43.7	25.2

Source: compiled by the authors based on OECD and PWC data.

5. Income dynamics of the 10th decile after taxes

The persistence of elevated social inequality against the backdrop of economic growth engenders substantial gains for the high-income 10th decile, which predominantly comprises high-paying jobs in business and government, as well as inheritance, business profits, income from securities, and so forth. This is an inertial process that the market economy sustains on an ongoing basis.

We have previously addressed the issue of intraregional inequality in terms of income groups (quintiles, deciles) in our other works, particularly highlighting the distinctive impact of crises on a significant reduction in the income of the 10th decile compared to the total national income [Grigoryev, Pavlyushina 2018; Grigoryev, Pavlyushina 2022b]. In this paper, we seek to underscore the potential of this approach to illuminate hitherto unexplored trends in inequality. We propose a methodology for calculating the after-tax income of the 10th decile for each country and for each group separately in absolute terms. This calculation will be based on two indicators from the statistical databases of the World Bank and the World Inequality Lab. To obtain the income of the 10th decile of country j in period t, we multiply the per capita GDP of

country j in period t by the share of the 10th decile income after taxation of country j in period t and multiply the resulting number by 10^3 (see Appendix B).

We will demonstrate these indicators in Figure 4 (p. 22). It shows a surprising picture in which, after income redistribution, the 10th decile of the East converges with the 10th decile of the South. At the beginning of the 21st century, the rich South and North had relatively equal incomes, but by the end of the period under review, the rich South had lost their position and were caught up by the new rich from the East. Thus, the integration of the rich fits into the history of EU integration with overall growth in inequality in the EU.

Figure 4.   Weighted average of imputed post-tax GDP per capita (PPP, 2021 constant prices) of the 10th decile, thousand international dollars, 2000–2022
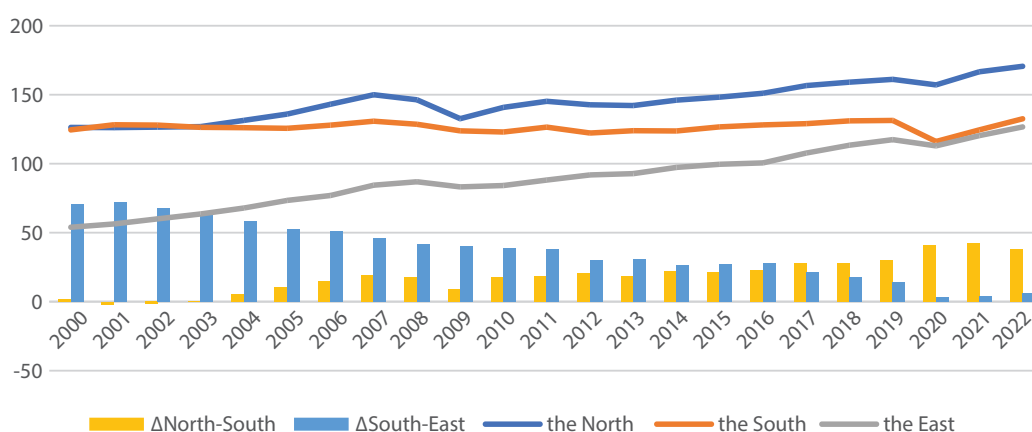
Source: compiled by the authors based on data from the World Bank, the World Inequality Lab (see Appendix B).

Conclusion

The picture of the EU's development in the 21st century points to certain successes in bringing countries closer together. The observed convergence of the eastern region toward the southern direction is particularly pronounced. The human capital accumulated during the period of the planned economy may play a certain role in this. It is evident that the trend toward convergence was observed until the global crisis of 2008–2010. Subsequent to this period, the Southern states have exhibited a persistent underperformance in comparison to other demographic groups, a circumstance that has contributed to the escalating disparity between the European Union and the United States.

The limitations inherent in the scope of this work preclude the possibility of supplementing the initial tier of analysis with broader coverage in two or three

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[3]   The income of the 10th decile of each country in absolute terms is equal to

$$\frac{National\ GDP \times 10^{th}\ decile\ income\ share}{0.1 \times Population} = GDP\ per\ capita\ of\ the\ country \times \\ \times 10^{th}\ decile\ income\ share \times 10$$

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directions. Initially, the work cited in the article [Blanchet et al. 2022] suggests the presence of underlying social inequality in the EU, as evidenced by a more thorough examination of income. Secondly, the institutional disparities (diverse tax systems, etc.) delineated in Grigoryev and Lyakhova (2025) imply specific challenges in the integration process and impose constraints, including on the convergence of the overall level of development of EU countries. Thirdly, there is a room for a more thorough delineation of each of the three regional groups, encompassing their economic, demographic, and other characteristics. An expansion of the aforementioned analysis would facilitate the identification of potential correlations between internal economic characteristics (e.g., unemployment, labor market specifics, population structure, etc.) and the observed trends in income inequality dynamics. Such an expansion would also allow for the refinement of arguments concerning the etiology of income disparities and the degree of convergence among groups of countries.

A notable consequence of the interplay between income inequality and the extent of its redistribution is a discernible convergence in the post-tax income levels of the affluent elites in the Southern and Eastern regions. In essence, had Karl Marx conducted a thorough review of the statistical data presented, it is plausible that he might have conceptualized the notion of a "10th decile international," a category that has exhibited a marked divergence from the middle and lower strata of European society, despite the implementation of substantial tax redistribution measures in favor of low-income groups.

Bibliography

Barrios, S., Ivaškaitė-Tamošiūnė, V., Maftei, A., Narazani, E., Varga, J., 2020. Progressive Tax Reforms in Flat Tax Countries. *Eastern European Economics*, Vol. 58, No. 2. P. 83–107. Available at: https://doi.org/10.1080/00128775.2019.1671201

Blanchet, Th., Chancel, L., Gethin, A., 2022. Why Is Europe More Equal than the United States? *American Economic Journal: Applied Economics,* Vol. 14, No 4. P. 480–518. Available at: https://doi.org/10.1257/app.20200703

Bourguignon, F., Morrison, C., 2002. The size distribution of income among world citizens, 1820–1990. *American Economic Review*, Vol. 92, No 4. P. 727–744. DOI: 10.1257/00028280260344443

Corac, M., 2013. Income Inequality, Equality of Opportunity, and Intergenerational Mobility. *Journal of Economic Perspectives*, Vol. 27, No 3. Summer. P. 79–102.

Dabrowski, M., 2022. Thirty years of economic transition in the former Soviet Union: Macroeconomic dimension. *Russian Journal of Economics*, Vol. 8, No 2. P. 95–121. Available at: https://rujec.org/article/90947/ download/pdf/721472

Dabrowski, M., 2023. A limping transition: The former Soviet Union thirty years on. *Bruegel Essay&Lecture Series*. Available at: https://www.bruegel.org/sites/default/files/202302/Transition%20in%20the%20FSU_essay%20140223%20HB.pdf

Dabrowski, M., 2024. A special historical analysis: Europe's 35-year journey since the fall of the Berlin Wall. *Bruegel Analysis*. Available at: https://www.bruegel.org/sites/default/files/private/2023-02/Transition%20in%20the%20FSU_essay%20140223%20HB.pdf

Dabrowski, M., Hagemejer, J., Hartwell, C. A., Otrachshenko, V., Popova, O., 2025. Eastern European economies amidst global and regional shocks. Case Report No. 511. Case Research EU. Available at:

https://case-research.eu/publications/eastern-european-economies-amidst-global-and-regional-shocks/

Doroshenko, M.E., 2013. Economic growth yesterday, today, and tomorrow. In: *The global economy at the beginning of the 21st century*. Moscow: Direct Media. P. 96–116. Available at: http://video.wehse.ru/web/we/books/Mirovaya_Ekonomika_V_Nachale_XXI_Veka.pdf (in Russian)

Eurostat. General government expenditure by function (COFOG) [gov_10a_exp_custom_10168312] // Education, Healthcare, % of GDP. Available at: https://ec.europa.eu/eurostat/data/database

Grigoryev, L. M., Lyakhova, S. V., 2025. The secret behind the slowdown of the European Union. *Russia in Global Affairs*, Vol. 23, No 3. P. 83–104. DOI: 10.31278/1810-6439-2025-23-3-83-104

Grigoryev, L., Zharonkina, D., 2024. China's Economy: Thirty Years of Surpassing Development. *International Organisations Research Journal.* Vol. 19. No 1. DOI:10.17323/1996-7845-2024-01-08

Grigoryev, L.M., 2023. The Shocks of 2020-2023 and the Business Cycle. *Contemporary World Economy*, Vol. 1., No 1. Available at: https://doi.org/10.17323/2949-5776-2023-1-1-8-32

Grigoryev, L.M., 2025. The world bids farewell to Utopias: Time to reconsider development theories. *Moscow University Economics Bulletin*, No 3 (in Russian).

Grigoryev, L.M., Golyashev, A., Brilliantova, V., 2017. Uneven development of European Union countries in the 2000s. *Bulletin on current trends in the global economy,* Nov., No 26. P. 1–16. Available at: https://ac.gov.ru/files/publication/a/15555.pdf (in Russian).

Grigoryev, L.M., Kurdin, A.A., Makarov, I.A. (eds), 2022. *The World Economy in a Period of Big Shocks.* Moscow: INFRA-M, 2022. Chapters 1 and 14. Available at: https://doi.org/10.12737/1858585

Grigoryev, L.M., Maykhrovitch, M.Y., 2023. Growth theories: The realities of the last decades (Issues of sociocultural codes — to the expansion of the research program). *Voprosy Ekonomiki.* No 2. P. 18-42. Available at: https://doi.org/10.32609/0042-8736-2023-2-18-42 (in Russian).

Grigoryev, L.M., Pavlyushina, V.A., 2018. Social inequality in the world: Trends during 2000–2016. *Voprosy Ekonomiki,* No 10. P. 29–52. Available at: https://doi.org/10.32609/0042-8736-2018-10-29-52 (in Russian).

Grigoryev, L.M., Pavlyushina, V.A., 2022(a). Intercountry inequality: Dynamics and the problem of stages of development. In: Grigoryev, L.M., Kurdin, A.A., Makarov, I.A. (eds), 2022. *The World Economy in a Period of Big Shocks*. Moscow: INFRA-M (in Russian).

Grigoryev, L.M., Pavlyushina, V.A., 2022(b). Social inequality in the modern world. In: Grigoryev, L.M., Kurdin, A.A., Makarov, I.A. (eds), 2022. *The World Economy in a Period of Big Shocks*. Moscow: INFRA-M (in Russian).

Grigoryev, L.M., Elkina, Z.S., Mednikova, P.A., Serova, D.A., Starodubtseva, M.F., Filippova, E.S., 2021. The perfect storm of personal consumption. *Voprosy Ekonomiki*, No 10. P. 27–50. Available at: https://doi.org/10.32609/0042-8736-2021-10-27-50 (in Russian).

Hammer, B., Christl, M., De Poli, S., 2021. Redistribution across Europe: how much and to whom? *JRC Working Papers on Taxation and Structural Reforms.* No 14/2021. Available at: https://publications.jrc.ec.europa.eu/repository/handle/JRC127070

Huber, E., Stephens, J. D., 2014. Income inequality and redistribution in post-industrial democracies: Demographic, economic and political determinants. *Socio-Economic Review*, Vol. 12, No 2. P. 245–267. Available at: https://doi.org/10.1093/ser/mwu001

Inchauste, G., Karver, J., 2017. Fiscal Redistribution in the European Union. World Bank report on European Union. Available at: https://thedocs.worldbank.org/en/doc/632981520461235859-0080022018/original/EUIGReportFiscalRedistribution.pdf

Krueger, A., 2012. The Rise and Consequences of Inequality in the United States. Jan. 12. Available at: https://obamawhitehouse.archives.gov/sites/default/files/krueger_cap_speech_final_remarks.pdf

Kuznets, S., 1956. Economic Growth and Income Inequality. *The American Economic Review*, No 45(1). P. 1–28. Available at: http://www.jstor.org/stable/1811581

Lakner, Ch., Milanovic, B., 2013. Global Income Distribution: From the Fall of the Berlin Wall to the Great Recession. Policy Research Working Paper; No. 6719. World Bank, 2013. Available at: http://documents.worldbank.org/curated/en/914431468162277879

Maddison Project Database, 2023. GDP pc 2011 prices Real GDP per capita in 2011$. University of Groningen. DOI: 10.34894/INZBF2

Maykhrovich, M.-Ya., 2023.Economic convergence of the countries in 1992–2022. *Contemporary World Economy*, Vol. 1, No 4(4). Available at: https://doi.org/10.17323/2949-5776-2023-1-4-48-71

Maykhrovich, M.-Ya., 2025. The speed of convergence of world countries' development levels in the 21st century: theoretical approaches and statistical limitations. *Moscow University Economics Bulletin,* No 5 (in print) (in Russian).

OECD. Table I.7. Top statutory personal income tax rates. OECD Data (updated 27 March 2024). Available at: https://data-explorer.oecd.org/vis?tenant= archive&df[ds]=DisseminateArchiveDMZ&df[id]=DF_TABLE_I7&df[ag]=OECD&dq=.&lom= LASTNPERIODS&lo=5&to[TIME_PERIOD]=false

Paprotny, D., 2021. Convergence Between Developed and Developing Countries: A Centennial Perspective. *Social Indicators Research*, Vol. 153. P. 193–225. Available at: https://doi.org/10.1007/s11205-020-02488-4

Perugini, C., Martino, G., 2008. Income inequality within European regions: Determinants and effects on growth. *Review of Income and Wealth,* Vol. 54, No 3. P. 373–406. Available at: https://doi.org/10.1111/j.1475-4991.2008.00280.x

Piketty, T., 2014. *Capital in the 21st Century*. Cambridge, MA: Harvard University Press.

PWC. World tax summaries 2024. Available at: https://taxsummaries.pwc.com

Roine, J., Vlachos, J., Waldenström, D., 2009. The long-run determinants of inequality: What can we learn from top income data? *Journal of Public Economics*, Vol. 93, No 7–8. P. 974–988. Available at: https://doi.org/10.1016/j.jpubeco.2009.04.003

Solow, R.M., 1956. A Contribution to the Theory of Economic Growth. *The Quarterly Journal of Economics*, Vol. 70, No. 1, Feb. P. 65–94. Available at: https://doi.org/10.2307/1884513

Suárez-Arbesú, C., Apergis, N., Delgado, F. J., 2023. Club convergence and factors of income inequality in the European Union. *International Journal of Finance&Economics*, Vol. 28, No 4. P. 3654–3666. Available at: https://doi.org/10.1002/ijfe.2612

World Development Indicators Database. GDP, PPP (constant 2021 international $); GDP per capita, PPP (constant 2021 international $); Population, total (data updated on 15 April 2025). Available at: https://databank.worldbank.org/source/world-development-indicators

World Inequality Database. Pre-tax national income top 10%, middle 40%, bottom 50% (share, adults, equal split); Post-tax national income top 10%, middle 40%, bottom 50% (share, adults, equal split). Available at: https://wid.world/data/ (data updated on 01 May 2025).

Zharonkina, D.V., 2025. The capacity of the global market and Chinese exports in the 21st century. *International Organisations Research Journal*, No 4 (in print) (in Russian).

Appendix A: Economic indicators of the EU-27, the US, and the UK, 2000–2023

	Population, million (right: share of EU-27, %)				GDP (PPP, 2021 constant prices), billion international dollars (right: share of EU-27, %)				GDP per capita PPP (2021 constant prices), thousand international dollars (EU-27)						
	2000	2023	2000	2023	2000	2023	2000	2023	2000	2008	2019	2020	2021	2022	2023
North															
Austria	8	9.1	2	2	429	588	2	2	53.6	61.2	64.7	60.3	63.0	65.7	64.4
Belgium	10.3	11.8	2	3	517	742	3	3	50.5	56.8	60.5	57.4	60.7	62.7	62.9
Germany	82.2	83.3	19	19	4 109	5 260	24	22	50.0	55.5	63.0	60.3	62.5	62.9	63.2
Denmark	5.3	5.9	1	1	307	425	2	2	57.4	62.5	66.6	65.2	69.7	70.2	71.5
Finland	5.2	5.6	1	1	243	316	1	1	46.9	57.5	56.9	55.4	56.8	57.5	56.5
Ireland	3.8	5.3	1	1	205	613	1	3	53.7	62.4	97.2	103.1	118.7	125.6	115.5
Luxembourg	0.4	0.7	0	0	50	87	0	0	113.5	135.1	131.7	128.4	135.5	134.6	130.5
Netherlands	15.9	17.9	4	4	892	1263	5	5	56.0	63.7	67.8	64.9	68.6	71.3	70.7
Sweden	8.9	10.5	2	2	425	661	2	3	47.9	55.8	61.2	59.6	62.7	63.2	62.7
Total	140	150.1	33	33	7 176	9 954	42	41							
Average[1]									**51.2**	**57.8**	**64.7**	**62.3**	**65.4**	**66.6**	**66.3**
Coefficient of variation [2], %									35.4	37.5	32.9	34.9	36.9	36.8	34.1
South															
Spain	40.6	48.3	9	11	1 621	2 289	9	9	39.9	44.9	46.9	41.5	44.3	46.7	47.3
France	60.9	68.3	14	15	2 798	3 689	16	15	45.9	50.1	53.4	49.3	52.5	53.7	54.0
Greece	10.8	10.4	3	2	339	383	2	2	31.4	41.7	33.5	30.5	33.5	35.9	36.9
Italy	56.9	59	13	13	2 867	3 105	17	13	50.4	52.1	49.7	45.5	49.8	52.3	52.6
Malta	0.4	0.6	0	0	12	33	0	0	31.0	36.2	53.3	50.3	56.7	57.7	59.6
Portugal	10.3	10.6	2	2	361	439	2	2	35.1	37.3	40.2	36.9	38.7	41.1	41.5
Croatia	4.5	3.9	1	1	95	159	1	1	21.3	31.1	35.1	32.5	36.9	39.9	41.1
Cyprus	0.9	1.3	0	0	25	48	0	0	36.1	44.3	46.2	44.2	48.8	51.7	52.2
Total	185.3	202.4	43	45	8 118	10 146	47	42							
Average									**43.8**	**47.8**	**48.5**	**44.3**	**47.7**	**49.7**	**50.1**
Coefficient of variation, %									25.0	16.9	17.3	18.0	18.1	16.3	16.1

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	Population, million (right: share of EU-27, %)				GDP (PPP, 2021 constant prices), billion international dollars (right: share of EU-27, %)				GDP per capita PPP (2021 constant prices), thousand international dollars (EU-27)						
	2000		2023		2000		2023		2000	2008	2019	2020	2021	2022	2023
East															
Bulgaria	8.2	2	6.4	1	103	1	214	1	12.6	21.8	27.7	27.0	29.3	31.6	33.1
Czech Republic	10.3	2	10.9	2	302	2	516	2	29.4	40.3	47.8	45.1	47.8	48.4	47.5
Estonia	1.4	0	1.4	0	29	0	57	0	20.7	34.6	42.7	41.3	44.3	43.7	41.7
Hungary	10.2	2	9.6	2	226	1	386	2	22.1	29.5	37.2	35.6	38.3	40.4	40.2
Lithuania	3.5	1	2.9	1	55	0	133	1	15.8	30.4	43.3	43.3	46.0	46.7	46.2
Latvia	2.4	1	1.9	0	34	0	72	0	14.6	28.7	35.2	34.2	36.9	37.7	38.4
Romania	22.4	5	19.1	4	333	2	768	3	14.9	27.0	36.6	35.5	37.7	39.4	40.3
Slovakia	5.4	1	5.4	1	99	1	213	1	18.3	29.5	37.2	36.2	38.4	38.6	39.2
Slovenia	2	0	2.1	0	60	0	102	0	30.1	41.3	44.6	42.5	45.9	47.1	47.9
Poland	38.3	9	36.7	8	710	4	1 600	7	18.6	25.6	38.2	37.5	41.1	43.4	43.6
Total	104	24	96.3	21	1 951	11	4 060	17							
Average									**18.8**	**28.4**	**38.3**	**37.2**	**40.1**	**41.8**	**42.2**
Coefficient of variation, %									30.7	20.0	14.7	14.2	13.8	12.4	11.0
EU-27	429.3		448.8		17 245		24 160		**40.2**	**46.6**	**51.6**	**48.7**	**51.9**	**53.7**	**53.8**
Coefficient of variation, %									56.2	47.2	41.1	43.5	43.9	43.0	40.0
EU-15[3] ("old" EU)	378.5		415		17 709		23 454		46.8	51.8	55.2	51.4	54.8	56.5	56.5
Coefficient of variation, %									36.0	38.1	37.9	41.7	42.8	41.9	38.9
United Kingdom	58.9		68.4		2 547		3 594		43.2	49.0	52.5	46.9	51.0	52.8	52.6
Δ North–South									7.4	10.0	16.1	18.0	17.8	17.0	16.2
Δ South–East									25.0	19.4	10.2	7.1	7.6	7.8	8.0
EU-15 (excluding UK)[4]	320		347.2		15 174		19 893		47.4	52.3	55.7	52.2	55.5	57.2	57.3
Coefficient of variation, %									37.9	39.7	37.9	41.3	42.3	41.5	38.3
United States	282.2		334.9		15 530		24 977		**55.0**	**60.8**	**69.5**	**67.4**	**71.3**	**72.8**	**74.6**
Δ North–US									3.8	3.0	4.8	5.0	5.9	6.2	8.3
Δ South–US									11.2	13.0	21.0	23.1	23.7	23.2	24.4
Δ East–US									36.3	32.4	31.2	30.2	31.2	31.0	32.4

Source: compiled by the authors based on data from the World Bank (World Development Indicators).

Notes to Appendix A:

GDP and GDP per capita are given in PPP terms at constant 2021 prices.

1 — Average per capita income for a group of countries (in thousands of PPP dollars) is calculated using the formula: the ratio of the total GDP of the group (in PPP dollars) to the total population of the group (in persons).

2 — Coefficient of variation — a relative measure of data dispersion, calculated as the ratio of the standard deviation to the arithmetic mean (%). For a sample to be considered homogeneous, the coefficient of variation must not exceed the threshold value of 33.3%.

3 — Indicators are calculated for the **EU-15** group: **fundamental countries of the EU**. Austria, Belgium, Germany, Denmark, Finland, Ireland, Luxembourg, the Netherlands, Sweden, the United Kingdom, France, Italy, Portugal, Greece, and Spain. The following are given: the total population of the group of countries, the total GDP of the group of countries, the average per capita income of the group of countries, calculated using a formula similar to that in paragraph 1.

4 — Indicators are calculated for the **EU-15** group: **the North group + the South group excluding Croatia and Cyprus**. The total population of the group of countries, the total GDP of the group of countries, and the average per capita income of the group of countries, calculated using a formula similar to that in paragraph 1, are given.

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Appendix B: Distribution of the 10th decile post-tax national income in the EU-27, PPP in constant 2021 prices

	Share in national GDP[1]		Per capita GDP, thousand international dollars per capita[2]					
	2000	2022	2000	2008	2019	2020	2021	2022
North								
Austria	0.28	0.28	148	173	170	167	174	183
Belgium	0.25	0.24	126	135	148	137	147	153
Germany	0.25	0.28	125	158	180	168	176	177
Denmark	0.19	0.21	107	118	130	132	143	147
Finland	0.23	0.25	108	137	136	136	140	143
Ireland	0.27	0.28	147	151	265	276	323	346
Luxembourg	0.33	0.30	373	472	385	381	408	407
Netherlands	0.22	0.23	123	144	158	149	160	167
Sweden	0.20	0.23	97	128	133	137	146	146
Average aggregate[3]			126	146	161	157	167	171
Arithmetic mean[4]	**0.25**	**0.26**	**151**	**180**	**189**	**187**	**202**	**208**
Arithmetic mean excluding Luxembourg			123	143	165	163	176	183
Coefficient of variation, %			56.7	61.8	44.5	45.7	47.6	47.1
South								
Spain	0	0.27	113	125	128	109	118	126
France	0.25	0.23	116	129	124	111	123	124
Greece	0.34	0.30	105	116	90	81	92	106
Italy	0.29	0.29	146	140	146	129	143	151
Malta	0.26	0.29	81	98	157	141	162	167
Portugal	0.30	0.27	105	110	112	100	101	110
Croatia	0.27	0.28	57	88	100	90	104	113
Cyprus	0.28	0.21	103	99	111	102	98	107
Average aggregate			124	129	131	116	124	133
Arithmetic mean	**0.28**	**0.27**	**103**	**113**	**121**	**108**	**118**	**126**
Coefficient of variation, %			25.2	15.7	18.6	18.2	20.7	17.7

	Share in national GDP[1]		Per capita GDP, thousand international dollars per capita[2]					
	2000	2022	2000	2008	2019	2020	2021	2022
East								
Bulgaria*	0.30	0.39	38	68	115	110	112	122
Czech Republic	0.24	0.23	71	102	111	102	107	109
Estonia*	0.36	0.32	75	113	133	129	140	139
Hungary*	0.24	0.29	53	81	110	102	110	117
Lithuania	0.33	0.34	52	109	150	147	156	159
Latvia	0.33	0.32	47	95	112	108	115	122
Romania*	0.33	0.37	49	105	133	130	139	145
Slovakia	0.22	0.21	40	74	82	80	80	79
Slovenia	0.25	0.25	74	103	109	104	112	115
Poland	0.28	0.32	51	81	121	119	130	139
Average aggregate	0.29	0.30	54	87	117	113	120	127
Arithmetic mean			**55**	**93**	**118**	**113**	**120**	**125**
Coefficient of variation, %			24.7	17.2	15.5	16.6	17.8	17.8
EU-27, coefficient of variation, %			64	58	42	45	47	45
EU-15, coefficient of variation, %[5]			51	58	44	48	49	48

Source: compiled by the authors based on data from the World Inequality Database (World Inequality Lab) and the World Bank.

Notes to Appendix B:

GDP per capita is given in PPP terms at constant 2021 prices (World Bank database).

1 — Shares of the 10th decile in national GDP after taxation are taken from the World Inequality Database (World Inequality Lab). Share of national income after taxes attributable to the 10th decile. The unit of observation is an adult aged 20 years and older. Income is divided equally between spouses [post-tax national income top 10% (share, adults, equal split)].

2 — The income of the 10th decile of each country in absolute terms is calculated using the formula: *GDP per capita of the country × share of income of the 10th decile after tax × 10*.

3 — We have named this parameter "average aggregate"; it is calculated using the following formula: *average GDP per capita of the group (from Appendix A) × arithmetic mean of the share of income of the 10th decile of income of the 10th decile after tax of the group × 10*.

4 — Classic arithmetic mean parameters.

5 — Indicators are calculated for the EU-15 group: the North group + the South group excluding Croatia and Cyprus.

***** — Countries with a fixed income tax rate are indicated.

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