



What explains recent trends in income inequality in the European Union?

Stefano Filauro¹ · Zachary Parolin¹ · Pietro Valetto²

Received: 25 November 2023 / Accepted: 9 October 2024
© The Author(s) 2025

Abstract

We investigate trends in income inequality in the European Union (EU) from 2007 to 2019. Using EU-SILC data, we find that EU-wide inequality declined between 9 and 20%, depending on the inequality measure applied, despite rising within-country income inequality during the same period. Applying a series of decomposition techniques, we find that between-country convergence in pre-tax/transfer incomes fully explains the declining EU-wide inequality. Changes in tax and transfer systems, in contrast, contributed to marginally higher inequality in 2019 compared to 2007. Nonetheless, the 10th percentile of the EU-wide income distribution grew six times the rate of the 90th percentile, a product of widespread earnings gains among residents of lower-income EU Member States. Re-centered influence functions and Kitigawa-Oaxaca-Blinder analyses reveal that those earnings gains are not due to specific compositional or employment changes but rather are due to rising earnings returns to employment in lower-income Member States. Despite the contribution of between-country income convergence in reducing EU-wide inequality between 2007 and 2019, however, within-country income disparities continue to explain the larger share of EU-wide inequality *levels* in 2019. Thus, reducing within-country economic disparities is increasingly important for achieving further reductions in EU-wide inequality moving forward.

Keywords Income inequality · Taxes and transfers · European Union · Economic convergence

1 Introduction

Rising levels of income inequality are a common feature of many advanced economies, including Member States of the European Union (EU), where income inequality has been rising steadily since the mid-1980s. Much of the scholarly work on income inequality in

Pietro Valetto contributed to this study during his tenure at Bocconi University. He has been affiliated with the University of Antwerp since January 2024.

✉ Stefano Filauro
Stefano.filauro2@unibocconi.it

¹ Bocconi University, Via Roentgen 1, 20136 Milan, Italy

² University of Antwerp, Antwerpen, Belgium

Europe has focused on trends of individual EU countries and the investigation of their underlying drivers (e.g. Förster and Toth 2015). This national-level perspective has proved useful and policy-relevant given that both pre-distributive and redistributive policies aimed at addressing income inequality tend to occur at the national level.

However, a broader, pan-EU perspective on income inequality is becoming increasingly important. Since its inception, the EU, despite having relatively little competence in the tax-transfer power of individual countries, has played a substantial role in fostering conditional economic convergence, often referred to as “the convergence machine” (Gill and Raiser 2012). Newer and smaller economies have been growing faster and catching up with larger Member States. Market convergence between EU countries has gone hand in hand with rising income inequality within most of the individual EU countries, however (OECD 2015).

The extent to which income convergence and rising within-country inequality jointly operate in shaping income inequality at the EU-level remains rather unknown, albeit highly relevant. Particularly, their distinct role in contributing to the EU inequality reduction observed over the last 15 years in various studies (Filauro and Parolin 2019, Dauderstädt 2020, Eurofound 2017) warrants exploration. Are changes in EU inequality primarily determined by trends in pre-tax/transfer income inequality and the ‘convergence machine’ operating in the realm of market income? Alternatively, are changes attributable to trends in the redistributive power of the EU welfare states? This question is largely unaddressed but can inform the policy agenda the EU can adopt to tackle EU-wide inequality.

Addressing inequality at the EU level has proved challenging due to the EU’s institutional structure, limited centralization, and less robust redistribution mechanisms compared to national counterparts. Thus, a consolidated knowledge of the causes of the recent improvements in EU-wide income inequality is essential to inform future policy interventions, whether focused on enhancing labor income convergence or equalizing tax-benefit systems.

The supranational perspective on EU-wide inequality is valuable for several reasons. First, the EU has recently adopted a more prominent role in setting current economic and social policies. An increasing number of welfare policies capable of reducing income inequality are coordinated at the EU level. Already before the COVID-19 pandemic and, to a greater extent, in response to it, the EU promoted and set up several policy initiatives from both a pre-distributive and a redistributive perspective with the potential to tackle EU-wide inequality. This trend towards the Europeanization of welfare policies is exemplified by the EU Directive on adequate minimum wages and the strong push in the common COVID policy response, with labor-preserving policies being strongly promoted and financed directly at EU level through the Support to mitigate Unemployment Risks in an Emergency (SURE) instrument.¹ This enhanced involvement of the EU in social policy necessitates a framework to assess its impact on inequality at the EU level. In addition to moving towards ‘viewing the EU as an entity’ in the Atkinsonian spirit (1998), a pan-EU perspective on EU-level inequality makes it possible to compare it with other unions that combine economic and political integration with considerable federal-state interaction, such as the US. As one example, Blanchet, Chancel, and Gethin (BCG 2022) focus on the concepts of redistribution versus predistribution in a US-Europe comparison, finding that a more equal predistribution of factor income in Europe explains why disposable income is less unequally distributed in Europe than in the US. This finding contrasts with the conventional emphasis on Europe’s redistributive welfare states (OECD 2011).

¹ EU sources: Directive (EU) 2022/2041 on adequate minimum wages in the European Union and. <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32020R0672>

Second, there are instrumental reasons for studying changes in EU-wide inequality. Rising inequality is a concern for policymakers as it can erode social cohesion, exacerbate political polarization, and jeopardize economic growth. This is documented within countries (OECD 2015) and applies to unions of states, as well. Notably, inequality can fuel pro-dissolution forces (Milanovic 2010) and weaken the space for solidarity policies across EU countries impairing confidence in the EU and its political legitimacy among EU citizens (Vandenbroucke and Rinaldi 2015). Increasing inequality at the EU level can present challenges for the EU project given that increased political polarization within Member States complicates EU level decision making which so often hinges on the balance of unanimity (Schmidt 2020). Shortly, EU-level inequality has consequences that are distinct from those arising from national patterns of inequality which also impact the Union's prospects to push a socio-economic agenda to further contrast EU-level inequality through the integration of (EU-coordinated or EU-run) tax-benefit or market policies.

Hence, our contribution is twofold. First, we present a framework to analyze various drivers of post-tax/transfers inequality change at the EU-level: changes in within- and between-country inequality in pre-tax/transfer income and changes in the effect of (mostly national) taxes and transfers in mitigating it. We use European Union Statistics on Income and Living Conditions (EU-SILC) data, and focus on equivalized household level income. We follow the standard practice of separating pre-distributive patterns, such as greater convergence in market incomes across countries,² from redistributive ones, such as developments in the tax-benefit systems, to adjudicate the main source of improvement in EU-level inequality in the 2007–2019 period. We focus specifically on the European Union rather than Europe as a whole (different from BCG), and we adopt a definition of post-tax/transfer income that is conventionally applied in inequality studies (OECD 2011; Brandolini and Smeeding 2011). We do not distribute government expenditure according to the Distributional National Accounts (DINA) framework because, although this approach enables reconciliation between survey data and income aggregates from national accounts, it risks introducing arbitrary assumptions about the allocation of collective expenditures and in-kind transfers to individuals.³

Second, we look at demographic and employment patterns and their impact on EU-level pre-tax/transfer inequality. In this respect, we aim to answer the following questions: are any between-country convergence effects due to changing demographic and employment patterns in EU countries, or are they primarily due to higher earnings regardless of changes in demography and employment? To do so, we apply a reweighting decomposition framework to break down changes in EU market inequality into (1) changes in observed composition and (2) changes in returns to composition (residual).

We find that it is between-country convergence in pre-tax/transfer income that most explains the reduction in EU income inequality over the last decade (over 125% of the

² To be sure, both convergence in market incomes across EU countries and redistributive power of the welfare states can be influenced by EU policies directly, through EU policy instruments, or indirectly, through the EU coordination mechanisms such as the European semester.

³ We rely on a more conventional definition of post-tax/transfer income, which we detail in the 'Data and Methods' section, because the distribution of government expenditure, as discussed in World Inequality Lab (2024), although pioneering and offering potential for new research possibilities, remains exploratory.

overall inequality change).⁴ In turn, within-country inequality in pre-tax/transfer income has also declined across EU countries and contributed, albeit minimally, to improving the distribution of post-tax/transfer income. Conversely, we find that the role of tax-transfer systems across EU countries is less consequential in mitigating EU-level inequality in 2019 than it was in 2007. In fact, social transfers did not play any role in the EU inequality reduction between 2007 and 2019. On top of a reduced transfer budget across the EU, this is likely due to different country positions in the EU pre-tax/transfer distribution in 2019. Finally, we find that compositional changes in demographic and labor characteristics explain only a small part (8.5%) of the overall reduction in pre-tax/transfer inequality at EU level, at least before the pandemic.

This collection of findings confirms that while the EU is indeed experiencing conditional convergence of incomes between its Member States, within-country inequality is simultaneously increasing due mainly to a reduction of the efficacy of national tax-transfer systems over time.

2 Background

2.1 Income inequality across EU countries

Income inequality has followed heterogeneous trends across the various EU countries over the last 30 years. The overall evidence indicates that disposable incomes have become more unequally distributed in many of these countries, regardless of their initial levels. Most OECD countries usually surveyed in LIS or in the OECD income database experienced an increase in the Gini coefficient of at least one ‘Gini point’ in the time range from the 90 s to early 2010s (Thewissen et al. 2018 and Forster and Toth 2015).

Comprehensive surveys of previous studies on inequality have identified a variety of factors influencing market inequality as well as the policy levers in welfare policies influencing redistribution (Forster and Toth 2015, Nolan et al. 2019). Large-scale socioeconomic, political, demographic and technological transformations are known to have determined long-term changes in the distribution of pre-tax/transfer income.

On the one hand, globalisation determined large between-firm wage differentials, occupational switching and offshoring practices with the potential to stretch the wage distribution (see Helpman (2016) for a cross-country overview; Nilsson Hakkala and Huttunen (2015) for Finland; Crozet and Orefice for France (2017)). Similarly, technological advancements have contributed to rising wage premia for high-skill workers and a fall in employment in routine occupations (Borrs and Knauth 2016). Goos, Manning and Salomons (2014) examine both offshoring and skill-biased technological change, and identify the latter as the predominant factor explaining job polarization in 16 European countries.

On the other hand, all EU Member States have experienced secular demographic changes in the last several decades as a potential determinant of inequality trends. Age, family structure, changing patterns of household employment participation and migration flows had all relevant effects on inequality, albeit of different sign and magnitude across countries.⁵

⁴ We acknowledge that EU market incomes are generated through unique processes stemming from country-specific labor and capital markets, which are then subject to predominantly national tax-transfer systems. Thus, when discussing labor convergence, we acknowledge that EU market incomes result from very diverse labor markets with significant wage disparities. Consequently, improved predistribution can primarily occur through wage convergence.

⁵ See Förster and Toth (2015) and Nolan et al. (2019) for a deeper overview of evidence in this respect across OECD countries.

While these factors have had crucial influence on market inequality, welfare systems operate an ex-post redistribution and have, at least theoretically, the power to neutralize or even counterbalance changing trends in market inequality. Various OECD reports (2011, 2015) have repeatedly highlighted that tax-benefit systems became more redistributive from the 1980s to the 2000s in many OECD countries, but this effect did not fully cancel out increases in market inequality. Moreover, in a different time horizon, the redistributive power of tax-benefit systems weakened from the mid-1990s to the mid-2000s, albeit heterogeneously across EU countries, with the result of a general increase in inequality in that decade. More recently, the overall redistributive impact weakened, following large fiscal consolidation programs in the wake of the great recession, though EU countries reformed their automatic stabilisers and their tax policies to varying degrees with different effects on inequality (De Agostini et al. 2014 or Nolan 2018). Bozio et al. (2024) analysed the role of redistribution as opposed to predistribution over the long run in the US and France using tax data, quantifying the extent of the reduction from market to posttax inequality—and highlighting that differences in market inequality drive most of the differences in post-tax inequality between France and the United States over time.

2.2 Income inequality at the EU level

The extent to which these trends unfold from the national to the EU level is relatively unknown though, as the investigation of EU wide inequality is still a emerging field of research. There are only a few recent studies that treat the EU as a single entity and investigate levels of inequality within it. So far, the analysis of the inequality-generating process at EU-level has focused particularly on two main areas: 1) the within- versus between-country dynamics in shaping inequality levels and 2) the redistributive power of EU tax-benefit system(s), especially in comparison to the US.

Filauro and Parolin (2019) examine how the dynamics between countries, as opposed to within them, have contributed to shaping levels of EU-level inequality from 2007 to 2016. They find that inequality in the EU has a sizeable between-country component (ca. 20%) mainly due to its historical path of enlargement towards below-EU average income countries. This differs significantly from the structure of US income inequality, which is almost fully attributable to inequality within states, with differences in average income across states accounting for no more than 1% of the overall inequality. Moreover, they find an improvement in the component of between-country inequality in the latter period of analysis indicating a convergence in mean post-tax/transfer incomes between countries as responsible for a more equal income distribution among EU households. Similar results have been found by Dauderstadt (2020) and Eurofound (2017). Particularly, the gap in average income between enlargement countries in South-Eastern Europe and Mediterranean countries diminished, as the former caught up while the latter faced recessive periods in the wake of large fiscal consolidation policies (Kvedaras and Cseres-Gergely 2020).⁶ Vacas-Soriano et al. (2020) echo these findings focusing on EU-wide wage trends in the labour market although they note that the contribution of within-country wage developments to explain changes in wage inequality for the EU as whole over the 2004–2015 decade was relatively limited.

⁶ In turn, recessions in Southern countries coupled with good business cycle in Northern and Continental countries triggered a slight increase in between-country inequality in the eurozone.

In a parallel line of research some authors have focused on the role of the various EU tax-benefit systems to bring about a more equal distribution at EU-level than in the US, a Union of States with much larger tax-benefit power at the federal level (Filauro and Parolin 2019; Blanchet et al. 2022). Starting from the evidence that post-tax/transfer inequality is lower in the EU the findings of these studies point at different redistributive power across the two sides of the Atlantic. The evidence is however inconclusive. On the one hand, the overall reduction of market inequality attributable to taxes and transfers is greater in the EU than the US (Filauro and Parolin 2019). On the other hand, Blanchet, Chancel, Gethin (2022) argue that the pre-tax/transfer inequality is much greater in the US, though they adopt a broader definition of income that includes government expenditure and other national-accounts components. Thus, the redistributive effect operated by US taxes and transfers is larger than in Europe, although their focus is on a European aggregate (inclusive of non-EU countries) other than the European Union. Their allocation of government expenditures to household incomes risks making arbitrary assumptions about the distribution of value from government consumption.⁷

While these contributions have helped to confirm the existence of a convergence in post-tax/transfer income and quantify the role of redistribution in the EU, there is still a need to clarify the underlying drivers of *trends* in EU income inequality. A noticeable reduction in EU-level inequality occurred in the last decade, after the effects of the 2008 financial crisis faded away, until 2018 (from around 36 in 2008 to below 34 Gini points in 2018, own calculations).

Little is known about the interaction between the pre-tax/transfer distribution and the effectiveness of the redistribution system in producing this outcome. Moreover, in a Union such as the EU, where taxes and benefits are largely a national competence, analysing the redistributive effect of welfare states on household income in the EU should take into account the country positions in the EU pre-tax/transfer distribution.⁸ Households that are at the bottom of the national distribution, and are so treated by the national tax-transfer system, might be in the middle of the EU distribution (e.g. a relatively poor Swede facing a generous welfare system is likely to be in the middle of the EU distribution). Conversely, households in the middle of the national distribution, and so treated by the national tax-transfer system, might still be at the bottom of the EU distribution (e.g. middle-income Bulgarians facing a less supportive welfare system). Thus, the analysis of the redistributive effect of EU welfare states should consider the combined effect of national tax-transfer systems as well as trends in the EU pre-tax/transfer income distribution across states that determine the various country positions at EU level. While the work of Blanchet et al. (2022) has tried to test the potential trade-off between market income inequality and redistribution across countries, the relation between trends in pre-tax/transfer income inequality and redistribution for the EU as a whole is still unknown.

⁷ The pan-EU section in Blanchet et al.'s paper (2022) is only marginally focused on the EU as an entity with policy competences. Their Europe's aggregate does not coincide with the European Union, and their correction for living costs across EU countries adjusts for market exchange rates, so their results should be compared to ours with caution.

⁸ The welfare treatment of households at potentially very similar points of the EU income distribution depends on their national treatment.

3 Data and methods

Our methodological approach proceeds in three steps. We first detail our data source and sample selection. We then detail our inequality measures. Third, we describe how we apply our decomposition frameworks to analyse inequality changes from both the perspective of changes in redistribution and market income convergence (taxes and benefits versus within- and between-country inequality in pre-tax/transfer income) as well as the perspective of socio-demographic changes.

3.1 Data and sample

We use household income data from the EU-SILC Database. EU-SILC provides harmonized data on income and living conditions for all countries in the European Union as of 2004. We chose 2007 as our starting wave to include more countries and to allow us to isolate pre-tax/transfer income. Bulgaria, Romania, and Malta joined the data collection in 2007 and information on gross wages, needed to reconstruct a comparable variable of pre-tax/income, is available for all countries only as of that year.⁹ We set 2019 as the final year of observation as in the 2020 EU-SILC wave there were breaks in series in several countries due to data collection problems during the pandemic. The survey collects information on incomes of the previous year, i.e. 2019 survey reports 2018 income, 2007 reports 2006 income. The 2007–2019 timeframe allows us also to focus on medium-term structural trends and attenuate the influence of crisis-related cyclical factors shaping income inequality. Our definition of EU does not include the United Kingdom, which was removed from SILC in 2018 ahead of its official exit from the European Union in 2020, nor Croatia, which joined the European Union in 2013.

National sample sizes and demographic indicators are sufficiently consistent over time to carry out an analysis of the various determinants of inequality trends (see Appendix Table A1 for descriptive statistics). The EU countries in our study include large variations in welfare states and labour market institutions. As such, despite EU socio-economic policies being oriented to the common goal of upward convergence, we can expect to see variation in the inequality trends observed, as well as in the role of taxes, transfers, composition, and other factors in shaping patterns of income inequality.

Our analyses focus on non-retirement households. This is needed especially in the analysis of inequality changes in EU post-tax/transfer income as a function of EU pre-tax/transfer income: changing proportions of pensioners with zero market income blur the interpretation of the trend in pre-tax/transfer inequality. Specifically, we exclude households that are headed by non-employed individuals over the age of 65 due to their different income compositions. As a sensitivity test, we also adopt a sample of non-pensioner individuals, where we remove pensioners and their incomes if they are in a multigenerational household.

⁹ Some countries reported only net wages in the first three SILC waves (Italy, Spain, Portugal, Greece, Latvia). See Zardo-Trindade and Goedemé (2020) for an assessment of data comparability over time. Notice also that some countries switched from survey data to administrative registers in the time interval considered (France, Belgium, Austria, Slovenia). This change in the data source has improved the collection of some income components, such as capital income and transfers, which may have been under detected in 2007.

3.2 Income concepts

Table A1 details the distinctions among the two major income concepts. Pre-tax/transfer income includes a household's income from labor and capital. For most households, this is primarily gross earnings from employment. Importantly, income taxes and transfers are not accounted for in measuring pre-tax/transfer income. Post-tax/transfer income is the sum of a household's factor income plus monetary transfers, which include social insurance, social assistance, and private transfers, minus income taxes.

In order to distinguish the tax effect from the benefit effect in the reduction of pre-tax/transfer income inequality we also use gross income (pre-tax/transfer income plus social transfers) as an intermediate income concept.⁸ The distribution of social assistance and social insurance in the EU and across countries are presented in Sect. 4. Social assistance, typically financed by the general government without direct contributions from households, encompasses noncontributory schemes funded solely by the general government, based on financial need, and lacking premiums. Social insurance, on the other hand, is typically financed by contributions from employees and employers through payroll deductions or taxes and it is generally available to anyone who has paid into the scheme. The taxes considered include taxes on income, profits and capital gains as well as taxes assessed on holdings of property, land or real estate. Social contributions subtracted in the post-tax/transfer income concept refer to either mandatory government or employer-based social insurance schemes.

Public pensions are included in post-tax/transfer income, as is widely used in international research institutions (OECD 2015). However, the role of pensions in accounting for redistribution is greatly diminished in our analysis, which is restricted to households headed by working-age individuals. Overall, the share of public pensions in post-tax/transfer income in our sample of EU working-age households is 61% lower than for the overall population in 2019 (8% for the sample of working-age households versus 20.7% in full sample; see Table A8 for country-specific figures). Thus, in our main income concept we do not exclude pension income received by pensioners living in multigenerational households as their contribution to post-tax/transfer is not negligible, and post-tax/transfer income is the yardstick measure of economic well-being recommended in inequality studies (Brandolini and Smeeding 2011).

In-kind transfers such as education and health services are not considered in the analysis. Previous studies noted that in-kind services vary by coverage, adequacy and quality across countries, and if their impact is not monetized in traditional income analyses, the comparison of redistributive welfare action could not reflect the economic advantage that citizens of countries with accessible quality services have over citizens in countries where these services are not publicly provided (Goedemé et al. 2018). In the EU-wide distribution of income, the neglect of in-kind benefits is likely to be more severe for individuals at the bottom of the EU distribution, whose accessibility and quality of publicly provided services might be lower than their richer counterparts (e.g., Southern and Eastern countries compared to Scandinavian countries). Some studies, such as BCG (2022), distribute the entirety of national income, accounting also for the value of in-kind benefits such as education or health. However, this comes at the cost of introducing arbitrary assumptions about the allocation of expenditures associated with in-kind benefits across the population. Therefore, in line with general analyses of redistribution (Brandolini and Smeeding 2011), we do not account for in-kind benefits or attempt to monetize them.

For all household income definitions across all countries and years, we convert income values using the purchasing power parity (PPP) indices made available by Eurostat to control for different costs of living across EU countries and make them comparable in the EU income distribution.¹⁰ Household income is equivalised with the square root of household size. For sensitivity we also produce an income distribution where income values are equivalised with the OECD-modified scale. When incomes are analyzed in real terms, such as in the assessment of growth incidence curves, they are corrected for inflation. We follow the standard Eurostat practice of using the harmonized index of consumer prices (HICP, Eurostat code: `prc_hicp_aind`) to make these corrections and express the 2019 income values in 2007 terms.

3.3 Inequality measures

We primarily use inequality indices from the class of generalised entropy (GE) as is standard among decomposition techniques. We mainly adopt the Theil index, i.e. GE(1), and, whenever useful, the mean logarithmic deviation GE(0), in light of their perfect decomposability by population subgroups. According to this property the degree of inequality can be expressed as the sum of the within-group and between-group inequality (Bourguignon 1979).¹¹

For the sake of completeness, we also present inequality levels using the Gini coefficient, which is not perfectly decomposable by subgroup.

3.4 Decomposition framework

Thanks to the property of decomposability, *levels* of EU-level inequality can be separated into two distinct components: the average inequality within each EU member state and the inequality between these countries, as if all individuals in a country had the average national income. The inequality decomposition can be expressed as:

$$I_{\alpha}(Y) = I_{\alpha W}(Y) + I_{\alpha B}(Y) \quad (1)$$

$I_{\alpha}(Y)$ is the index of EU-wide inequality and $I_{\alpha B}(Y)$ is the between-country inequality, in which each household is assigned the mean income of his/her country. As such, the between-country component of the decomposition should be interpreted as inequality between the mean incomes in the various EU countries. In turn, the within-country inequality component $I_{\alpha W}(Y)$ can be expressed:

$$I_{\alpha W}(Y) = \sum_{m=1}^M v_m I_{\alpha}^{(m)} \quad (2)$$

¹⁰ The procedure implies first a conversion to local currencies for the countries outside the eurozone and then a correction with the ppp indices available on CIRCABC. We use different PPPs for different years, as provided by Eurostat. PPPs tell us how many currency units a given quantity of goods and services costs in different countries and can thus be used as currency conversion to eliminate the effect of price level differences across countries rates and express income values into an artificial common currency (the Purchasing Power Standard, PPS).

¹¹ See Jenkins and Van Kerm (2011) for a discussion of the property of subgroup decomposability for different inequality indices. This property does not hold for the Gini index as its decomposition involves a ‘residual’ component, due to subgroups having overlapping income ranks. Thus, our decomposition of EU inequality by country focuses on the Theil index or the mean logarithmic deviation.

v_m is country m 's share of the total EU income and $I_\alpha Y^{(m)}$ is the inequality within country m . Finally, α represents the sensitivity of the index to differences in income shares along the income distribution ($\alpha = 1$ is the Theil index, while $\alpha = 0$ is the mean logarithmic deviation). The within- and between-contributions are intended by country of current residence in the EU.

To analyse the drivers of the *change* in the EU post-tax/transfer inequality, we express it as follows:

$$I(postTT Y_{2019}) - I(postTT Y_{2007}) = \Delta I_W(preTT Y) + \Delta I_B(preTT Y) + \Delta TTEffect \quad (3)$$

In short, the change in post-tax/transfer inequality in the EU can be reformulated as the sum of the change in the between- and within-country components of EU pre-tax/transfer inequality and the change in the tax-transfer effect on pre-tax/transfer income inequality at EU level.

A further decomposition of inequality changes is carried out with a technique introduced by Mookherjee and Shorrocks (MS, 1982). The MS decomposition separates three main components responsible for the inequality trend: changes in subgroup inequality values, variations in the subgroup mean incomes and changes in the subgroup population shares. By considering the subgroups as the various EU countries, this method enables the identification of changing population shares, in addition to the role of between-country and within-country inequality.

3.5 Recentered influence function decomposition

Finally, to assess the effects of changes in occupational and demographic composition on the EU-level pre-tax/transfer inequality, we apply an extension of the traditional Kitigawa-Oaxaca-Blinder (KOB) decomposition to a distributional statistic such as the Theil index through a Recentered influence function (RIF).

The KOB decomposition is extensively used in labor economics to analyze outcome differences in mean wages between two years (Blinder 1973; Oaxaca 1973; Kitigawa 1952). These differences are characterized as the sum of two components: differences in characteristics (composition effect) and differences in coefficients associated with those characteristics (returns-to-composition effect). An extension of the original methodology pioneered by Firpo, Fortin, and Lemieux (FFL, 2018) allows the use of RIF regressions, in combination with a reweighted strategy (DiNardo et al. 1995), as a feasible methodology for decomposing differences in various distributional statistics between two points in time.

The building block of the RIF-regression is the influence function. Considering a given distributional statistic $I(Fy)$, for example the Theil index, computed on the distribution F , then the influence function of $I(Fy)$ represents the effect of an infinitesimal change in the function F at a given point y . FFL (2009) propose a simple OLS regression where the coefficient β can be interpreted unconditionally, in FFL's (2009) terms, as the unconditional partial effect (UPE).

Relying on this approach, the effect of different characteristics can be estimated along the entire (unconditional) outcome distribution, in our case EU pre-tax/transfer income. To further decompose the differences in a summary index between two groups, such as the EU working age population at time t (2007) and $t + 1$ (2019), it is necessary to combine the RIF-OLS with the standard KOB decomposition.¹² Introducing

¹² Although RIF-OLS provides a powerful tool to estimate unconditional effects of covariates of interest on a distributional statistic at time t , it is not sufficient to identify differences in a synthetic index between two periods.

the RIF-OLS, the KOB technique can be also applied to inequality indices such as the Theil index, preserving the unconditional interpretation and the explanatory power of the two components that explains the gap between the two groups. The first component is the difference in the characteristics (the distribution of covariates differs between the groups); the second refers to the different relation between the outcome and the characteristics of the two groups. To determine the magnitude of each effect a counterfactual distribution needs to be determined. Following the DFL framework, a counterfactual scenario requires the identification of a reweighting factor to be applied to the population at time $t + 1$ to mimic group t .

The DFL decomposition, in short, reweights the composition of the population in the final year for each country to match the composition of the population in the first year (for each country) based on a given set of observed characteristics, x . Here, this is a combination of demographic and employment characteristics. The DFL reweighting function is defined as

$$\psi(x) = \frac{Pr(t_x = 2007|x)}{Pr(t_x = 2019|x)} \cdot \frac{Pr(t_x = 2019)}{Pr(t_x = 2007)} \quad (4)$$

in which t_x is the probability of being in year t conditional on a vector of household characteristics x . In this study, vector x includes the following household-level variables based on household members' characteristics: our demographic characteristics, including the share of household members in given age bins (under 18, 18 to 25, 26 to 35, 36 to 45, 46 to 55, 55+), the gender of household head, mean educational attainment among adults in the household, family structure (single mother, single father, female head with no children, male head with no children, or two-parent households with children), mean marital/partnership status of adults in household, number of people in the household, number of children in the household, occupational classification (standardizing isco88 and isco08 to a three value category), an indicator of whether the household head and spouse/partner have the same level of education (set to zero for non-partnered heads), and a separate indicator of whether they have the same employment status; and our labor market characteristics, including mean employment status of adults in the household. In Appendix Tables A2 and A3, we provide descriptive statistics for each variable.

We can now have a full RIF decomposition of the following form:

$$\Delta I_{(2007,2019)} = x^{2019}(\beta_{2019} - \beta_c) + (x^{2019} - x^c)\beta_c + (x^c - x^{2007})\beta_{2007} + x^{2007}(\beta_c - \beta_{2007}) \quad (5)$$

The first term represents the (pure) returns-to-composition effect while the third addend is the (pure) composition effect. The other two terms represent the reweighting and the specification errors, respectively. The reweighting error is a measure of the quality of the reweighting strategy and, as FFL reports, it tends to zero when the sample size increases. The specification error, on the contrary, is a test on the model misspecification as it measures the departure from linearity and, consequently, it is a way to check whether the RIF-OLS are an appropriate tool for the decomposition of composition and returns-to-composition effects. We ideally expect both errors to not be statistically different from zero. Our use of the RIF estimates marks another methodological contribution of this study.

Table 1 Inequality indices, EU-level income distribution

	Post-tax/transfer income			Pre-tax/transfer income		
	2007	2019	%reduction	2007	2019	%reduction
Gini coefficient	0.3612	0.3295	-8.8%	0.4478	0.4175	-6.8%
Theil index	0.2287	0.2011	-12.1%	0.3532	0.3173	-10.2%
Mean logarithmic deviation	0.2585	0.2074	-19.8%	0.4857	0.4162	-14.3%

Equivalence scale: square root of household size. Working-age population. Croatia excluded

4 Findings

4.1 Inequality within the European union at-large

Table 1 documents inequality trends for the EU. Income inequality declined between 2007 and 2019. When considering the distribution of (ppp-adjusted) post-tax/transfer income, this reduction is quite pronounced. The Gini index fell by 3 pp, from 36.1 to 32.9 Gini points, equivalent to an 8.8% reduction. Generalized entropy measures, which are more sensitive to the upper part of the distribution, also indicate a significantly more equal distribution of income in the EU in 2019 than in 2007. The reduction in the Theil index was around 12% and even larger for the mean log deviation.¹³

A traditional decomposition of inequality *levels* by country highlights a remarkably pronounced decline of the between-country component, determined by increasingly similar mean post-tax/transfer incomes across the EU countries (Fig. 1). Between-country inequality halved in this period, decreasing by over 50% (see Figure A1 for statistics on the entire 2007–2019 period). This estimate echoes various analyses of economic convergence in the EU, stemming from the pronounced economic growth of the relatively lower-income Eastern enlargement countries vis-à-vis recession-hit Southern countries after the 2008–09 financial crisis (Kvedaras and Cseres-Gergely 2020; Brandolini and Rosolia 2021).¹⁴

However, more convergent mean incomes between EU countries were not accompanied by more equal within-country distributions in the catching-up process, rather the situation was quite the opposite. On average, within-country income inequality increased, albeit to a lesser extent (ca. +6%, both working-age and total population). Behind this mild increase in average within-country inequality there are heterogeneous country episodes though, as some countries even managed to curb inequality (e.g. Netherlands and Belgium, OECD 2015).

To understand the underlying dynamic behind the EU inequality reduction we first explore the growth rates of the different percentiles at various points of the distribution and then the country composition of the EU distribution between the two periods. Figure 2 illustrates that the bottom of the distribution has improved remarkably more than the middle and the top. While the growth rate of the 10th and the 25th percentile amounted to, respectively, 27% and 15%, the middle and the very top of the distribution improved by around 7%, while the middle-high percentiles displayed an even

¹³ The reduction in the mean logarithmic deviation, another generalized entropy index, from 2007 to 2019 was even more pronounced (19.9%). Figures for the total population are available in the Appendix.

¹⁴ The same finding is even reinforced using the mean logarithmic deviation that shows an even greater reduction of between-country inequality by around 55%

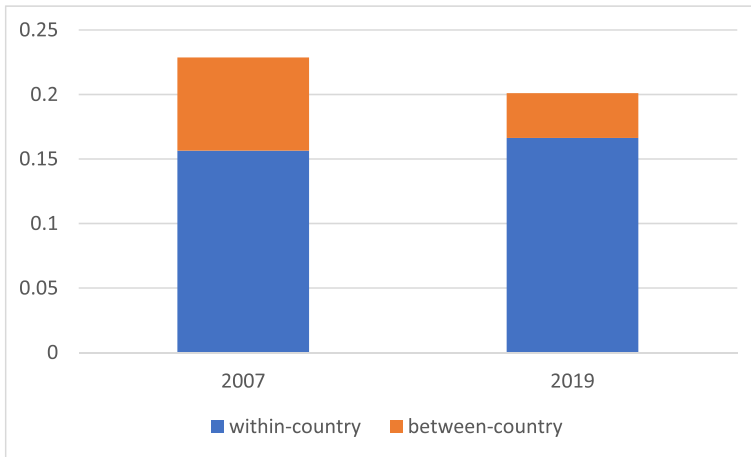


Fig. 1 Inequality in the EU, decomposition by country, post-tax/transfer income. Note: Theil index. Equivalence scale: square root of household size. Working-age population. Croatia excluded

lower growth rate.¹⁵ The large variability in growth rates for different points of the EU income distribution is indicative of different growth rates experienced by various EU countries that are located in different parts of the distribution. Anticipating the results of the decomposition, we also observe that the growth rates in pre-tax/transfer income (orange line in Fig. 2) outperform the growth in post-tax/transfer income across all parts of the income distribution, particularly at the lower end of the EU-wide income distribution. This suggests that the country composition underlying the pre-tax/transfer income distribution plays a significant role, as sustained growth in poorer market incomes is concentrated in lower-income countries.

We better visualize how the various countries are located along the EU income distribution in Fig. 3. A visual inspection of the country composition in the 2007 and 2009 distribution suggests a large reshuffling of the EU post-tax/transfer income distribution across countries. Big countries such as Spain and Italy were only marginally represented in the lowest quintiles in 2007, but by 2019, the composition of the EU's bottom class included a relatively larger component of Iberian (approximately 20%) and Italian (around 14%) populations (ca. 14%, see Fig. 3). In turn, Eastern countries and Poland, which hardly made it above the EU median in 2007, compose around 25% of the EU population around the median income and are still represented in the upper parts of the EU income distribution. As documented by the European Commission (2019), especially the EU's low-middle class (around 75% of the EU median income) became composed by relatively more Eastern households in 2016. In 2007, only about 20% of the enlargement countries (and Greece) made it to the EU low-middle class, while this proportion had risen to 30% in 2016. All this seems to suggest a more balanced composition of EU countries throughout the entire distribution in 2019, despite German-speaking countries and France still representing the lion's share in the top percentiles.

To further inform the causes of EU-wide inequality, we decompose the inequality change in the EU between 2007 and 2019. This enables us to identify the influence of

¹⁵ Note that the EU-SILC survey underestimates income values at the top of the distribution (Carranza et al. 2023). Thus, it is very likely that the 99% in Fig. 2 is not representative of the top-income individuals.

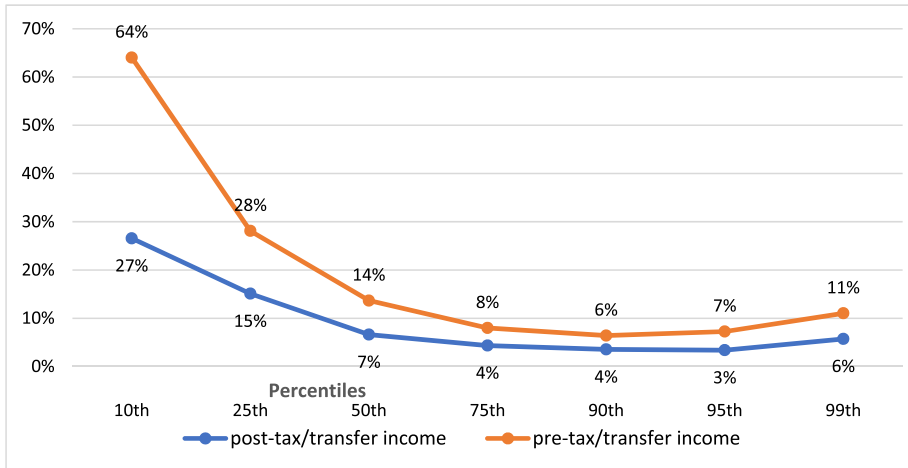


Fig. 2 Growth incidence curve in the EU, post-tax/transfer income, 2007 to 2019. Note: income values in 2019 expressed in 2007 real terms. HICP correction with EUROSTAT data [prc_ppp_aind]. Equivalence scale: square root of household size. Working-age population. Croatia excluded

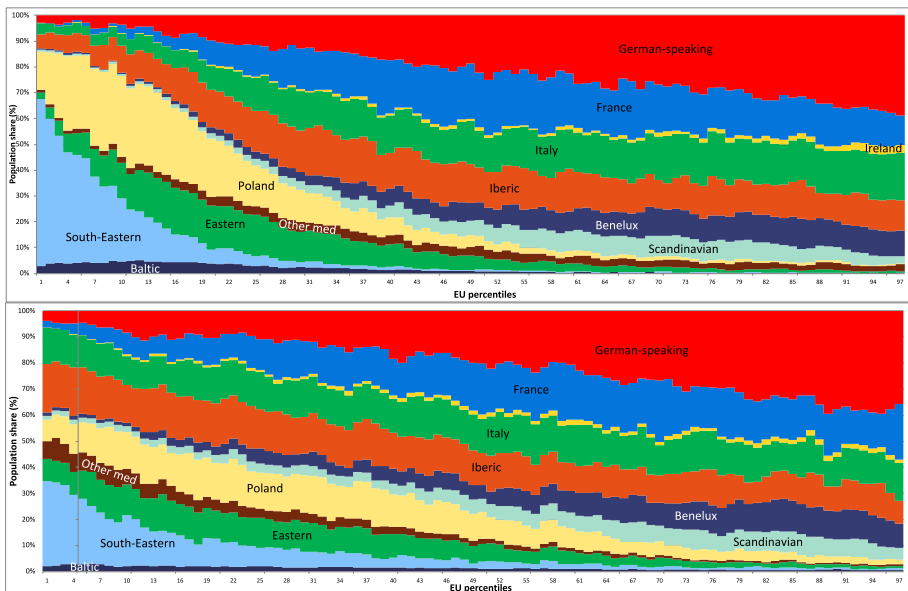


Fig. 3 EU income distribution by country, 2007 (top) and 2019 (bottom). Post-tax/transfer income. Note: equivalence scale: square root of household size. Working-age population. Croatia excluded. Baltic: Estonia, Latvia and Lithuania. South-Eastern: Bulgaria and Romania. Eastern: Czechia, Slovakia, Hungary and Slovenia. Other Med: Greece, Cyprus, Malta. Benelux: Belgium, Luxembourg, the Netherlands

Table 2 Changes in inequality in the EU, post-tax/transfer income, Mookherjee-Shorrocks decomposition by country

	Effect*100	% effect
Effect due to changes in within-country inequality	0.4244	-8.6%
Effect due to changes in population shares of within component	-0.0638	1.3%
Effect due to changes in population shares of between component	-0.2615	5.3%
Effect due to relative changes in country averages	-5.0308	102.0%
Total	-4.9317	1

Mean logarithmic deviation. Equivalence scale: square root of household size. Working-age population. Croatia excluded

changes in subgroup inequality values, shifts in the population shares and variations across the national mean incomes towards the EU inequality reduction (see Table 2).¹⁶

Results from the Mookherjee-Shorrocks decomposition reveal the dominant role of changes in between-country inequality in explaining the inequality change at play for the EU. As observed with the decomposition of inequality *levels* in Fig. 1, between-country inequality explains more than the totality of the inequality trend, at 102% in Table 2. At the same time, changes in the population shares of the between-country component improved the EU distribution of income, as they are likely to reflect population stagnation in relatively high-income countries whose mean average income lagged behind in the period considered (Mediterranean EU countries). On top of that, it seems that a minor but positive role was played by changes in population shares of the within component, indicating a positive population trend in more egalitarian EU countries. Conversely, the effect due to changes in within-country inequality has been disequalising on the EU-wide income distribution, confirming previous evidence from the decomposition of inequality *levels* (Fig. 1).

Hence, we propose a further framework, explained in Eq. 3, to separate the effect of the trend in pre-tax/transfer inequality from changes in tax-benefit effect. This enables us to test whether a greater convergence in labour market income was more consequential to EU-wide inequality reduction than trends in the tax-benefit effectiveness. Results in Fig. 4 reveal that greater convergence in pre-tax/transfer inequality across EU countries was the determinant force to bring about an inequality reduction in post-tax/transfer EU income (Fig. 4). This component is responsible for over 125% of the total inequality reduction. Thus, average pre-tax/transfer incomes across EU countries converged even more than post-tax/transfer ones during this period. Interestingly, and in contrast to post-tax/transfer patterns, within-country inequality in pre-tax/transfer income slightly improved in 2019 compared to 2007, although its contribution to the overall EU inequality reduction was almost negligible (3%).

The positive impact of the reduction in between-country pre-tax/transfer inequality counterbalanced the negative contribution of changes in the tax-transfer system to shaping inequality trends. In fact, social transfers redistributed more at the EU level in 2007 than in

¹⁶ For ease of programming, we decompose the 2007–2019 change in the mean logarithmic deviation, as this is the standard index in the *msdeco* command in STATA (Silva 2017). The *msdeco* command offers a close approximation of the change in inequality in terms of the mean logarithmic deviation, with a more practical interpretation than the exact change. To be sure, the difference between this approximation and the exact reduction is minimal, i.e. MLD exact reduction from 2007 to 2019 is 0.051 as in Table 1, the approximate reduction is 0.049 as in Table 2.

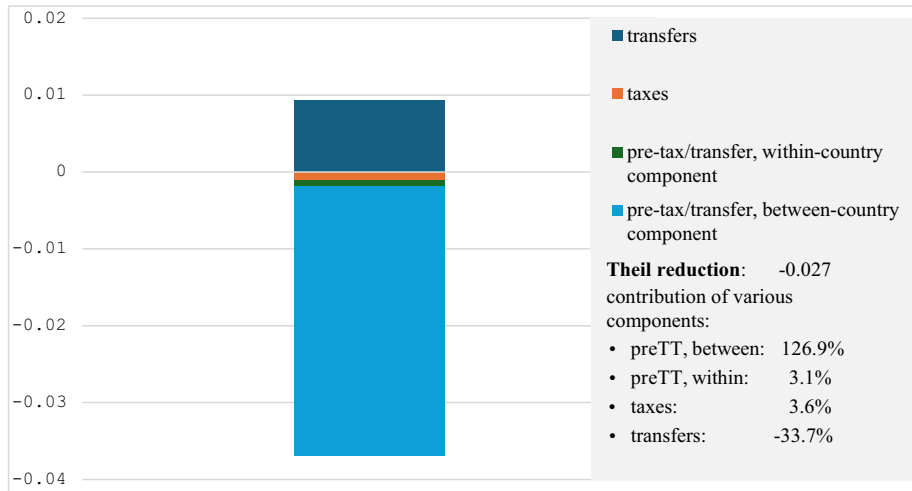


Fig. 4 Decomposition of inequality reduction in EU post-tax/transfer income, 2007 to 2019. Note: Theil index. Equivalence scale: square root of household size. Working-age population. Croatia excluded

2019. The negative contribution of transfers to reducing EU inequality can also be partly attributed to changes that occurred in the country composition of the EU pre-tax/transfer distribution. During this period, the mean incomes of poorer EU countries grew remarkably and this produced a reshuffling of the country positions, especially at the bottom of the distribution. Moreover, pre-tax/transfer income conditions of low-income individuals in poorer EU countries improved as labour income was boosted in these countries, requiring a lower level of transfers, as highlighted in Table A11.

These findings remain robust, and the overall trend is even starker, when analyzing a sample of non-pensioner individuals (Fig. A3). In this scenario, the positive impact of reducing between-country pre-tax/transfer inequality is even more pronounced compared to our chosen sample, which includes pensioners in multigenerational households, contributing to household income. The increased positive contribution of between-country convergence in market income (+150% versus +126%) in the non-pensioner sample contrasts with a more negative effect of transfers (-66% versus -34%). However, this difference across the two population samples is primarily due to the exclusion of pensioners in multigenerational households.

These findings support and extend some results presented by Blanchet et al. (2022). Despite a different European aggregate and different income concepts, we observe similar trends for the common years of analysis, while we find signs of reducing income inequality across the EU in the recent time span (2015 to 2019). While we also find that within-country inequalities matter the most (they are responsible for 82% of the total EU inequality in 2019, see Fig. 1), we document an increasingly beneficial role of between-country convergence, which is occurring at the level of pre-tax/transfer income due to converging labour earnings across EU countries.¹⁷ In contrast, redistribution, which is still greatly determined by national policies and welfare schemes, does not appear to be converging or enhancing its role in mitigating inequality.

¹⁷ The reduction in the between-country component of the inequality decomposition is of similar magnitude for pre-tax/transfer income and for just labour income, excluding capital income based on its lower reliability (Fig. A2).

To corroborate the finding of a pronounced convergence in pre-tax/transfer income we examine the growth rates in the pre-tax/transfer median income across EU countries. The countries that experienced the largest growth in pre-tax/transfer income were those with relatively lower income in 2007, i.e. Romania and Bulgaria. In general, Eastern countries whose incomes were below the EU average all benefitted from high growth rates in the pre-tax/transfer median incomes (see Poland, the Baltic countries, Slovakia in Fig. 5). Conversely, growth rates were sluggish in Mediterranean countries with higher mean income such as Italy, Spain, and even negative in Greece (Fig. 5). This further confirms that heterogeneous trends in pre-tax/transfer income, which primarily reflects trends in national labour markets and exposure to the 2009 financial crisis, were responsible for the dominant contribution of the between-country pre-tax/transfer inequality to the overall EU inequality reduction (Brandolini and Rosolia 2021).

Returning to the negative contribution of changes in tax-transfer systems to inequality reduction, it must be noted that they have been, at least until the pandemic, predominantly within national competence. Hence, the targeting of social transfers is determined usually with reference to national income distributions, potentially providing less support to low-income households at EU-level. In turn, EU low-income households might have become better-off in absolute terms and received less income support during this period. For instance, some of the less redistributive southern-eastern welfare states, characterized by low social assistance and mild social insurance, might have scaled back their redistributive role as national labor incomes improved for their lower income groups.

In this respect, national trends in social transfers appear mixed (Table 3). On average across EU countries, the total amount of transfers and their redistributive effect decreased overall, by respectively 0.3 pp and 0.5 pp.

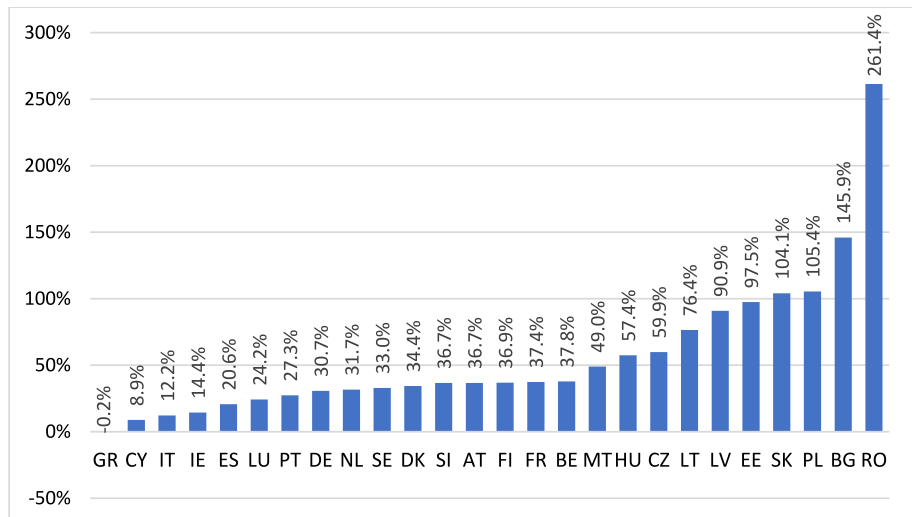


Fig. 5 Growth in the median pre-tax/transfer income, 2007 to 2019. Note: Equivalence scale: square root of household size. Working-age population. Full-time, full-year workers

Table 3 Trends in social transfers across EU countries

countries	Transfer share			Gini reduction (pp) due to transfers		
	2007	2019	difference 2007 to 2019	2007	2019	difference 2007 to 2019
AT	11.28%	10.03%	↘ -1.25%	-0.077	-0.071	↘ -0.005
BE	13.96%	14.10%	↗ 0.14%	-0.063	-0.060	↗ -0.002
BG	4.35%	7.71%	↗ 3.35%	-0.028	-0.044	↗ 0.017
CY	6.39%	8.31%	↗ 1.92%	-0.012	-0.037	↗ 0.025
CZ	9.57%	6.15%	↘ -3.42%	-0.059	-0.045	↘ -0.014
DE	10.38%	8.94%	↘ -1.44%	-0.064	-0.044	↘ -0.020
DK	20.25%	15.38%	↘ -4.87%	-0.071	-0.061	↘ -0.010
EE	6.98%	10.96%	↗ 3.98%	-0.039	-0.048	↗ 0.009
GR	3.17%	4.85%	↗ 1.68%	-0.039	-0.053	↗ 0.014
ES	5.03%	7.78%	↗ 2.75%	-0.087	-0.075	↗ -0.012
FI	15.84%	12.89%	↘ -2.95%	-0.096	-0.079	↘ -0.017
FR	12.36%	9.17%	↘ -3.19%	-0.040	-0.047	↘ 0.008
HU	15.53%	8.57%	↘ -6.96%	-0.091	-0.063	↘ -0.028
IE	15.28%	14.66%	↘ -0.62%	-0.061	-0.064	↘ 0.003
IT	5.01%	6.61%	↗ 1.60%	-0.043	-0.033	↘ -0.010
LT	7.63%	10.88%	↗ 3.25%	-0.034	-0.044	↘ 0.010
LU	10.20%	8.82%	↘ -1.38%	-0.060	-0.059	↘ -0.001
LV	6.92%	9.32%	↗ 2.41%	-0.038	-0.039	↘ 0.001
MT	6.66%	5.21%	↘ -1.45%	-0.049	-0.054	↘ 0.005
NL	10.84%	9.60%	↘ -1.24%	-0.064	-0.045	↘ -0.019
PL	8.50%	8.00%	↘ -0.50%	-0.073	-0.073	↘ 0.000
PT	6.08%	4.79%	↘ -1.28%	-0.035	-0.033	↘ -0.002
RO	7.75%	4.46%	↘ -3.29%	-0.052	-0.025	↘ -0.026
SE	18.68%	12.29%	↘ -6.39%	-0.079	-0.055	↘ -0.024
SI	12.79%	11.03%	↘ -1.77%	-0.077	-0.061	↘ -0.017
SK	7.50%	6.74%	↘ -0.75%	-0.047	-0.041	↘ -0.007
EU	10.0%	9.1%	↘ -0.8%	-0.057	-0.052	↘ -0.005

Positive difference = redistributive effect of transfers increased in 2019 compared to 2007. Conversely for a negative difference. Equivalence scale: square root of household size. Working-age population. Croatia excluded

On the one hand, relatively more affluent countries, whose low-income groups stand somewhere in the EU low-middle range, reduced both their overall transfer budget as well their redistributive effect (Sweden, Germany, Denmark). On the other hand, an overall trend of contraction in the total transfer bill and in its redistributive effect is also observable in lower-income countries, such as Hungary and Romania. Therefore, the combined effect of a tightened transfers budget on the EU average and its effects on the lower income groups within the EU distribution might explain why social transfers did not contribute to the improvement in the distribution of EU post-tax/transfers in 2019. Instead, their effect in mitigating inequality declined in the 2007–2019 period.¹⁸ A further breakdown of social transfers into social assistance and social insurance (Table A7) shows that the average

¹⁸ See Table A6 about trends in social transfers received by the bottom 10% of the national distribution.

Table 4 Oaxaca-RIF decomposition. Theil index, EU pre-tax/transfer inequality

	Coefficient	Std error
Group 1, Theil 2019	0.3125***	0.007
Group 0, Theil 2007	0.3478***	0.002
Total change	-0.0352***	0.007
Total explained	-0.003***	0.001
Total unexplained	-0.0322***	0.007
Total explained (-0.003): compositional features		
occupation		0.0023
employment		0.0004
education		-0.0078
family composition		0.0013
Total unexplained (-0.032): residual features		
occupation		0.0030
employment		0.0548
education		0.0263
family composition		-0.0117
other		-0.1044

Equivalence scale: square root of household size. Working-age population. Croatia excluded

reduction of social insurance benefits (-0.5%) was larger than the reduction in social assistance (-0.1%). Moreover, the magnitude of the mitigating effect of transfers on inequality, appears, at least visually, to more closely track the trend in social assistance benefits (see Germany, Italy, Poland in Table A7).

The final issue we set to address refers to changes in demographic and employment characteristics with the potential to affect pre-tax/transfer inequality change at EU level. The logic is similar to the one above: changes in individual characteristics and labour market structure are known to affect the market income distribution at national level. In turn, this can well affect the EU market distribution, compressing or widening the national distributions that form the EU distribution.

Results from the Oaxaca-RIF decomposition show that the composition effect, the change in socio-demographic characteristics, had only limited impact in influencing the reduction in pre-tax/transfer inequality (Table 4). Out of the Theil reduction by 0.035, equivalent to a 10% reduction, the total explained effect corresponded to around 8.5%, while most of the impact is to be attributed to residual factors (i.e.

returns-to-composition unexplained effect).¹⁹ Thus, the sizeable magnitude of the residual is fully responsible for the unexplained component and more than counteracts the inequality-magnifying role of the returns to employment and education on EU pre-tax/transfer inequality. This implies that there is widely shared earnings growth across EU countries regardless of specific compositional changes. The between-county convergence in pre-tax/transfer income across countries observed in Fig. 4 is only marginally determined by rising employment and changing education levels as well as their returns in the labour market.

5 Conclusions

In this study, we investigated trends in income inequality in the European Union (EU) from 2007 to 2019 using EU-SILC data. We examined the role of two distinct forces on EU-wide inequality trends: convergence in market incomes and changes in the effectiveness of tax-benefit systems, which may not necessarily act in conjunction.

First, our findings indicate that EU-wide inequality declined between 9 and 20%, depending on the inequality measure applied, despite rising within-country income inequality during this period. Applying a series of decomposition techniques, we find that between-country convergence in pre-tax/transfer incomes fully explains the declining EU-wide inequality. This finding holds significance for EU policies, highlighting the success of predistributive labour policies and convergence in labour and capital markets in reducing EU-level inequality.

Changes in tax-transfer effectiveness to mitigate EU inequality, in contrast, contributed to marginally higher inequality between 2007 and 2019. In fact, (mostly national) EU tax-benefit systems played a more substantial role in reducing EU inequality in 2007 than in 2019. Nonetheless, the 10th percentile of the EU-wide income distribution grew six times the rate of the 90th percentile, a product of widespread earnings gains among residents of lower-income EU Member States.

Re-centered influence functions and Kitigawa-Oaxaca-Blinder analyses reveal that those earnings gains are not a result of specific compositional or employment changes, but primarily a reflection of rising earnings returns to employment in lower-income Member States. Broadly shared earnings growth was rather independent of specific changes in employment or composition, as well as their returns.

A clarification is in order though. Tax-benefit systems in the EU level have a predominantly national focus. Social transfers, in particular, do not necessarily target low-income households at the EU level. They are intended to target low-income national populations and their coverage and adequacy is highly variable across countries, depending on national labour market conditions. Overall trends in pre-tax/transfer income inequality can reverberate on tax-benefit effectiveness. Little redistributive countries, typically located at the lower end of the EU income distribution, might contract their income support during periods of positive

¹⁹ Reweighting errors not significantly different from zero. The test of significance for the specification error suggests that the difference from zero cannot be rejected. It may flag a potential model misspecification. The *levels* of Theil indices are marginally different from those in Table 2 due to a small loss of observations in the Oaxaca-RIF decomposition, as those households missing demographic information were excluded. The *change* in the Theil index is however of the same magnitude (-10.2%).

business cycles. This implies that the positive contribution of pre-tax/transfer convergence might result in weakened effects on the redistributive power of EU tax-benefit systems.

Therefore, a genuinely European tax-benefit system, combined with enhanced coordination of national tax-benefit policy, should aim at improving income conditions of EU low-income households. Such policies should work in tandem with convergence policies to address EU-level inequality. This should be a desirable characteristic of 'European' tax-benefit systems, especially in this juncture characterized by the establishment of a larger EU budget and the expansion of EU policies in various social policy domains. The policies adopted in response to the COVID pandemic might have this feature. However, due to lack of timely income surveys, and the impossibility to distinguish the monetary effects of EU policies in them, the analysis of the impact of EU-promoted policies in response to COVID-19 on EU-level inequality is a topic for further research. Similarly, an analysis of the differing roles played by social insurance and social assistance, particularly in the context of post-COVID labor markets and welfare responses, is left for further research.

Despite the contribution of between-country income convergence in reducing EU-wide inequality between 2007 and 2019, however, within-country income disparities continue to explain the larger share of EU-wide inequality *levels* in 2019. Thus, reducing within-country economic disparities is increasingly important for achieving further reductions in EU-wide inequality moving forward.

Supplementary Information The online version contains supplementary material available at <https://doi.org/10.1007/s10888-024-09651-8>.

Author Contribution P.V. prepared the dataset and drafted part of the paper ("data and methods" and part of the "introduction"). S.F. produced most of the evidence. Z.P. and S.F. commented the empirical results and drafted the remaining part. All authors reviewed the manuscript.

Data Availability No datasets were generated or analysed during the current study.

Declarations

Competing Interests The authors declare no competing interests.

Open Access This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if changes were made. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit <http://creativecommons.org/licenses/by/4.0/>.

References

- Atkinson, A.B.: Poverty in Europe. Blackwell Publishers, Oxford (1998)
- Blanchet, T., Chancel, L., Gethin, A.: Why is Europe more equal than the United States? Am. Econ. J. Appl. Econ. **14**(4), 480–518 (2022). <https://doi.org/10.1257/app.20200703>
- Blinder, A.S.: Wage discrimination: reduced form and structural estimates. J. Hum. Resour. **8**(4), 436–455 (1973). <https://doi.org/10.2307/144855>
- Borrs, L., Knauth, F.: The Impact of Trade and Technology on Wage Components. In: Working Paper. DICE Discussion Paper (2016)

- Bourguignon, F.: Decomposable income inequality measures. *Econometrica*. **47**(4), 901–920 (1979). <https://doi.org/10.2307/1914138>
- Bozio, A., Garbinti, B.: Predistribution vs. redistribution: evidence from France and the United States. *Am. Econ. J. Appl. Econ.* **16**(2), 31–65 (2024). <https://doi.org/10.1257/app.20220023>
- Brandolini, A., Rosolia, A.: The distribution of well-being among Europeans. In: Fischer, G., Strauss, R. (eds.) *Europe's Income, Wealth, Consumption, and Inequality*, Chapter 2, pp. 39–103 (2021)
- Brandolini, A., Smeeding, T.M.: *Income inequality in richer and OECD countries*. Oxford University Press. (2011). <https://doi.org/10.1093/oxfordhb/9780199606061.013.0004>
- Carranza, R., Morgan, M., Nolan, B.: Top income adjustments and inequality: an investigation of the EU-SILC. *Rev. Income Wealth*. **69**(3), 725–754 (2023). <https://doi.org/10.1111/roiw.12591>
- Crozet, M., Orefice, G.: Trade and Labor Market: What Do we Know? CEPII Policy Brief (2017)
- Dauderstädt, M.: Measuring EU-wide inequality. *World Econ.* **21**(2), 83–104 (2020)
- De Agostini, P., Paulus, A., Sutherland, H., Tasseva, I.: The effect of tax-benefit changes on the income distribution in EU countries since the beginning of the economic crisis. Working Paper. EURO-MOD Working Paper (2014). <https://www.econstor.eu/handle/10419/113333>
- DiNardo, J., Fortin, N.M., Lemieux, T.: Labor market institutions and the distribution of wages, 1973–1992: a semiparametric approach. In: Working paper series, vol. 1995. National Bureau of Economic Research. <https://doi.org/10.3386/w5093>
- European Commission: *Employment and Social Developments in Europe 2019: Sustainable Growth for all: Choices for the Future of Social Europe*. Publications Office of the European Union, Luxembourg (2019). <https://data.europa.eu/doi/10.2767/305832>
- Filauro, S., Parolin, Z.: Unequal unions? A comparative decomposition of income inequality in the European Union and United States. *J. Eur. Soc. Policy*. **29**(4), 545–563 (2019). <https://doi.org/10.1177/0958928718807332>
- Firpo, S., Fortin, N.M., Lemieux, T.: Unconditional quantile regressions. *Econometrica*. **77**(3), 953–973 (2009). <https://doi.org/10.3982/ECTA6822>
- Förster, M.F., Tóth, I.G.: Cross-country evidence of the multiple causes of inequality changes in the OECD area. In: Atkinson, A.B., Bourguignon, F. (eds.) *Handbook of Income Distribution*, vol. Chapter 19, pp. 1729–1843. Elsevier (2015). <https://doi.org/10.1016/B978-0-444-59429-7.00020-0>
- Gill, I.S., Raiser, M.: *Golden Growth: Restoring the Lustre of the European Economic Model*. World Bank Publications (2012)
- Goedemé, T., Trindade, L.Z., Vandenbroucke, F.: A pan-European perspective on low-income dynamics in the EU. In: Cantillon, B., Goedemé, T., Hills, J. (eds.) *Improving Poverty Reduction in Europe*, Chapter 3 (2018)
- Goos, M., Manning, A., Salomons, A.: Explaining job polarization: routine-biased technological change and offshoring. *Am. Econ. Rev.* **104**(8), 2509–2526 (2014). <https://www.aeaweb.org/articles?id=10.1257/aer.104.8.2509>
- Hakkala, K.N., Huttunen, K.: *Displacing Tasks: Understanding the Employment Effects of Offshoring*. IZA – Institute of Labor Economics (2015)
- Helpman, E.: “Globalization and Wage Inequality”. Working Paper Series. National Bureau of Economic Research (2016). <https://doi.org/10.3386/w22944>
- Immervoll, H., Richardson, L.: Redistribution policy and inequality reduction in OECD countries: what has changed in two decades? *SSRN Electron. J.* (2011). <https://doi.org/10.2139/ssrn.1948026>
- Jenkins, S.P., Van Kerm, P.: The measurement of economic inequality. In: Nolan, B., Salverda, W., Smeeding, T.M. (eds.) *The Oxford Handbook of Economic Inequality*, Chapter 3 (2011)
- Kitagawa, E.M.: Components of a difference between two rates. *J. Am. Stat. Assoc.* **50**(272), 1168–1194 (1955). <https://doi.org/10.1080/01621459.1955.10501299>
- Kvedaras, V., Cseres-Gergely, Z.: Convergence of income distributions: total and inequality-affecting changes in the EU. *Econ. Lett.* **188**, (2020). <https://doi.org/10.1016/j.econlet.2020.108946>
- Milanovic, B.: *The Haves and the Have-Nots: A Brief and Idiosyncratic History of Global Inequality*. Basic Books, New York (2010)
- Mookherjee, D., Shorrocks, A.: Decomposition analysis of the trend in UK income inequality. *Econ. J.* **92**(368), 886–902 (1982). (<https://academic.oup.com/ej/article-abstract/92/368/886/5220472>)
- Nolan, B., Richiardi, M.G., Valenzuela, L.: The drivers of income inequality in rich countries. *J. Econ. Surv.* **33**(4), 1285–1324 (2019). <https://doi.org/10.1111/joes.12328>
- Nolan, B.: *Inequality and Inclusive Growth in Rich Countries: Shared Challenges and Contrasting Fortunes*. Oxford University Press (2018)
- Oaxaca, R.: Male-female wage differentials in urban labor markets. *Int. Econ. Rev.* **14**(3), 693–709 (1973). <https://doi.org/10.2307/2525981>

- OECD: Divided we Stand: why Inequality Keeps Rising. OECD Publishing, Paris (2011). <https://doi.org/10.1787/9789264119536-en>
- OECD: In it Together: why Less Inequality Benefits all. OECD Publishing, Paris (2015). <https://doi.org/10.1787/9789264235120-en>
- Rios-Avila, F.: Recentered influence functions (RIFs) in Stata: RIF regression and RIF decomposition. *Stata J.* **20**(1), 51–94 (2020). <https://doi.org/10.1177/1536867X20909690>
- Schmidt, V.A.: Politicization in the EU: between national politics and EU political dynamics. In: *The European Union beyond the Polycrisis?* pp. 56–74. Routledge (2020). <https://www.taylorfrancis.com/chapters/edit/10.1201/9781003002215-4/politicization-eu-national-politics-eu-political-dynamics-vivien-schmidt>
- Silva, A.: “MSDECO: Stata Module to Calculate the Mookherjee & Shorrocks (1982) over-Time Inequality Decomposition by Subgroup.” (2017). <https://EconPapers.repec.org/RePEc:boc:bocode:s458373>
- Thewissen, S., Kenworthy, L., Nolan, B., Roser, M., Smeeding, T.: Rising income inequality and living standards in OECD countries: how does the middle fare? *J. Income Distrib.* 1–23 (2018). <https://doi.org/10.25071/1874-6322.40351>
- Törmälehto, V.-M., Jäntti, M., Marlier, E.: The use of registers in the context of EU-SILC. In: Atkinson, A.B., Guio, A.-C., Marlier, E. (eds.) *Monitoring Social Inclusion in Europe*, pp. 499–508. Publications Office of the European Union, Luxembourg (2017)
- Trindade, L.Z., Goedemé, T.: The Comparability of the EU-SILC Income Variables: Review and Recommendations. Publications Office of the European Union, Luxembourg (2020)
- Vacas-Soriano, C., Fernández-Macías, E., Muñoz de Bustillo, R.: Recent trends in wage inequality from an EU perspective: a tale of two convergences. *Empirica.* **47**(3), 523–542 (2020). <https://doi.org/10.1007/s10663-019-09436-7>
- Vandenbroucke, F., Rinaldi, D.: Social inequalities in Europe – the challenge of convergence and cohesion. SSRN Scholarly Paper. (2015). <https://doi.org/10.2139/ssrn.3003904>
- World Inequality Lab: “Distributional National Accounts Guidelines - Methods and Concepts Used in the World Inequality Database” (2024). <https://wid.world/document/distributional-national-accounts-guidelines-2020-concepts-and-methods-used-in-the-world-inequality-database/>

Publisher's Note Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.