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Working Paper Series

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ECINEQ 2026 693

ECINEQ 2026 693
2026 April
www.ecineq.org

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Keyword: between-country inequality, GDP decomposition, Shapley value, functional income distribution, global imbalances

JEL Cassification: D63, E01, O47, F32

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Abstract

Between-country GDP inequality in Europe declined markedly from the early 1990s to the eve of the global financial crisis, but this convergence has since stalled and partly reversed, pointing to a structural change in the macroeconomic forces shaping cross-country disparities. This paper investigates the contribution of macroeconomic factors to that evolution by decomposing between-country GDP inequality into expenditure-side components, income-side components, and demographic and productivity-related channels. Using annual OECD National Accounts data for 17 European countries over 1990–2024, we implement a non-parametric two-stage decomposition strategy that combines a counterfactual Shapley procedure with a Shorrocks factor decomposition. The estimation strategy we propose provides an exact accounting of inequality in terms of interpretable factor contributions, separates demographic effects from per-capita GDP dynamics, and is well suited to settings in which macro aggregates are jointly determined. Our findings show that the decline in inequality up to the late 2000s was largely driven by wage- and consumption-led convergence, underpinned by narrowing productivity gaps. Since the 2000s, however, growing dispersion in exports has increasingly acted as the main source of divergence, while profits have progressively replaced wages as the main income-side channel through which productivity differences translate into inequality. These results suggest that, in a changed macroeconomic environment, reducing between-country inequality requires not only policies that reconnect wage growth to productivity and sustain domestic demand, but also interventions on the profit side and greater coordination of external balances.

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1 Introduction

Recent research has shown that the wage share has declined markedly since the 1980s, largely due to globalization, financialization, and welfare-state retrenchment under neoliberal policies, with technology playing a comparatively minor role (Lavoie and Stockhammer, 2013; Onaran and Galanis, 2013). This literature has mainly examined how changes in the functional distribution of income shape demand regimes—wage-led and profit-led—and, in turn, growth. However, the implications of the evolution of demand regimes for between-country GDP inequality has not been explored to our knowledge, despite its potential macroeconomic relevance and important implications for citizens' well-being across member states. In an integrated Europe, shifts in demand components and in the wage–profit split may translate into changes in the cross-country dispersion of per-capita GDP (e.g. through net exports and cross-border capital-income flows). The present study addresses this gap by decomposing between-country GDP inequality into the contributions of income-side (wages and profits) and expenditure-side components, separating out demographic effects and productivity-related dynamics. In this setting, we show that changes in demand composition and in the wage–profit split do matter for between-country GDP inequality.

While inequality in Europe is mainly a within-country phenomenon (Blanchet et al., 2019b; Filauro et al., 2025), cross-country differences in living standards remain a non-negligible dimension of European inequality and an important policy concern. Evidence for the 2007–2019 period points to convergence in mean disposable incomes across EU member states, but the process is far from uniform and masks substantial heterogeneity (Blanchet et al., 2019b; Nolan et al., 2019; Filauro et al., 2025). Looking at a longer horizon, a clear North–South/East divide emerges from the 1980s and becomes particularly visible from the early 1990s, with widening gaps in average incomes and standards of living between Northern Europe and Western/Southern Europe (Blanchet et al., 2019a). These patterns motivate a closer look at the macroeconomic drivers of between-country GDP inequality in Europe.

To explain why persistent between-country gaps in per-capita GDP and living standards exist in the first place, the literature has primarily emphasized structural supply-side forces and their interaction with institutions (Nolan et al., 2019; Sauer et al., 2023). In this vein, technological innovation, globalization, and finance are often regarded as key forces behind these differences; assessing their direct or indirect effects on between-country inequality is rather complex given the links between them and their interactions with sociodemographic factors, policy interventions and institutional settings. As to the latter aspect, contributions in the Comparative Political Economy field have brought to the forefront the significance of institutional arrangements of coordinated market economies for tempering the effects of supply-side factors such as technological progress and globalization on earnings inequality and related macro distributional outcomes (Streeck, 1991; Hall and Soskice, 2001). In this perspective, the shortcomings of liberal markets in terms of inequality can be addressed by institutional arrangements.

However, the spreading of earnings inequality among developed nations from the nineties, regardless of the institutional framework, has redirected attention to how different demand regimes shape the relationship between changes in income distribution and growth models (Baccaro and Pontusson, 2016). Following the neo-Kaleckian approach, a decline in the wage share depresses consumption, while it may stimulate investment through higher profitability and a stronger capacity for self-financing, and support exports through lower labor costs and greater price competitiveness. Whether a demand model is wage-led or profit-led is determined by the relative impact of consumption compared to investments and net exports on aggregate demand (Behringer and van Treeck, 2019). This perspective is particularly relevant for understanding the time evolution of between-country GDP inequality in an integrated Europe, as it points to demand components and the wage–profit split as potential drivers of divergence or convergence.

Empirical evidence from the years 1960 to 2007 shows that overall demand was wage-led in the Euro area (12 nations) with high intra-EU trade (Onaran and Galanis, 2013). However, a more nuanced view emerges when evaluating aggregate demand of the European countries and extending the analysis to the period 2009-2018, suggesting that the 2008 financial crisis marked a significant transformation in demand regimes (Baccaro and Pontusson, 2016; Baccaro and Hadziabdic, 2024). From the second half of the nineties to 2007, continental Europe[1] was mainly export led, this orientation became stronger after the crisis. Germany, for instance, was characterized by wage moderation, favoring manufacturing exports, sensitive to price competitiveness, and lower domestic consumption. While Nordic countries such as Denmark, Finland, Iceland, Norway, and Sweden, were focused on domestic demand, with increasing reliance on it after the crisis. This excluded Iceland and Denmark, which became more outward oriented. Interestingly, Sweden coupled consumption growth with export growth in ICT sector and services, not very price-sensitive and thus, not requiring the compression of salaries. United Kingdom especially in the first period adopted consumption-led growth driven by domestic consumption financed by higher real wages and financial capital from abroad. In Ireland, demand was led by export and by FDI. In Southern Europe, including France, Greece, Italy, Portugal and Spain, government expenditure played a major role, though after the crisis it became more export oriented. Italy provides a noteworthy example as it experienced slow growth of consumption and exports with a

[1] Austria, Belgium, Germany, Luxembourg, Netherlands, and Switzerland.

declining wage share throughout the 1990s and early 2000s.

Beyond the well known effect of demand regime shifts on both domestic and foreign economies through the external channel, there is a spillover effect associated with wages. Wage restraint to promote exports forces other countries to take the same approach to maintain their competitiveness; when wage competition becomes widespread, even for profit-led countries competitive advantage is reduced (Onaran and Galanis, 2013).

Within such framework, our contribution is to empirically examine the relationship between the pattern of aggregate expenditure components and income distribution across European countries, which can help to understand the dynamics of inequality through a macroeconomic lens. To our knowledge, this aspect has not been addressed. Thus, we consider how the dispersion of expenditure components, on the one hand, and of salaries and profits, on the other, has contributed to the dispersion of per capita GDP among countries over the period 1990-2025. Importantly, the link between GDP inequality and productivity divergence via expenditure and income components is explored.

Data are drawn from the OECD and cover annual GDP and its components—both from the expenditure approach and the income approach—form 1990 to 2025 for 17 European countries: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, and the United Kingdom.

Methodologically, we propose a novel non-parametric two-stage decomposition strategy that combines multiplicative and additive factor decompositions. In a first stage, we use a counterfactual Shapley procedure to separate population effects from per-capita components in total GDP inequality (Shapley, 1953; Duro and Esteban, 1998); in a second stage, we apply a Shorrocks factor decomposition to quantify how demand components and the wage–profit split contribute to between-country inequality in per-capita GDP (Shorrocks, 1982, 2013). Importantly, this strategy offers several advantages: it yields an accounting of inequality in terms of interpretable factor contributions, cleanly disentangles demographic from per-capita GDP dynamics, and remains well suited to settings where macro aggregates are jointly determined (thereby mitigating endogeneity concerns).

Our findings strikingly show that exports become the main driver of divergence in per capita GDP from 2000. Exports also contribute to productivity dispersion from 2000 onward. The contribution of salaries steadily decline throughout the period whereas the one of profits rises around 2014. This result hint to the decoupling of wages and productivity and the role of exports in the divergence of profits, which appear to absorb the productivity gains instead of salaries.

These findings hold substantial importance within the current environment of growing instability and uncertainty that affects the external channel. They suggest that an unbalanced shift of demand regimes toward exports may lower living standards at home and abroad if competitiveness relies on wage moderation and productivity gains are largely captured by profits. From a policy perspective, this calls for a twofold strategy: on the one hand, policies that reconnect wage growth to productivity and support domestic demand; on the other hand, profit-oriented strategies—such as extra-profit taxation or other redistributive interventions—to curb the concentration of productivity gains while reducing structural dependence on export-led competitiveness.

The remainder of the paper is organized as follows. Section 2 describes the data and outlines the empirical methodology. Section 3 presents and discusses the results of the two-stage decomposition. Section 4 extends the analysis to examine the role of productivity as a transmission channel of inequality. Section 5 concludes.

2 Data and Empirical Strategy

2.1 Data

GDP per capita and total GDP serve different analytical purposes. The former is the preferred lens for convergence in living standards since it measures average material welfare. The latter captures macroeconomic weight, relevant for external spillovers across countries and their systemic importance.

Data are drawn from the OECD and cover Annual GDP and components—expenditure approach and income approach—from 1990 to 2025 for 17 European countries, nominally Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.[2]

The income decomposition separates Salaries (W), defined as compensation of employees in the primary distribution of income account, from Profits (Π), the sum of gross operating surplus and mixed income, thus encompassing corporate and self-employment returns.

The expenditure decomposition disaggregates GDP into Actual Individual Consumption (AIC), Collective Government Consumption (CGC), Government Individual Consumption (GIC), Gross Fixed Capital Formation (GFCF), Changes in Inventories (IN) and Net Exports (NX).[3] AIC represents the goods and services consumed by households irrespective of who pays for them, reflecting living-standard convergence; CGC captures pure public goods, offering a lens on cross-country differences in state capacity; GIC measures publicly provided

[2] In line with Blanchard and Giavazzi (2002), we excluded Luxembourg since its surpluses over time are noticeably higher than the surpluses of the other countries (see Fig. A1 in the Appendix).

[3] For details see Table 1 in the appendix.

education and health services, indicative of the welfare state; GFCF records investment in capital stock, the engine of growth; IN proxies for short-run inventory cycles; NX represents net exports and thus connects directly to the literature on global imbalances.[4]

To compute per-capita GDP and the employment-to-population ratio, we use OECD data on Population (N) and Employment (E).

Table 2.1 presents summary statistics (mean and standard deviation over time) for the variables.[5]

Table 2.1: Country averages over time (thousand euros; E and N # of individuals)

Country	Y	AIC	CGC	GIC	$GFCF$	IN	X	IM	W	Π	E	N
AT	360460	208394	24562	39824	77851	2740	160415	153328	148541	120935	3945514	8344470
	(126938)	*(70859)*	*(8044)*	*(16261)*	*(26631)*	*(4197)*	*(79587)*	*(75295)*	*(46415)*	*(41579)*	*(303528)*	*(419853)*
BE	448257	259734	32968	56509	89800	3147	299847	293749	187788	148119	4299257	10700000
	(164347)	*(95232)*	*(11831)*	*(24113)*	*(35868)*	*(3919)*	*(139977)*	*(143965)*	*(58880)*	*(53814)*	*(434399)*	*(582940)*
CH	645671	365144	32814	36788	162022	1700	361360	314160	335718	241746	4227463	7722474
	(156195)	*(77535)*	*(6630)*	*(10698)*	*(34555)*	*(8336)*	*(152301)*	*(123122)*	*(80202)*	*(48892)*	*(350013)*	*(684108)*
DE	3361606	1995455	236382	362831	629497	14748	1096658	973966	1503960	1114613	38300000	82000000
	(995225)	*(553608)*	*(67816)*	*(135703)*	*(169973)*	*(17123)*	*(528726)*	*(450821)*	*(393079)*	*(283065)*	*(2496766)*	*(1033513)*
DK	305550	168868	19539	44665	54600	1580	136753	120457	128005	87199	2738543	5504094
	(104945)	*(54618)*	*(5886)*	*(15298)*	*(21264)*	*(1944)*	*(73826)*	*(65342)*	*(40511)*	*(29530)*	*(123717)*	*(247601)*
ES	1135713	707048	80821	111091	228143	7825	305159	303643	465683	422535	17100000	43900000
	(444509)	*(266234)*	*(33109)*	*(50883)*	*(83758)*	*(7605)*	*(168388)*	*(148596)*	*(167089)*	*(156313)*	*(2976316)*	*(3373593)*
FI	227794	131407	15507	30139	45472	979	76292	72003	91655	75413	2398286	5307547
	(79448)	*(47969)*	*(5018)*	*(13079)*	*(16566)*	*(1809)*	*(31457)*	*(34165)*	*(28800)*	*(24738)*	*(163003)*	*(185683)*
FR	2423339	1461479	184582	315167	455005	8040	621536	622471	1047943	715042	25300000	63400000
	(709305)	*(432407)*	*(49054)*	*(105784)*	*(146178)*	*(10785)*	*(247469)*	*(271800)*	*(285534)*	*(182304)*	*(1775215)*	*(3468305)*
GR	203660	143204	19187	18423	33860	1609	50549	63173	61883	97197	4014000	10800000
	(69675)	*(48860)*	*(7888)*	*(6656)*	*(14291)*	*(3142)*	*(29792)*	*(32087)*	*(24306)*	*(30577)*	*(325231)*	*(253617)*
IE	250728	103717	10870	21580	59310	2171	264944	211865	71038	118619	1874229	4298229
	(178453)	*(51460)*	*(5946)*	*(12739)*	*(51733)*	*(3682)*	*(253587)*	*(189165)*	*(35791)*	*(101506)*	*(452557)*	*(584448)*
IS	14098	8219	1096	1888	2671	16	5256	5050	5631	3801	168600	307784
	(10417)	*(5802)*	*(795)*	*(1512)*	*(2159)*	*(45)*	*(4193)*	*(3923)*	*(3946)*	*(2600)*	*(25727)*	*(36866)*
IT	1847079	1165884	134890	183187	334207	6447	449706	427243	628482	791524	22000000	58400000
	(482954)	*(307060)*	*(34803)*	*(50994)*	*(91145)*	*(12261)*	*(179602)*	*(177031)*	*(154823)*	*(181867)*	*(1146066)*	*(1377130)*
NL	785933	420346	55419	107206	139966	2688	504467	444159	313145	266927	8048543	16400000
	(308204)	*(155845)*	*(19851)*	*(50995)*	*(50651)*	*(5614)*	*(268421)*	*(237904)*	*(100813)*	*(98145)*	*(931529)*	*(829752)*
NO	292996	143104	18932	36322	57643	6944	107344	77294	106069	109335	2411886	4815574
	(164562)	*(73804)*	*(9869)*	*(22153)*	*(32514)*	*(5274)*	*(70361)*	*(44917)*	*(53401)*	*(65978)*	*(287115)*	*(425171)*
PT	197939	133826	14361	18681	37502	680	63665	70778	79647	70033	4796057	10300000
	(70763)	*(46729)*	*(4995)*	*(6755)*	*(11608)*	*(690)*	*(36148)*	*(32792)*	*(25102)*	*(23294)*	*(260182)*	*(216030)*
SE	435816	240950	26942	68813	85036	819	163946	149563	163381	116532	4544257	9377925
	(179471)	*(96183)*	*(10436)*	*(29664)*	*(40032)*	*(2262)*	*(88217)*	*(85458)*	*(65549)*	*(38555)*	*(432342)*	*(638481)*
UK	219666	1488711	144328	239447	342659	4836	553598	576911	907517	743345	29100000	62000000
	(891632)	*(595821)*	*(54938)*	*(120594)*	*(134093)*	*(8602)*	*(273632)*	*(284822)*	*(346538)*	*(263074)*	*(2656036)*	*(3735413)*

Note: Standard deviations in parentheses.

[4] For Spain, Greece, and Sweden, some observations are missing for GIC, CGC, and IN in the OECD data. We fill these gaps by expressing each missing component as a share of GDP. For each country and component, we compute a five-year moving average of the component-to-GDP ratio and use the first available smoothed value as the reference share. Missing values are then recovered by applying this reference share to GDP in the relevant year.

[5] The dynamics of the main macroeconomic variables (Y, AIC, $GFCF$, $NX = X - IM$, Π, W, E, N) for four countries (France, Germany, Italy, Spain) that exemplify different growth, demand and external adjustment patterns is reported in Figure 2 (Appendix).

2.2 Methodology

In this section, we introduce a two-stage non-parametric estimation strategy to assess the contributions of expenditure aggregates and gross income components to GDP inequality, independently of the influence of population dynamics.

The dynamics of inequality metrics over time has been widely employed to assess convergence (or divergence) among EU countries, using either total GDP or per-capita GDP depending on the focus of the analysis. In this paper, we investigate the contribution of GDP components (defined in Table A.1 in the Appendix) to overall GDP inequality, which is inevitably influenced by changes in population size across countries. Since our aim is to examine the drivers of inequality among EU countries independently of population changes over time, we propose to combine two different decomposition procedures. This allows to disentangle the impact of demographic changes from total GDP inequality while limiting issues arising from the joint determination of macroeconomic aggregates.

The two-stage procedure reconciles two well-established factor decomposition methods designed for multiplicative and additive outcome functions (Shorrocks, 1982, 2013; Duro and Esteban, 1998). This framework allows us to identify the main drivers of GDP inequality over time while disentangling the role of demographic changes from that of per-capita GDP dynamics. The procedure is particularly effective because, by definition, the dynamics of total GDP inequality net of population effects coincide with those of per-capita GDP inequality.

2.2.1 First-stage decomposition

Let $i \in (1, \ldots, M)$ denote country i. Define the GDP and population vectors, respectively, $Y = \{Y_i\}_{i=1}^M \in \mathbb{R}_+^M$ and $N = \{N_i\}_{i=1}^M \in \mathbb{R}_+^M$, with $Y_{\text{tot}} = \sum_{i=1}^M Y_i$ and $N_{\text{tot}} = \sum_{i=1}^M N_i$. Per-capita GDP in the ith country is $y_i = Y_i/N_i$, while $\bar{y} = Y_{\text{tot}}/N_{\text{tot}}$ is the average per-capita GDP for the entire population of individuals.

For the GDP vector Y, let $\bar{Y} = M^{-1} \sum_{i=1}^M Y_i$ be the mean GDP across countries. The coefficient of variation (CV) can be used to measure between-country inequality as follows[6]

$$CV(Y) = \frac{\sqrt{\frac{1}{M} \sum_{i=1}^M (Y_i - \bar{Y})^2}}{\bar{Y}}. \tag{1}$$

[6]Between-country inequality—as measured by CV(Y) in (1)—differs from the between-group component from inequality decomposition computed over the entire population of individuals (e.g. Shorrocks, 1980): the latter would inevitably require within-country distributional information, which we can ignore here while retaining the effect of country size, which we account for separately.

Remarkably, given the Generalized Entropy (GE) class of entropy measures,

$$GE_\alpha(Y) = \frac{1}{\alpha(\alpha-1)}\left[\frac{1}{M}\sum_{i=1}^{M}\left(\frac{Y_i}{\bar{Y}}\right)^{\alpha} - 1\right], \qquad \alpha \neq 0, 1, \tag{2}$$

CV is known to be a particular member of this class for $\alpha = 2$, that is,

$$GE_2(Y) = \frac{1}{2}CV(Y)^2. \tag{3}$$

Building on the counterfactual approach to inequality decomposition proposed by Duro and Esteban (1998), we construct counterfactual GDP vectors defined through multiplicative components as follows:

$$Y^y = \{y_i N_{\text{tot}}\}_{i=1}^M, \qquad Y^n = \{\bar{y} N_i\}_{i=1}^M, \qquad Y^{yn} = \{y_i N_i\}_{i=1}^M = Y. \tag{4}$$

Hence, given $v(S) = CV(Y^S)$ for $S \in \{y, n, yn\}$, we adopt the Shapley rule to obtain an exact and path-independent inequality decomposition (Shapley, 1953; Shorrocks, 2013) such that

$$CV(Y) = CV^y + CV^n, \tag{5}$$

where

$$\begin{aligned} CV^y &= \frac{1}{2}v(y) + \frac{1}{2}\Big[v(yn) - v(n)\Big], \\ CV^n &= \frac{1}{2}v(n) + \frac{1}{2}\Big[v(yn) - v(y)\Big]. \end{aligned} \tag{6}$$

Basically, the CV^y component (analogously, CV^n) captures the average between two effects: the contribution of introducing a single inequality-generating variable, y (respectively, N), and the contribution of removing that same variable when both are jointly involved in the determination of inequality. Intuitively, CV^y measures the contribution of cross-country dispersion in per-capita GDP to total GDP inequality in Y (holding, on average, population fixed), and CV^n captures the contribution of between-country dispersion in population.

Notably, CV^y and CV^n should not be confused with the inequality of per-capita GDP, which we denote by $CV(y)$, and of population, which we denote by $CV(N)$. Specifically, CV^y (respectively, CV^n) measures the contribution of per-capita GDP (respectively, population) to $CV(Y)$ according to a symmetric imputation of the marginal contributions of each variable to total GDP inequality—that is, the Shapley rule. As such, it must be the case that

$$CV^y = \frac{1}{2}\Big[CV(y) + CV(Y) - CV(N)\Big], \qquad CV^n = \frac{1}{2}\Big[CV(N) + CV(Y) - CV(y)\Big]. \tag{7}$$

Hence, the contribution of each component becomes negative whenever the second term in (6) is both negative and dominant. This situation may arise if the two variables exhibit a sufficiently strong negative correlation—an outcome that is, however, highly unlikely in real data. Moreover, it is worth observing that, from (5) and (6), if $CV(N) = 0$ then $CV(y) = CV(Y) = CV^y$.

The decomposition in (5) is particularly useful for the assessment of the dynamics of GDP inequality. Indeed, if the size of population is constant over time in each country, then there is a bi-univocal relationship between per-capita and total GDP inequality changes over time. On the contrary, if population sizes change over time, CV^y allows us to observe how the per-capita GDP contribution to (overall) GDP inequality over time would have changed independently from population dynamics.

In contrast to Duro and Esteban (1998), who analyze factors influencing per-capita GDP inequality (such as productivity and labor market participation), we employ the counterfactual approach to disentangle the respective contributions of population size and per-capita GDP to total GDP inequality. This distinction is crucial in order to separate the effect of demographic changes over time from that of variations in per-capita GDP.[7] From a methodological standpoint, our analysis also departs from Duro and Esteban (1998) in two important respects: (i) we focus on $\alpha = 2$, rather than $\alpha = (0, 1)$, as it is the only well-known GE index that remains well-defined in the presence of non-positive values, which may arise in our data (see Section 2.2.2); and (ii) we rely on Shapley decomposition rather than variance-based properties, since the coefficient of variation is not additively decomposable across factors (y, n)—unlike Theil-type indices ($\alpha = 0, 1$).

2.2.2 Second-stage decomposition: expenditure components

Consider the country-level GDP decomposition into expenditure-side sources,

$$Y_i = AIC_i + CGC_i + GIC_i + GFCF_i + IN_i + X_i - IM_i, \tag{8}$$

where AIC denotes Actual Individual Consumption, CGC Collective Government Consumption, GIC Government Individual Consumption, $GFCF$ Gross Fixed Capital Formation, IN Changes in Inventories, X Exports, and IM Imports. Hence, define the vectors $AIC = \{AIC_i\}_{i=1}^M$, $CGC = \{CGC_i\}_{i=1}^M$, $GIC = \{GIC_i\}_{i=1}^M$, $GFCF = \{GFCF_i\}_{i=1}^M$, $X = \{X_i\}_{i=1}^M$, $IM = \{IM_i\}_{i=1}^M$ in $\mathbb{R}_+^M$ and $IN = \{IN_i\}_{i=1}^M \in \Re^M$ (i.e. real-valued). For completeness, define net exports $NX_i = X_i - IM_i$ and $NX = \{NX_i\}_{i=1}^M \in \mathbb{R}^M$.

[7] In Section 4, we also present results based on the decomposition procedure originally proposed by Duro and Esteban (1998).

For the per-capita GDP component $y_i = Y_i/N_i$, introduce source-specific per-capita terms as follows

$$\begin{aligned} aic_i &= \frac{AIC_i}{N_i}, \quad cgc_i = \frac{CGC_i}{N_i}, \quad gic_i = \frac{GIC_i}{N_i}, \quad gfcf_i = \frac{GFCF_i}{N_i}, \\ in_i &= \frac{IN_i}{N_i}, \quad x_i = \frac{X_i}{N_i}, \quad im_i = \frac{IM_i}{N_i}, \quad nx_i = \frac{NX_i}{N_i} = x_i - im_i, \end{aligned}$$

so that

$$y_i = aic_i + cgc_i + gic_i + gfcf_i + in_i + x_i - im_i. \tag{9}$$

Hence, we can apply a Shorrocks-type factor decomposition (Shorrocks, 1982) to the cross-country variance of y by assigning to each source $k \in \{AIC, CGC, GIC, GFCF, IN, X, -IM\}$ the share

$$s_k = \frac{Cov(q_k, y)}{Var(y)}. \tag{10}$$

Here, $q_{AIC} = aic$, $q_{CGC} = cgc$, $q_{GIC} = gic$, $q_{GFCF} = gfcf$, $q_{In} = in$, $q_X = x$ and $q_{-Im} = -im$; $Cov(\cdot)$ and $Var(\cdot)$ are computed across countries (equal weights). By construction, $\sum_k s_k = 1$ whenever $Var(y) > 0$, and some s_k may be negative, indicating an inequality-reducing association between source k and y.

Once Shorrocks shares/contributions s_k are obtained, define source-level per-capita contributions as follows

$$CV^{y,k} = s_k\, CV^y, \qquad k \in \{AIC, CGC, GIC, GFCF, IN, X, -IM\} \tag{11}$$

so that $CV^y = \sum_k CV^{y,k}$ by construction. Notice that s_k is obtained from the distribution of per-capita GDP, but it is applied to the contribution of per-capita GDP to total GDP inequality obtained from Shapley's decomposition at the first stage. As such, from (5) the two-stage decomposition of cross-country inequality in GDP is

$$\begin{aligned} CV(Y) = CV^{y,AIC} + CV^{y,CGC} + CV^{y,GIC} + CV^{y,GFCF} \\ + CV^{y,In} + CV^{y,X} + CV^{y,-Im} + CV^n. \end{aligned} \tag{12}$$

This expression attributes total cross-country inequality in GDP, $CV(Y)$, to (i) the per-capita channel—disaggregated into expenditure-side sources per person—and (ii) the population channel. Roughly, the two-stage term $s_k CV^y$ is precisely the contribution of factor k to inequality in aggregate GDP Y, net (in the Shapley sense) of cross-country population inequality and with the $y \times N$ interaction split symmetrically between y and N. Remarkably, the application of the metric CV ensures compatibility with potentially negative terms (e.g.

IN or NX) at the second stage, while the Shapley allocation at the first stage guarantees an exact and path-independent distribution of interaction effects between CV^y and CV^n.

Moreover, when comparing the two-stage contribution of factor k, $CV^{y,k} = s_k CV^y$, with the one-stage attribution of per-capita inequality $CV^k(y) = s_k CV(y)$, it is worth observing that (see also (7))

$$CV^{y,k} - CV^k(y) = s_k\Big(CV^y - CV(y)\Big) = \frac{s_k}{2}\Big[CV(Y) - CV(N) - CV(y)\Big], \tag{13}$$

implying that, if $CV(N) = 0$, then the two attributions coincide since $CV^{y,k} = CV^k(y)$. Differently, if heterogeneity in N (and/or its interaction with y) is substantial, CV^y scales factor k's contribution up or down in a way consistent with the pass-through from per-capita dispersion to aggregate inequality.

2.2.3 Second-stage decomposition: income components

Consider the decomposition of the country-level GDP on the income side, i.e.

$$Y_i = W_i + \Pi_i, \tag{14}$$

where W_i denotes salaries (compensation of employees) and Π_i denotes profits (gross operating surplus plus mixed income). Define the vectors $W = \{W_i\}_{i=1}^M \in \mathbb{R}_+^M$ and $\Pi = \{\Pi_i\}_{i=1}^M \in \mathbb{R}_+^M$.

For the per-capita component $y_i = Y_i/N_i$, introduce income-side per-capita terms

$$w_i = \frac{W_i}{N_i}, \qquad \pi_i = \frac{\Pi_i}{N_i},$$

so that

$$y_i = w_i + \pi_i. \tag{15}$$

Once again, apply a Shorrocks-type factor decomposition (Shorrocks, 1982) to the cross-country variance of y by assigning to each source $k \in \{W, \Pi\}$ the share

$$s_k = \frac{Cov(q_k, y)}{Var(y)}, \tag{16}$$

where $q_W = w$ and $q_\Pi = \pi$; $Cov(\cdot)$ and $Var(\cdot)$ are computed across countries (equal weights). By construction, $s_W + s_\Pi = 1$ whenever $Var(y) > 0$.

Define source-level per-capita contributions $CV^{y,W} = s_W\, CV^y$ and $CV^{y,\Pi} = s_\Pi\, CV^y$.

The two-stage decomposition of cross-country inequality in GDP is then

$$CV(Y) = CV^{y,W} + CV^{y,\Pi} + CV^{n}. \tag{17}$$

Analogously to the expenditure-side decomposition, this expression attributes total between-country inequality in GDP, $CV(Y)$, to (i) the per-capita channel—disaggregated into wages and profits per person—and (ii) the population channel.

3 Results and Discussion

3.1 Expenditure-side decomposition

Figure 3.1 presents the first-stage Shapley decomposition of between-country GDP inequality into its per-capita (CV^y) and population (CV^n) components. As one might expect, the overall dispersion in total GDP, $CV(Y)$, largely reflects cross-country differences in population size rather than in per-capita income. Indeed, the demographic component accounts for about 82% (see Table 2) and remains broadly stable over time, whereas the contribution of dispersion in per-capita GDP is markedly smaller and shows a clear downward trend—consistent with gradual convergence among European countries at least until 2010. The per-capita component also appears to be the main driver of the decline in total GDP inequality, which falls up to the 2008 crisis and slightly increases thereafter.

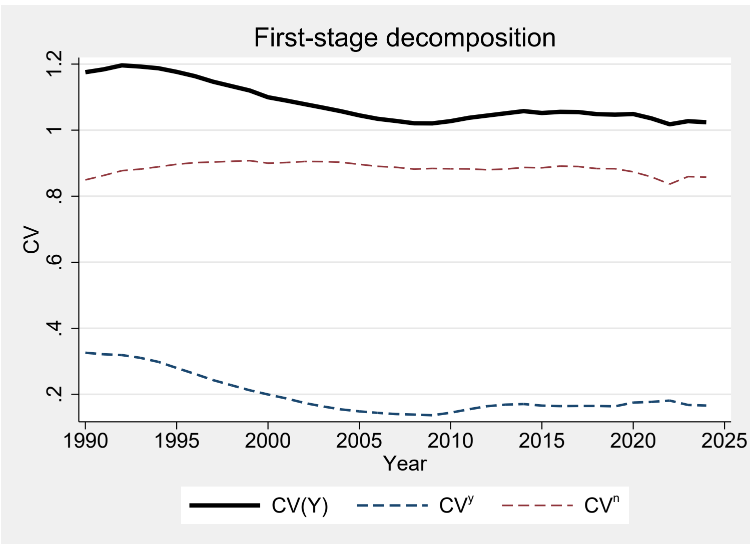
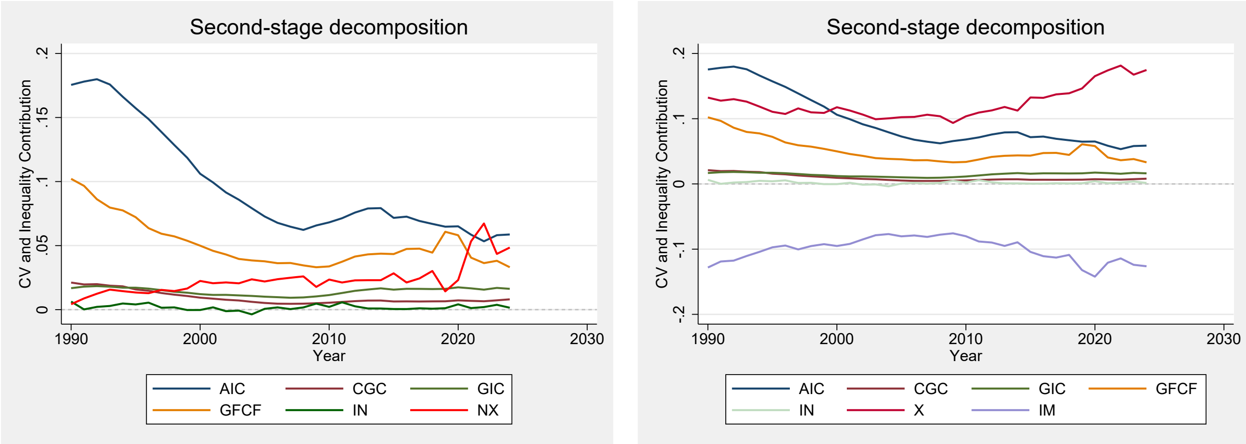


Figure 3.1: First-stage decomposition of between-country GDP inequality (total, per-capita, and population components).

Figure 3.2a shows the second-stage decomposition of per capita GDP inequality by ex-



(a) Second-stage decomposition of per-capita GDP inequality by expenditure components.

(b) Second-stage decomposition of per-capita GDP inequality by expenditure components (exports and imports disaggregated).

Figure 3.2: Second-stage decomposition of per-capita GDP inequality by expenditure components, with and without exports/imports disaggregation.

penditure components including net exports. The major source of GDP variation is consumption of households (AIC), 8.9%, followed by gross fixed investments (GFCF), 4.7%, and, to a lesser extent, net exports (NX), 2.2%. The impact of household consumption and gross fixed investments decreases dramatically from the beginning of the 1990s to the first decade of the 2000s. The global financial crisis reverses the role of consumption and investments as equalizers. The contribution of consumption begins to steadily decline again around 2013, though heterogeneity slightly re-emerges with the recovery from the Covid-19 shock. Investments present a renewed peak around 2019 and a subsequent reduction in 2020.

The rise in the contribution of the trade balance becomes evident around the end of the nineties, followed by a decline soon after the financial crisis. After Covid-19, coinciding with the investment peak, we observe a drop in the contribution of net exports, which suggests an asymmetric response to the common shock. In the aftermath of the crisis, while investment regains the role of equalizer, net exports become a relevant source of variation, reaching 29.2% in 2024 (see Table 2 in the Appendix). In conclusion, in the long run, the declining asymmetry in the distribution of GDP per capita across countries is associated with the convergence of consumption and investment, while net exports have become a constraining factor in recent years.

We separate net exports into exports and imports to better understand their role. The results in Figure 3.2b show that over a large part of the nineties exports become less important, from roughly the end of the nineties they emerge as the main source of inequality. Their role becomes increasingly relevant in the aftermath of the 2008 crisis. This could partly mirror the growing net export to GDP ratio in Germany and the overall large variability of net exports in the other countries beginning approximately in the late 1990s and early 2000s (Figure 1 in the Appendix).

The contribution of imports rises till the end of the 2000s, after that it declines.

Discussion. The explanation for the role of exports is not univocal. A number of factors that primarily impact countries' competitiveness is at the core of external imbalances. Differences in price competitiveness emerged from the last stage of the European Monetary Union in 1999,[8] with Germany increasing its competitiveness, while Italy, Portugal, Spain, Ireland and Luxembourg losing it to a different extent (Fischer, 2007). Diverse patterns of unit labor costs (ULCs hereafter) caused disparities in competitive strength: from the mid-1990s, Germany's rate of ULC appeared below the level necessary for EMU convergence, while Portugal, Greece, and to a lesser extent Italy, persistently reported higher rates than the other EMU countries (Dullien and Fritsche, 2008).

We focus on some explanatory factors regarding labor market institutions and fiscal policies, on the one hand, and capital flows, on the other.

Labor market institutions and fiscal policies

Labor market institutions can explain the structural imbalance between export-led countries with current account surpluses and domestic demand-led countries with current account deficits within the EMU. When export-led Northern countries (Austria, Belgium, Finland, France, Germany and the Netherlands) joined the EMU, their institutional arrangement prompted competitiveness with respect to Southern economies (Greece, Ireland, Italy, Portugal and Spain). Coordination institutions favored wage moderation in wage bargaining leading to lower inflation and real exchange rate competitiveness (Hall, 2012). They stimulated the production of high value-added goods as well (Streeck, 1997; Hall, 2012). The political coalition with tradable manufacturing sectors generally prevailing in Northern Europe kept unit labor costs low, while in peripheral states coalitions focused on domestic non-tradable sectors where wage inflation was higher (Johnston and Regan, 2016).

Analyzing the other European countries outside of the EMU alongside post-2008 shifts in demand regimes aids in clarifying the dispersion of exports. Prior to the financial crisis, Nordic countries were primarily driven by domestic demand, with Sweden also focusing on export growth in the ICT and services sectors. Subsequently, only Denmark and Iceland along with Southern Europe shifted to an export-led model. The role of exports became stronger in continental Europe (Baccaro and Pontusson, 2016; Baccaro and Tober, 2021).

[8]Stage 3 was characterized by the implementation of a common monetary policy and the gradual introduction of the euro.

Overall, the strategy adopted by Austria, Belgium, Finland, France, Germany and the Netherlands was coupled with tight fiscal policy leading to competitive deflation (Hall, 2012). In Southern Europe the rise of domestic demand was stimulated through fiscal policy conducive to different inflationary patterns and real exchange rates. The internal fixed exchange rate did not allow Southern states to adjust the nominal exchange rate against their principal trading partners to offset the inflationary pressure of domestic demand and preserve competitiveness (Hall, 2012). After the debt crisis, there was the revival of the Stability and Growth Pact (SGP) in 2011 and the Fiscal Stability Treaty in 2013 until 2019. This helped Greece, Italy, Portugal and Spain improve and stabilize their current-account balances (Glebocki Keefe and Hepp, 2024).

It is plausible that diverse fiscal policies affected the dispersion of imports, though, the 2008 and the COVID shocks appear to transform imports in an equalizing factor.

However, Johnston and Regan (2016) observe that despite different institutional arrangements, external imbalances were not significant throughout the process of European monetary integration in the 1980s and 1990s, and that peripheral states witnessed lower inflation in the pre-crisis 2000s than in the 1990s. They show that the introduction of the single currency was the source of the rise of persistent external imbalances. It took away policy tools from states such as nominal exchange-rate adjustments, thereby preventing them from counteracting significant wage moderation, especially in Germany.

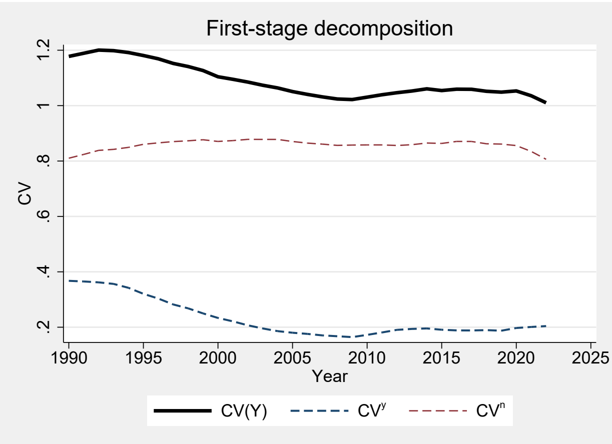
Capital flows

An additional source of external imbalances is the movement of capital from core economies to peripheral ones prompted by the EMU creation of a favorable environment through financial integration. It triggered the expansion of domestic credit in Southern countries at the end of the 1990s and over part of the first decade of the 2000s (Spaventa and Giavazzi, 2010). Especially when the euro was introduced, capital flows to Southern countries were matched by lower private savings rates, higher consumption, private investment rates and imports (Jaumotte and Sodsriwiboon, 2010; Holinski et al., 2012). The boost of domestic demand caused higher labor costs and prices, lower real interest rates and higher real exchange rates in the period 1995–2012 (Gabrisch and Staehr, 2015). Recent empirical findings (Baccaro and Tober, 2021) show that financial flows stimulating private credit explain nominal wage increases in 1999–2014 better than wage-bargaining coordination. Relative changes in wages influenced bilateral Germany's exports to other European countries to a greater extent compared to Austria and the Netherlands.

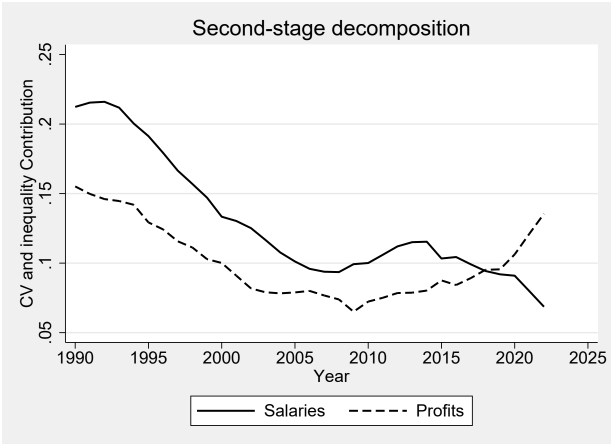
A final observation is that the development of domestic demand, powered by the expansion of domestic credit, particularly in peripheral countries throughout part of the nineties and the first decade of the 2000s, was likely to have an equalizing influence on consumption and investment.

3.2 Income-side decomposition

We notice in Figures 3.3a[9] and 3.3b that wages display the higher contribution to per-capita GDP inequality, even if a reversal can be observed from 2019 onward. Both salaries and profits inequality contribute to per capita and total GDP inequality reduction until 2009, respectively from 18% and 13% to 9.7% and 6.4%; similarly, the rise from 2010 to 2014 (i.e. from 9.7% and 7% to 10.9% and 7.6% respectively) seems to be explained by both factors still preserving the same dominance ratio of the wage component (see Table 3 in the Appendix). However, starting from 2015 two different dynamics can be observed, since the contribution of salaries to per capita (and total) GDP inequality decreases from 9.8% to 6.8% whereas the opposite can be observed for profits whose contribution move from 8.3% in 2015 to 13.4% in 2022).



(a) First-stage decomposition of cross-country GDP inequality (total, per capita, and population components).



(b) Second-stage decomposition of per-capita GDP inequality by income components (salaries and profits).

Figure 3.3: Decomposition of cross-country and per-capita GDP inequality.

Discussion. Does this evidence reflect the dynamics of the expenditure components? Could wage restraint in Northern Europe previously mentioned mirror the pattern of wages and profits? Between 1999 and 2007, there was an increase in ULCs in all countries of the Eurozone apart from Germany. The reason was differences in wage increases rather than in productivity growth, which was significant especially between Germany, on the one hand,

[9] CV values for total GDP differ from those used in the Section 3.2 because the OECD factor components are estimated values; as a result, their sum (i.e., total GDP) may differ slightly between the two datasets. Moreover, results are reported until 2022 in this section according to data availability from OECD.

and Greece, Italy, Ireland, Portugal and Spain on the other. The difference was progressively smoothed after the Euro crisis (Baccaro and Tober, 2021).

Notably, in Germany from 2000 to 2008, wage restraint and falling labor shares along with globalization raised exports and profits (Dao and Maggi, 2018; Dao, 2020). Despite more recent wage growth, it has been offset by lower net benefits since 2005 caused by welfare-state downsizing. This resulted in the fall of the household disposable income-to-GDP ratio by around 6 percentage points over 2005–2017 (Dao, 2020).

Considering the whole time span, wage dispersion became less and less important in accordance with the evidence of wage convergence for the period from 1981 to 2001 (Mora et al., 2005), which is most likely due to the spread of wage restraint to preserve competitiveness.

4 Extension: the contribution of productivity over time

Recall definitions in Section 2.2. Let $E = \{E_i\}_{i=1}^M \in \mathbb{R}_+^M$ be the total employment and let the aggregate value be $E_{\text{tot}} = \sum_{i=1}^M E_i$. For each country i, define productivity $p_i = Y_i/E_i$ and employment-to-population ratio $e_i = E_i/N_i$; at the aggregate level use $\bar{p} = Y_{\text{tot}}/E_{\text{tot}}$ and $\bar{e} = E_{\text{tot}}/N_{\text{tot}}$. Finally, set $n_i = N_i$ and write $Y_i = p_i e_i n_i$.

Given the Coefficient of Variation in (1), construct the counterfactual GDP vectors as follows

$$\begin{aligned} Y^p &= \{p_i\,\bar{e}\,N_{\text{tot}}\}_{i=1}^M, & Y^e &= \{\bar{p}\,e_i\,N_{\text{tot}}\}_{i=1}^M, & Y^n &= \{\bar{p}\,\bar{e}\,n_i\}_{i=1}^M, \\ Y^{pe} &= \{p_i\,e_i\,N_{\text{tot}}\}_{i=1}^M, & Y^{pn} &= \{p_i\,\bar{e}\,n_i\}_{i=1}^M, & Y^{en} &= \{\bar{p}\,e_i\,n_i\}_{i=1}^M, \\ Y^{pen} &= \{p_i\,e_i\,n_i\}_{i=1}^M = Y. \end{aligned} \tag{18}$$

Let $v(S) = CV(Y^S)$ for $S \in \{p, e, n, pe, pn, en, pen\}$. By adopting a Shapley-value allocation to obtain an exact, path-independent decomposition

$$CV(Y) = CV^p + CV^e + CV^n. \tag{19}$$

The three components are

$$\begin{aligned} CV^p &= \frac{1}{3}v(p) + \frac{1}{6}\Big[v(pe) - v(e)\Big] + \frac{1}{6}\Big[v(pn) - v(n)\Big] + \frac{1}{3}\Big[v(pen) - v(en)\Big], \\ CV^e &= \frac{1}{3}v(e) + \frac{1}{6}\Big[v(pe) - v(p)\Big] + \frac{1}{6}\Big[v(en) - v(n)\Big] + \frac{1}{3}\Big[v(pen) - v(pn)\Big], \\ CV^n &= \frac{1}{3}v(n) + \frac{1}{6}\Big[v(pn) - v(p)\Big] + \frac{1}{6}\Big[v(en) - v(e)\Big] + \frac{1}{3}\Big[v(pen) - v(pe)\Big]. \end{aligned} \tag{20}$$

Intuitively, CV^p captures the contribution of cross-country dispersion in labor productivity to overall inequality in Y (holding, on average, employment and population fixed); CV^e the contribution of dispersion in employment-to-population rates; and CV^n the contribution of dispersion in population. The Shapley averaging fairly allocates interaction effects among (p, e, n). This information is particularly relevant in that, compared to the bi-partition in (5), the tri-partition in (21) identifies the contribution of productivity and employment-to-population rate to the dynamics of inequality of per-capita GDP.

Given this first-stage decomposition, define source-specific terms for the productivity component $p_i = Y_i/E_i$ on the expenditure and income side as follows

$$aic_i^p = \frac{AIC_i}{E_i}, \quad cgc_i^p = \frac{CGC_i}{E_i}, \quad gic_i^p = \frac{GIC_i}{E_i}, \quad gfcf_i^p = \frac{GFCF_i}{E_i},$$
$$in_i^p = \frac{IN_i}{E_i}, \quad x_i^p = \frac{X_i}{E_i}, \quad im_i^p = \frac{IM_i}{E_i}, \quad nx_i^p = \frac{NX_i}{E_i} = x_i^p - im_i^p,$$

and

$$w_i^p = \frac{W_i}{E_i}, \qquad \pi_i^p = \frac{\Pi_i}{E_i},$$

so that

$$p_i = aic_i^p + cgc_i^p + gic_i^p + gfcf_i^p + in_i^p + x_i^p - im_i^p, \tag{21}$$

and

$$p_i = w_i^p + \pi_i^p. \tag{22}$$

As above, we can apply a Shorrocks-type factor decomposition to the cross-country variance of p by assigning to each source k the share

$$s_k = \frac{Cov(q_k, p)}{Var(p)}. \tag{23}$$

Consequently, a second-stage decomposition can be obtained using either expenditure or income components. In the former case, we obtain

$$\begin{aligned} CV(Y) = CV^{p,AIC} + CV^{p,CGC} + CV^{p,GIC} + CV^{p,GFCF} \\ + CV^{p,IN} + CV^{p,NX} + CV^e + CV^n, \end{aligned} \tag{24}$$

where $CV^{p,k} = s_k CV^p$ with s_k indicating Shorrocks' share in (23) (and $\sum_k s_k = 1$). Basically, the second-stage decomposition from the tripartition of the first-stage decomposition in (21) highlights how much the contribution of productivity to total GDP inequality passes through the kth source. For instance, a high value of $CV^{p,NX}$ would prove that the contribution of productivity to total GDP inequality is mostly associated with net exports. Differently, if income components are considered at the second stage,

$$CV(Y) = CV^{p,W} + CV^{p,\Pi} + CV^{e} + CV^{n}, \tag{25}$$

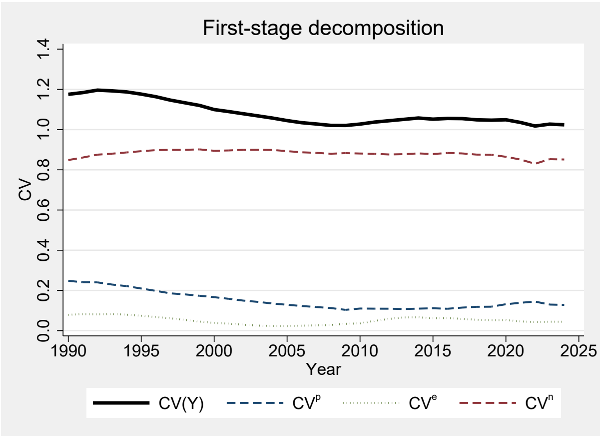
where, once again, $CV^{p,k} = s_k CV^p$. On the income side, the comparison between $CV^{p,W}$ and $CV^{p,\Pi}$ indicates whether the productivity-related component of aggregate GDP inequality is predominantly transmitted through wages or through profits, thus providing evidence on whether the process is wage-led or profit-led.

4.1 Evidence on the expenditure-side and income-side decomposition

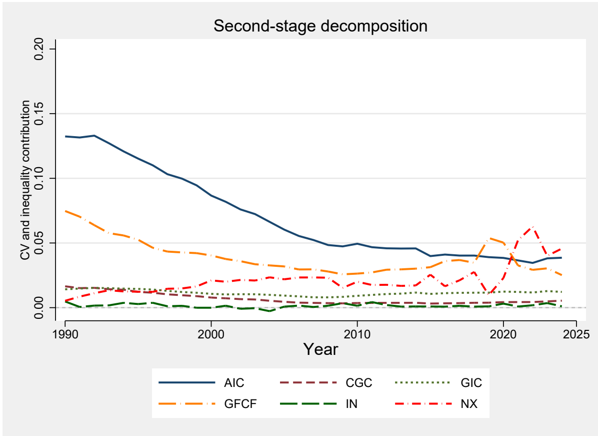
Figure 4.1 summarizes the extension for the sample from 1990 to 2024. Panel (a) reports the first-stage decomposition of $CV(Y)$ into productivity, employment and population components on the expenditure side. The population component CV^n remains the dominant term in levels, again reflecting largely cross-country differences in population size. Employment inequality strongly reflects the pattern of total GDP inequality over time more than per-capita GDP inequality. In addition, overall, inequality in productivity contributes more than inequality in employment by 14% and 4.7% respectively (see Table 5 in the Appendix).

CV^p declines from the early 1990s to around 2008 and then stabilizes at a lower level. The employment component CV^e is comparatively small throughout, but it becomes more relevant around downturns and in the aftermath of the global financial crisis, indicating that cross-country differences in participation rates shape short-run movements in inequality.

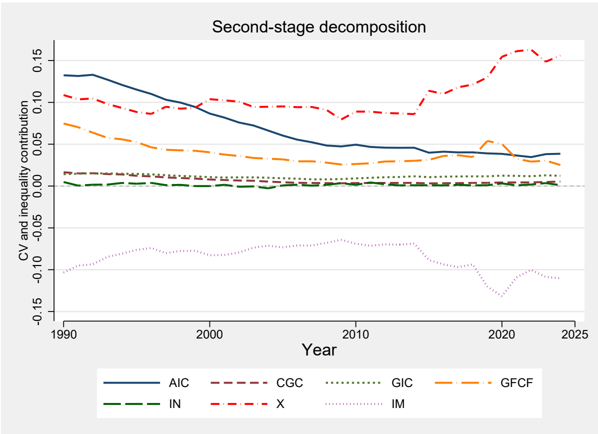
Panel (b) and panel (c) display the second-stage decomposition of the productivity-related component CV^p by expenditure aggregates. In panel (c) we divide net exports into exports and imports. Overall, the patterns match the contribution of expenditure components to GDP variation (Figures 4.2(a) and 4.2(b)). Panel (b) shows that in the early 1990s, more than half of CV^p is transmitted through Actual Individual Consumption (AIC), while Gross Fixed Capital Formation (GFCF) roughly contributes by one third and exports play a secondary role. In the following period, the contribution of AIC and GFCF declines markedly (respectively from 11% and 6.4% to 7.8% and 3.7%), while the role of exports increases. Over the 2000s, the dispersion of total productivity is increasingly channeled through the dispersion of productivity in net exports. It becomes clear that the export side of external demand carries most of the productivity-related divergence across countries in panel (c). While imports act as a mildly equalizing force, by the end of the nineties the contribution of exports begins to rise and from the early 2000s becomes the main driver of productivity inequality between European countries (from 9.4% in 2000 to 15.2% in 2024).



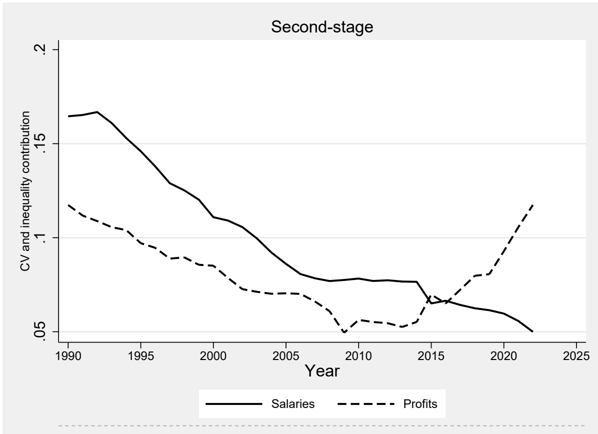
(a) First-stage decomposition (expenditure side): $CV(Y)$ into CV^p, CV^e and CV^n.



(b) Second-stage decomposition of CV^p by expenditure components.



(c) Second-stage decomposition of CV^p by expenditure components (NX disaggregated).



(d) Second-stage decomposition of CV^p by income components (wages and profits).

Figure 4.1: Extension: Shapley decomposition of $CV(Y)$ into productivity (p), employment (e) and population (n) components and second-stage decompositions of the productivity channel, 17 OECD economies, 1990–2024.

Finally, Panel (d) shows the second-stage decomposition of the productivity-related component by income sources. In the early 1990s about 60% of CV^p is transmitted through wages and 40% through profits (see Table 5 in the Appendix). By the 2010s these shares are reversed, with profits accounting for more than two-thirds of CV^p (Table 5). In other words, productivity-induced divergence increasingly manifests itself in the dispersion of capital incomes rather than in wage differentials.

Discussion. Productivity dispersion may lie in the misallocation of resources: for instance, in South Europe in the early 1990s, lower real interest rates drove capital inflows to firms with higher net worth, though not more productive (Gopinath et al., 2017). It may also lie in technological differences due to a weaker diffusion across firms (Andrews et al., 2016). Furthermore, heterogeneity in labor productivity growth after 1995 was affected by diversity in labor market institutions like employment protection and union density, and product market regulation (Dew-Becker and Gordon, 2008).

When considering the expenditure channel, demand-oriented export-led growth (Thirlwall, 2002) is helpful. Variations in demand regimes resulted in exports influencing growth patterns in distinct ways. Growth patterns in turn shaped differences in the growth of productivity and ULCs. It is plausible that the introduction of a single nominal exchange rate boosted production in some European economies, raised their productivity and furthered their competitive advantage, thus triggering a virtuous circle of export-led growth. In this respect, lower real exchange rate through undervaluation can foster the expansion of the tradable sector and increase growth (Rodrik, 2008).

From the income perspective, the role of wage steadily declined, in line with some evidence showing that nominal wage and productivity presented different patterns from 1981 to 2001 in the Euro-area (Mora et al., 2005). Other findings hold that the weakening of the link between wage and productivity growth started to deteriorate at the aggregate level around the early 1990s; however, there were country differences in terms of timing due to technological progress, global integration and institutional setup (Bobeica et al., 2019). From 2000 to 2016 in EU countries the deterioration of the pass-through from productivity to wages was also caused by more productive and competitive firms specifically in the tradable sector and exposed to external competition. They increased their profits from globalization and did not pass productivity gains to wages due to their stronger labor market power especially when collective bargaining was weak (Bormans and Theodorakopoulos, 2023). Hence, it is likely that this was combined with a race to the bottom.

Taken together, the extension shows that the decline in between-country inequality observed in the 1990s and the 2000s was underpinned by genuine narrowing of productivity gaps, transmitted primarily through household consumption and investment, on the expenditure side, and wages, on the income side. It is likely that the decoupling of wages from productivity, weakened the association of consumption with productivity. It is also evident that the link between investments and productivity became steadily weaker. However, in the years following the financial crisis, exports and profits gained momentum. At the same time, demographic and participation patterns modulated the impact of these forces on total output.

5 Concluding Remarks

We empirically examine how the dispersion of expenditure components, on the one hand, and of salaries and profits, on the other, has contributed to the inequality of per capita GDP among countries in Europe over the period 1990-2025 to understand the dynamics of inequality. In addition, the link between divergence in expenditure and income components and productivity is explored.

The results highlight that the declining asymmetry in the distribution of GDP per capita across countries was associated with the convergence of consumption and investment, while exports along with external imbalances became the main source of dispersion from the end of the nineties. It appears that demand regimes though progressively shifting to export major role, were marked by diversity over time.

From the income side, the wage component played a role less and less relevant, probably because of the spread of wage restraint to preserve competitiveness, while profits became increasingly important beginning in 2015.

During the 2000s, exports carried most of the productivity-related divergence, while salaries became progressively unrelated to productivity dynamics giving way to profits. The race to the bottom combined with the capture of productivity gains from globalization by profit were most likely the causes of wages' falling importance.

Our results suggest that an unbalanced shift of demand regimes toward exports may lower living standards at home and abroad if competitiveness in globalized economies relies on wage moderation and a race to the bottom, and productivity gains are largely captured by profits. Within the current environment of growing instability and uncertainty, it is widely acknowledged that this strategy can fire back into domestic economies, faced with a strong need to expand internal demand and to reduce external imbalances. This calls for a twofold policy strategy: policies that reconnect wage growth to productivity and support domestic demand, and profit-oriented strategies—such as extra-profit taxation or other redistributive interventions—to curb the concentration of productivity gains while reducing structural dependence on export-led competitivenes.

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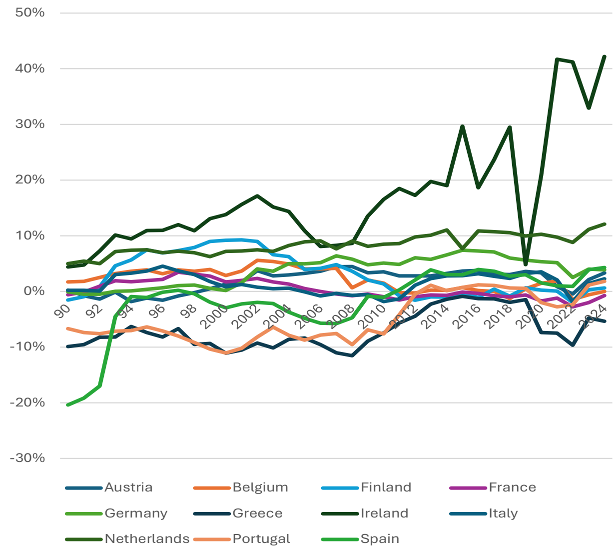
Appendix

Figure 1: Net exports as percentage of GDP

(a) Countries in the European Monetary Union.



(b) Other countries

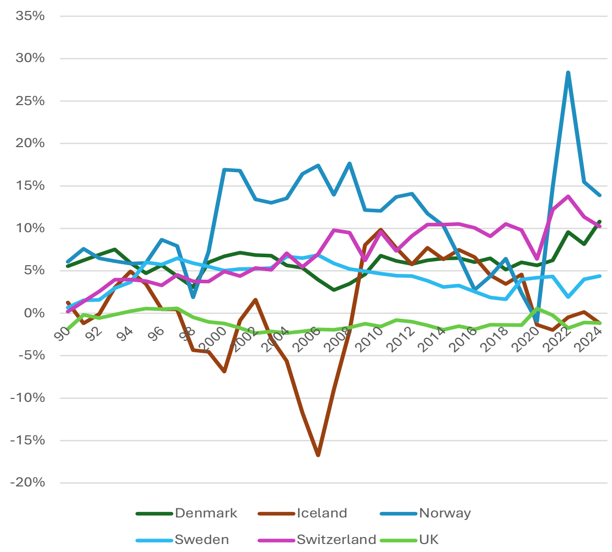


Table 1: Definition of variables and data sources

Variable name	**Description**	**Data source**
GDP	Gross domestic product: standard measure of the value added created through the production of goods and services in a country during a certain period.	OECD data
GDP per capita	Gross domestic product per capita.	OECD data
AIC	Actual Individual Consumption: goods and services actually consumed by households, including those purchased directly by households and those provided by government and non-profit institutions.	OECD data
CGC	Collective Government Consumption: public goods and services benefiting society as a whole or large parts of society.	OECD data
GIC	Government Individual Consumption: expenditures incurred by government on behalf of an individual household (health care, housing, education, etc.).	OECD data
GFCF	Gross Fixed Capital Formation: acquisition less disposals of produced fixed assets for the production of other goods and services.	OECD data
IN	Inventories: stocks of outputs that are still held by the units that produced them for sale, work in progress, or materials and supplies to be used in production.	OECD data
NX	External balance of goods and services: goods and services (including transactions in barter or goods exported as part of gifts or grants) sold from residents to non-residents minus imports reflecting the same transactions from non-residents to residents.	OECD data
Salaries	Compensation of employees (wages and salaries paid to employees and their employers' social contributions).	OECD data
Profits	Gross operating surplus (business profits) and gross mixed income (profits of the self-employed), plus taxes on production and imports less subsidies.	OECD data
Employment	Employers, own account workers, employees, contributing family workers.	OECD data
Population	Annual population: data refer to mid-year estimates of the population.	OECD data

Note: Values are reported in US dollars, converted from local currencies using exchange rates and transformed in constant prices by adjusting to 2020 prices. OECD data are available at: `https://data-explorer.oecd.org/vis?lc=en&tm=GDP%20EXPENDITURE%20APPROACH&pg=0&hc[Transaction]=&hc[Financial%20instruments%20and%20non-financial%20assets]=&snb=37&df[ds]=dsDisseminateFinalDMZ&df[id]=DSD_NAMAIN10%40DF_TABLE1_EXPENDITURE&df[ag]=OECD.SDD.NAD&df[vs]=2.0&dq=A.AUS.......XDC.V..&lom=LASTNPERIODS&lo=5&to[TIME_PERIOD]=false` `https://data-explorer.oecd.org/?lc=en&tm=GDP%20income%20APPROACH&pg=0&hc[Transaction]=&hc[Financial%20instruments%20and%20non-financial%20assets]=&snb=23&isAvailabilityDisabled=false` `https://data-explorer.oecd.org/vis?lc=en&df[ds]=dsDisseminateFinalDMZ&df[id]=DSD_POPULATION%40DF_POP_HIST&df[ag]=OECD.ELS.SAE&dq=AUS..PS._T..&pd=2014%2C2024&to[TIME_PERIOD]=false&vw=ov` `https://data-explorer.oecd.org/vis?lc=en&df[ds]=dsDisseminateFinalDMZ&df[id]=DSD_ALFS%40DF_ALFS_EMP&df[ag]=OECD.SDD.TPS&df[vs]=1.1&dq=CHE.EMP.PS.N._T%2BM%2BF.Y_GE15._T._T.A&pd=1990%2C&to[TIME_PERIOD]=false&vw=tb`

Table 2: Decomposition of cross-country GDP inequality: expenditure side

Year	$CV(Y)$	CV^y	CV^n	$CV^{y,\text{AIC}}$	$CV^{y,\text{CGC}}$	$CV^{y,\text{GIC}}$	$CV^{y,\text{GFCF}}$	$CV^{y,\text{IN}}$	$CV^{y,X}$	$CV^{y,-IM}$
1990	1.1755	0.3260	0.8494	0.1755	0.0211	0.0168	0.1021	0.0063	0.1324	-0.1282
1991	1.1841	0.3213	0.8628	0.1781	0.0197	0.0180	0.0967	0.0002	0.1277	-0.1189
1992	1.1962	0.3190	0.8773	0.1799	0.0199	0.0184	0.0862	0.0022	0.1300	-0.1176
1993	1.1926	0.3107	0.8820	0.1758	0.0187	0.0180	0.0797	0.0029	0.1262	-0.1105
1994	1.1874	0.2983	0.8891	0.1662	0.0182	0.0172	0.0775	0.0048	0.1186	-0.1042
1995	1.1765	0.2799	0.8966	0.1573	0.0158	0.0171	0.0722	0.0041	0.1106	-0.0972
1996	1.1635	0.2619	0.9017	0.1488	0.0147	0.0164	0.0636	0.0055	0.1073	-0.0944
1997	1.1466	0.2431	0.9035	0.1387	0.0130	0.0152	0.0593	0.0015	0.1158	-0.1004
1998	1.1333	0.2276	0.9057	0.1285	0.0117	0.0139	0.0572	0.0018	0.1098	-0.0953
1999	1.1201	0.2124	0.9077	0.1186	0.0106	0.0132	0.0538	-0.0003	0.1088	-0.0924
2000	1.0997	0.1996	0.9000	0.1061	0.0094	0.0121	0.0500	-0.0003	0.1176	-0.0952
2001	1.0896	0.1877	0.9020	0.0993	0.0086	0.0115	0.0459	0.0018	0.1126	-0.0920
2002	1.0789	0.1739	0.9050	0.0915	0.0077	0.0115	0.0431	-0.0012	0.1064	-0.0851
2003	1.0682	0.1635	0.9048	0.0858	0.0072	0.0111	0.0396	-0.0008	0.0992	-0.0787
2004	1.0573	0.1544	0.9028	0.0792	0.0061	0.0107	0.0384	-0.0037	0.1006	-0.0769
2005	1.0448	0.1485	0.8964	0.0728	0.0052	0.0101	0.0377	0.0006	0.1023	-0.0803
2006	1.0344	0.1439	0.8904	0.0678	0.0047	0.0097	0.0363	0.0018	0.1028	-0.0790
2007	1.0279	0.1404	0.8876	0.0648	0.0046	0.0093	0.0364	0.0004	0.1061	-0.0812
2008	1.0209	0.1387	0.8822	0.0623	0.0047	0.0095	0.0345	0.0017	0.1038	-0.0778
2009	1.0205	0.1366	0.8839	0.0657	0.0050	0.0103	0.0331	0.0047	0.0935	-0.0758
2010	1.0274	0.1443	0.8830	0.0682	0.0054	0.0114	0.0337	0.0022	0.1037	-0.0802
2011	1.0374	0.1548	0.8827	0.0714	0.0060	0.0130	0.0374	0.0057	0.1094	-0.0883
2012	1.0442	0.1641	0.8801	0.0758	0.0066	0.0147	0.0415	0.0026	0.1127	-0.0898
2013	1.0509	0.1688	0.8821	0.0790	0.0071	0.0157	0.0431	0.0009	0.1180	-0.0950
2014	1.0576	0.1706	0.8870	0.0793	0.0071	0.0166	0.0437	0.0009	0.1125	-0.0895
2015	1.0520	0.1659	0.8861	0.0717	0.0064	0.0156	0.0434	0.0005	0.1326	-0.1042
2016	1.0555	0.1644	0.8911	0.0726	0.0065	0.0163	0.0474	0.0005	0.1320	-0.1108
2017	1.0547	0.1649	0.8899	0.0692	0.0064	0.0162	0.0476	0.0010	0.1373	-0.1130
2018	1.0486	0.1649	0.8836	0.0670	0.0065	0.0161	0.0445	0.0007	0.1390	-0.1088
2019	1.0469	0.1637	0.8832	0.0648	0.0065	0.0162	0.0608	0.0011	0.1464	-0.1321
2020	1.0489	0.1751	0.8738	0.0651	0.0073	0.0174	0.0581	0.0041	0.1653	-0.1422
2021	1.0357	0.1772	0.8585	0.0585	0.0069	0.0166	0.0406	0.0012	0.1741	-0.1208
2022	1.0177	0.1812	0.8366	0.0534	0.0066	0.0156	0.0363	0.0020	0.1815	-0.1142
2023	1.0272	0.1678	0.8594	0.0581	0.0073	0.0170	0.0381	0.0038	0.1675	-0.1240
2024	1.0239	0.1661	0.8578	0.0587	0.0081	0.0163	0.0331	0.0015	0.1747	-0.1262

Table 3: Decomposition of cross-country GDP inequality: income side

Year	$CV(Y)$	CV^y	CV^n	$CV^{y,W}$	$CV^{y,\Pi}$
1990	1.1777	0.3675	0.8102	0.2123	0.1552
1991	1.1891	0.3652	0.8239	0.2154	0.1498
1992	1.2006	0.3620	0.8385	0.2160	0.1460
1993	1.1985	0.3564	0.8421	0.2118	0.1447
1994	1.1917	0.3423	0.8493	0.2003	0.1420
1995	1.1810	0.3206	0.8603	0.1913	0.1293
1996	1.1691	0.3036	0.8656	0.1793	0.1243
1997	1.1524	0.2822	0.8701	0.1665	0.1157
1998	1.1412	0.2682	0.8731	0.1569	0.1112
1999	1.1268	0.2499	0.8768	0.1471	0.1029
2000	1.1042	0.2335	0.8707	0.1334	0.1001
2001	1.0951	0.2213	0.8738	0.1303	0.0910
2002	1.0852	0.2069	0.8782	0.1252	0.0818
2003	1.0736	0.1956	0.8780	0.1166	0.0790
2004	1.0639	0.1859	0.8780	0.1077	0.0783
2005	1.0507	0.1801	0.8706	0.1012	0.0789
2006	1.0406	0.1759	0.8647	0.0959	0.0800
2007	1.0316	0.1706	0.8610	0.0938	0.0767
2008	1.0240	0.1675	0.8565	0.0936	0.0739
2009	1.0220	0.1643	0.8577	0.0992	0.0651
2010	1.0306	0.1724	0.8582	0.1001	0.0723
2011	1.0393	0.1811	0.8582	0.1060	0.0751
2012	1.0466	0.1905	0.8561	0.1120	0.0785
2013	1.0528	0.1938	0.8590	0.1151	0.0788
2014	1.0607	0.1957	0.8650	0.1154	0.0803
2015	1.0544	0.1909	0.8635	0.1033	0.0876
2016	1.0594	0.1886	0.8708	0.1044	0.0843
2017	1.0590	0.1884	0.8706	0.0992	0.0892
2018	1.0518	0.1895	0.8623	0.0943	0.0952
2019	1.0488	0.1875	0.8612	0.0920	0.0956
2020	1.0531	0.1972	0.8558	0.0910	0.1063
2021	1.0357	0.2010	0.8347	0.0799	0.1211
2022	1.0104	0.2041	0.8063	0.0686	0.1355

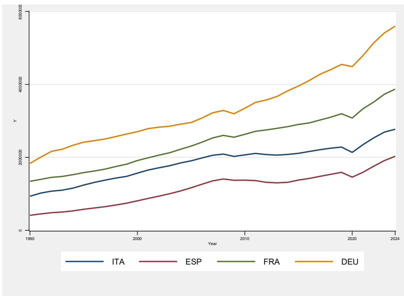
Table 4: Extension of the decomposition of cross-country GDP inequality: expenditure side

Year	$CV(Y)$	CV^p	CV^e	CV^n	$CV^{p,\text{AIC}}$	$CV^{p,\text{CGC}}$	$CV^{p,\text{GIC}}$	$CV^{p,\text{GFCF}}$	$CV^{p,\text{IN}}$	$CV^{p,X}$	$CV^{p,-IM}$
1990	1.1755	0.2480	0.0789	0.8486	0.1324	0.0165	0.0142	0.0747	0.0048	0.1087	-0.1034
1991	1.1841	0.2409	0.0821	0.8611	0.1316	0.0151	0.0148	0.0703	0.0005	0.1037	-0.0951
1992	1.1962	0.2402	0.0807	0.8753	0.1330	0.0153	0.0153	0.0638	0.0016	0.1046	-0.0934
1993	1.1926	0.2293	0.0830	0.8803	0.1271	0.0143	0.0151	0.0576	0.0018	0.0980	-0.0846
1994	1.1874	0.2216	0.0794	0.8864	0.1209	0.0139	0.0147	0.0558	0.0037	0.0933	-0.0808
1995	1.1765	0.2096	0.0742	0.8927	0.1152	0.0122	0.0145	0.0525	0.0028	0.0885	-0.0762
1996	1.1635	0.1980	0.0678	0.8978	0.1101	0.0116	0.0140	0.0463	0.0038	0.0862	-0.0740
1997	1.1466	0.1856	0.0616	0.8994	0.1032	0.0103	0.0130	0.0434	0.0011	0.0948	-0.0802
1998	1.1333	0.1805	0.0534	0.8994	0.0997	0.0096	0.0121	0.0427	0.0014	0.0925	-0.0776
1999	1.1201	0.1736	0.0449	0.9016	0.0946	0.0089	0.0115	0.0422	-0.0001	0.0937	-0.0773
2000	1.0997	0.1666	0.0385	0.8946	0.0867	0.0078	0.0107	0.0404	-0.0001	0.1039	-0.0827
2001	1.0896	0.1585	0.0348	0.8963	0.0818	0.0072	0.0102	0.0376	0.0015	0.1024	-0.0824
2002	1.0789	0.1495	0.0298	0.8996	0.0760	0.0066	0.0104	0.0359	-0.0009	0.1009	-0.0794
2003	1.0682	0.1432	0.0251	0.9000	0.0724	0.0063	0.0104	0.0336	-0.0004	0.0945	-0.0736
2004	1.0573	0.1350	0.0235	0.8988	0.0663	0.0053	0.0099	0.0327	-0.0027	0.0948	-0.0713
2005	1.0448	0.1289	0.0231	0.8929	0.0603	0.0045	0.0093	0.0319	0.0008	0.0952	-0.0733
2006	1.0344	0.1225	0.0248	0.8871	0.0554	0.0039	0.0087	0.0295	0.0016	0.0943	-0.0709
2007	1.0279	0.1175	0.0261	0.8843	0.0523	0.0037	0.0080	0.0296	0.0005	0.0945	-0.0711
2008	1.0209	0.1125	0.0284	0.8800	0.0484	0.0035	0.0080	0.0280	0.0015	0.0910	-0.0678
2009	1.0205	0.1036	0.0340	0.8829	0.0474	0.0033	0.0083	0.0258	0.0035	0.0795	-0.0642
2010	1.0274	0.1100	0.0363	0.8810	0.0494	0.0036	0.0092	0.0263	0.0015	0.0890	-0.0689
2011	1.0374	0.1094	0.0484	0.8796	0.0468	0.0037	0.0099	0.0272	0.0043	0.0889	-0.0714
2012	1.0442	0.1092	0.0588	0.8762	0.0459	0.0037	0.0105	0.0294	0.0020	0.0873	-0.0696
2013	1.0509	0.1076	0.0656	0.8777	0.0457	0.0037	0.0108	0.0296	0.0008	0.0869	-0.0700
2014	1.0576	0.1096	0.0664	0.8816	0.0458	0.0038	0.0117	0.0302	0.0010	0.0859	-0.0687
2015	1.0520	0.1114	0.0620	0.8785	0.0399	0.0032	0.0106	0.0313	0.0009	0.1139	-0.0884
2016	1.0555	0.1090	0.0627	0.8837	0.0411	0.0034	0.0112	0.0360	0.0008	0.1102	-0.0936
2017	1.0547	0.1147	0.0585	0.8815	0.0403	0.0035	0.0115	0.0368	0.0014	0.1180	-0.0969
2018	1.0486	0.1187	0.0542	0.8756	0.0403	0.0038	0.0116	0.0347	0.0008	0.1213	-0.0937
2019	1.0469	0.1192	0.0525	0.8753	0.0391	0.0039	0.0116	0.0539	0.0010	0.1299	-0.1201
2020	1.0489	0.1315	0.0528	0.8646	0.0385	0.0043	0.0124	0.0503	0.0031	0.1545	-0.1316
2021	1.0357	0.1387	0.0459	0.8511	0.0365	0.0043	0.0122	0.0326	0.0009	0.1611	-0.1090
2022	1.0177	0.1446	0.0431	0.8301	0.0346	0.0044	0.0117	0.0292	0.0019	0.1630	-0.1002
2023	1.0272	0.1298	0.0445	0.8529	0.0381	0.0049	0.0128	0.0304	0.0035	0.1486	-0.1086
2024	1.0239	0.1281	0.0444	0.8514	0.0386	0.0054	0.0122	0.0252	0.0011	0.1559	-0.1102

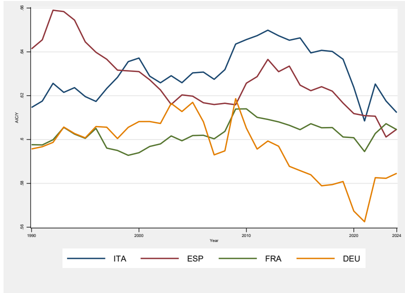
Table 5: Extension of the decomposition of cross-country GDP inequality: income side

Year	$CV(Y)$	CV^p	CV^e	CV^n	$CV^{p,W}$	$CV^{p,\Pi}$
1990	1.1777	0.2820	0.0834	0.8124	0.1646	0.1174
1991	1.1891	0.2770	0.0871	0.8250	0.1653	0.1118
1992	1.2006	0.2757	0.0853	0.8396	0.1668	0.1088
1993	1.1985	0.2666	0.0881	0.8438	0.1610	0.1056
1994	1.1917	0.2570	0.0843	0.8503	0.1530	0.1041
1995	1.1810	0.2431	0.0784	0.8595	0.1460	0.0971
1996	1.1691	0.2325	0.0719	0.8647	0.1379	0.0946
1997	1.1524	0.2179	0.0656	0.8689	0.1290	0.0889
1998	1.1412	0.2147	0.0577	0.8689	0.1252	0.0895
1999	1.1268	0.2058	0.0483	0.8726	0.1202	0.0856
2000	1.1042	0.1960	0.0413	0.8669	0.1109	0.0851
2001	1.0951	0.1878	0.0375	0.8698	0.1091	0.0786
2002	1.0852	0.1783	0.0324	0.8745	0.1056	0.0726
2003	1.0736	0.1708	0.0279	0.8749	0.0996	0.0712
2004	1.0639	0.1623	0.0263	0.8754	0.0921	0.0702
2005	1.0507	0.1566	0.0260	0.8682	0.0861	0.0705
2006	1.0406	0.1508	0.0277	0.8621	0.0806	0.0701
2007	1.0316	0.1445	0.0288	0.8583	0.0784	0.0661
2008	1.0240	0.1379	0.0310	0.8551	0.0770	0.0609
2009	1.0220	0.1270	0.0370	0.8580	0.0775	0.0495
2010	1.0306	0.1346	0.0390	0.8571	0.0783	0.0563
2011	1.0393	0.1322	0.0508	0.8564	0.0770	0.0552
2012	1.0466	0.1319	0.0615	0.8532	0.0774	0.0545
2013	1.0528	0.1292	0.0681	0.8555	0.0767	0.0525
2014	1.0607	0.1318	0.0686	0.8604	0.0765	0.0552
2015	1.0544	0.1348	0.0635	0.8561	0.0651	0.0698
2016	1.0594	0.1315	0.0641	0.8638	0.0665	0.0651
2017	1.0590	0.1366	0.0600	0.8624	0.0642	0.0724
2018	1.0518	0.1423	0.0553	0.8543	0.0625	0.0798
2019	1.0488	0.1421	0.0536	0.8531	0.0615	0.0806
2020	1.0531	0.1525	0.0543	0.8463	0.0597	0.0928
2021	1.0357	0.1614	0.0468	0.8275	0.0557	0.1056
2022	1.0104	0.1674	0.0427	0.8003	0.0500	0.1174

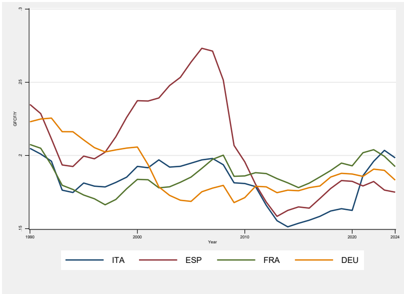
Figure 2: Variables' dynamics



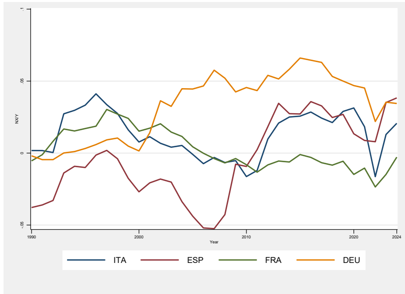
(a) GDP - Y



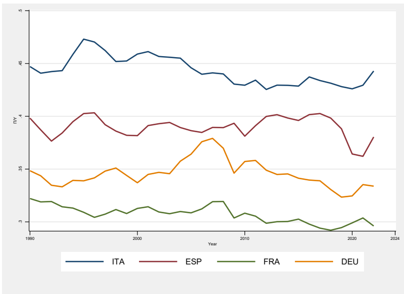
(b) Private Consumption (%) - AIC/Y



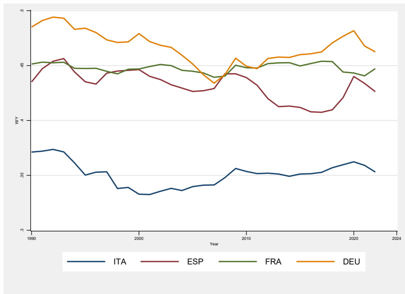
(c) Investment (%) - In/Y



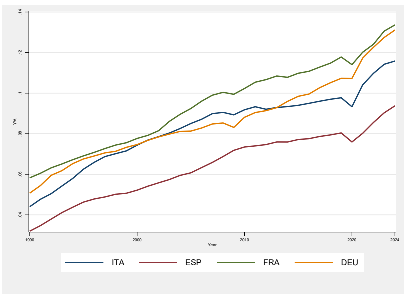
(d) Net Exports (%) - NX/Y



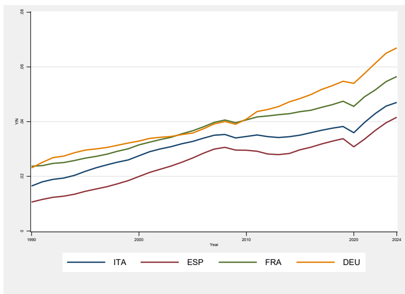
(e) Profits (%) - Π/Y



(f) Salaries (%) - W/Y



(g) Employment - E



(h) Population - N