Trade Ties and Economic Divides: Trade and Income Inequality in the Regions of Europe

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Abstract: This paper analyses how trade influences intra-regional income inequality across Europe's NUTS-2 regions. Drawing on newly compiled datasets capturing both inter-regional trade and local-level inequality for all EU member states plus the UK, we employ an econometric framework — complete with Instrumental Variable estimations and robust sensitivity analyses— to gauge the impact of trade on regional interpersonal inequality. In addition to examining aggregate trade, we distinguish between various trade channels, including exchanges within the EU versus those with the rest of the world, links to neighbouring regions versus non-neighbours, and domestic versus international flows. Our findings reveal that higher levels of trade are positively associated with changes in regional income inequality, as measured by the Gini coefficient. Crucially, this link depends on trading partners: trade within a single country, within the EU, and with non-neighbouring regions correlates with rising inequality, whereas international trade, trade with non-EU partners, or trade with neighbouring regions shows no statistically significant effect. These conclusions withstand a battery of robustness checks, including new control variables and a population-weighted approach, further underscoring the role that particular types of trade play in shaping regional income disparities.

Keywords: Trade, interpersonal inequality, regions, Europe

JEL Codes: D63, F14, R13

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1 Introduction

In the last few decades, trade has powered globalisation at a remarkable pace, profoundly affecting a wide spectrum of social and economic domains. By 2007, global trade volumes had doubled from 1997, multiplied sixfold since 1972, and stood at a staggering 32 times their 1950 levels (Federico and Tena-Junguito, 2017). This far-reaching impact has reverberated across countless areas, reshaping how economies operate and how societies function. Trade's breadth has accelerated economic growth and development while also influencing social and cultural exchanges (Frankel and Romer, 1999; Acheson and Maule, 2006; Coyne and Williamson, 2009).

Yet trade's influence does not stop at economic transactions. Its expansion has been a catalyst for technological progress, cultural transformations, and the rapid spread of ideas (Ben-David and Loewy, 1998; Salomon and Shaver, 2005; Acheson and Maule, 2006; Suranovic et al., 2005). Regions that engage actively in trading networks often enjoy faster growth, reduced poverty, and heightened macroeconomic productivity (Frankel and Romer, 1999; Dollar and Kraay, 2004; Durlauf et al., 2005). Even so, global integration brings its own set of complications, including possible upheaval for particular locations or industries.

Against this backdrop, the world has also witnessed a marked surge in both inter- and intra-regional inequalities (Rodríguez-Pose, 2012; Lindley and Machin, 2014; Lee et al., 2016; Terzidis et al., 2017; Iammarino et al., 2019; Feldman et al., 2021). These gaps manifest in incomes, resources, and opportunities alike, with significant social and political repercussions. Studies repeatedly link higher levels of inequality to poorer health, reduced social cohesion, spikes in crime, and even heightened risks of conflict (Sen, 1997; Frank, 2007; Wilkinson and Pickett, 2009; Dorling, 2015).

But how closely are these two developments —rising trade and greater inequality— intertwined? Do expanded trade flows truly move the needle on intra-regional income disparities? Although multiple factors underlie inequality, globalisation, and trade in particular, are frequently cited as major drivers of interpersonal polarisation (Faber, 2007; Dreher and Gaston, 2008; Iammarino et al., 2019; Heimberger, 2019). A growing body of literature, including key studies by Autor et al. (2013) on the 'China syndrome', highlights how participating in trade can disrupt regional labour markets, eroding the fortunes of middle-income earners in advanced economies. Yet the forces behind trade's influence on income distribution are far from straightforward. On one side, trade may spark economic growth, job creation, and wider consumer choice, possibly easing poverty and inequality. On the other, it can displace employment in certain sectors, depress wages, and enlarge the gulf between skilled and unskilled workers, thereby exacerbating inequality.

Whether trade naturally precipitates higher inequality remains contentious, especially at subnational scales. Much research has examined inequality in a cross-country context (Hirte et al., 2020; Dorn et al., 2018; Roser and Cuaresma, 2016; Dreher and Gaston, 2008), looked into single-country evidence (Barusman and Barusman, 2017; Silva and Leichenko, 2004), or probed how international trade affects territorial disparities within countries (Rodríguez-Pose, 2012; Rodríguez-Pose and Gill, 2006). However, on-the-ground insights into subnational, intra-regional inequality — particularly within Europe— remain scarce, largely because data have been difficult to obtain. Filling this gap is crucial, given the potentially harmful social and economic consequences of income polarisation at the local level.

This paper tackles that challenge by exploring the interplay between trade and interpersonal inequality across European regions.[1] Specifically, we examine whether domestic trade, EU-based trade, or trade with neighbouring or non-neighbouring regions contributes to changing income distributions at the NUTS-2 (Nomenclature of Territorial Units for Statistics) level. Despite widespread interest in globalisation and inequality, questions persist as to how precisely trade drives subnational inequality in Europe. Understanding these dynamics is vital for policymakers eager to anticipate negative fallout for regions that may bear the brunt of global competition.

In this study, we shed light on which dimensions of trade most affect intra-regional inequality in Europe; a salient question, given that inter-regional trade in the EU predominantly occurs within national borders rather than beyond them. Much existing literature has zeroed in on cross-border flows, often to the neglect of trade within the EU or within countries themselves. To address this shortcoming, we employ two innovative datasets: the inter-regional trade flow information from Thissen et al. (2019) for 2013, and Gini coefficient data drawn from the European Union Statistics on Income and Living Conditions (EU-SILC) and the Luxembourg Income Study (LIS).

Our results indicate a clear, positive link between trade and regional income inequality, contingent on the trading partner in question. Trade within the EU, within individual countries, and with non-neighbouring regions correlates with higher intra-regional inequality. By contrast, neither international trade nor trade with neighbouring regions exerts a significant impact. These findings are reinforced by Instrumental Variable (IV) methods and a series of robustness checks, which collectively demonstrate that certain forms of trade have more pronounced distributional consequences than others.

[1] Throughout the paper we refer to Europe as regions in the current 27 member states of the European Union (EU) plus the UK. For analytical purposes, when we talk of trade within the EU or with the rest of the world, we consider the UK as a member of the EU, which was the case in 2013, when the trade data is calculated.

The paper is organised as follows. We first survey the relevant literature, outlining the conceptual underpinnings of trade's relationship with local inequality. Next, we detail our data sources and measurement strategies for trade and income inequality, before offering descriptive statistics and the framework for our baseline estimation. In the concluding sections, we discuss the core findings and consider their implications for both research and policy, highlighting ways in which targeted measures might mitigate the most detrimental effects of globalised trade on Europe's diverse regions.

2 Does Trade Shape Regional Inequality?

2.1 Understanding the Impact of Trade

Free trade generally drives income growth (Frankel and Romer, 1999). The more a place trades, the greater its potential for economic growth. Yet the intensity and distribution of trade vary enormously from one territory to another. Factors such as geographical proximity are of essence for forging trade relationships. Trading with nearby partners helps reduce transportation costs, making goods more competitively priced. Indeed, numerous studies demonstrate that trade frequently flourishes between countries sharing borders or strong cultural linkages (Anderson and Van Wincoop, 2004; Disdier and Head, 2008; Klasing, 2013). Cultural affinity —encompassing shared norms and values— significantly influences decisions to embark on trade (Tadesse and White, 2010), fostering trust and lowering perceived risks. In much the same way, a well-aligned institutional framework is vital to bilateral trade (De Groot et al., 2004; Alvarez et al., 2018). Accordingly, trade often thrives in areas where institutions are similar (e.g. the same country or within blocs such as the EU). Such environments entail lower institutional risks, established firm networks, and —thanks to processes of economic integration like in the EU— fewer trade barriers.

Because of these factors, a considerable portion of trade tends to remain within national or EU boundaries, alongside investment in tradable goods and services. Yet while these types of trade may owe much to institutional similarity, proximity, and lower trade costs, the regions involved often differ starkly in economic structure and skill sets. Consequently, certain industries in these regions expand, driven by shifting demand. In turn, this expansion is likely to influence the division of labour, the distribution of skills, and ultimately, income levels. Since trade is frequently linked to heightened inequality, we might expect a positive correlation between intra-national or EU-based trade and regional shifts in inequality.

Neoclassical trade theory underscores how regions exploit comparative advantage. The concept, first set out by Ricardo (1891), posits that regions specialise in producing goods for which they have the greatest efficiency. In advanced economies, this generally raises demand for skilled labour at the

expense of unskilled workers, whereas the reverse pattern often emerges in developing nations. Provided other factors remain unchanged, a rising demand for skilled labour naturally leads to higher wages for those workers. Consequently, trade liberalisation tends to elevate the skill premium (Burstein and Vogel, 2017). By contrast, falling demand for the less skilled can result in lower wages and spark major shifts in local employment. Hence, the impact of trade remains multifaceted, hinging on one's trading partners, the nature of required skills, and the scope of specialisation-driven workforce realignment. Certain sectors expand; others contract—potentially deepening inequality (Duranton, 1999).

However, it is not solely neoclassical trade theory that anticipates labour market upheaval following trade integration. From the New Economic Geography perspective, trade may also widen regional inequality. Krugman (1991) theorises that producers gravitate toward places with substantial demand, seeking to cut transport costs and exploit economies of scale. This behaviour produces clusters of economic activity in cities or regions with stronger conditions, often leaving peripheral areas comparatively untouched. These clusters, typically centred around tradable goods and services, enhance total factor productivity and industry-specific growth while certain other industries languish.

Such clustering exerts distinct effects on income distributions within regions, as dynamic economic hubs frequently arise in large agglomerations that enjoy positive externalities and attract a high-skilled workforce. Yet it is crucial to distinguish between regions specialising in high-end, innovative manufacturing and those reliant on more routine forms of production. Wealthier places often secure innovative manufacturing and service expansions, whereas routine manufacturing has been prone to job losses and competitiveness challenges (Iammarino et al., 2019). Therefore, assessing manufacturing in aggregate may mask critical discrepancies between routine and high-end industries. A more revealing yardstick is to view innovation itself as a proxy for agglomeration economies. Innovation tends to cluster geographically, generating hubs of ideas and technology (Moretti, 2012). Moreover, technology amplifies this process by both fuelling and reinforcing the spatial concentration of economic pursuits. By examining factors such as professional services, population trends, and innovative activities, one gains a clearer picture of these clusters, suggesting that regions with such attributes commonly display higher income inequalities.

2.2 Trade and Regional Income Inequality

The relationship between trade and income distribution has long stood at the forefront of academic enquiry. In recent years, this interest has only intensified, spurred by mounting evidence of trade's

impact on labour markets (Autor et al., 2013). Early work by Stolper and Samuelson (1941) drew particular attention to how international trade, while often beneficial on the whole, can prove detrimental to certain groups of workers. Specifically, when advanced regions trade with less developed areas, the resulting rise in demand for skilled labour in wealthier regions typically comes at the expense of less skilled workers, who may find their wages stagnating or their jobs at risk.

During the current wave of economic globalisation, which took shape from the 1970s onwards, research conducted through the 1980s and 1990s indicated that trade exerted only a modest effect on the labour markets of high-income countries (Krugman, 2008). This initial consensus held that the surge in inequality was more a product of skill-biased technological change than of global economic integration (Katz et al., 1999; Feenstra and Hanson, 1999). However, views have since shifted. A growing body of evidence highlights how expanding trade, particularly led by newly emerging powerhouses such as China, has negatively affected wages and job prospects for blue-collar employees in developed economies. In their analysis of the so-called "China syndrome", Autor et al. (2013) demonstrated that trade with locations enjoying a marked comparative advantage — especially in terms of production costs— can undercut middle-class employment in advanced nations. This revised understanding has reignited scholarly interest in the subtleties of economic globalisation and its implications for inequality. Research now extends to diverse geographies, including the United States (Pierce and Schott, 2016; Feenstra and Sasahara, 2018), Germany (Dauth et al., 2014; Simon, 2018), Portugal (Branstetter et al., 2019), Norway (Balsvik et al., 2015), Europe more broadly (Barth et al., 2020), and Eastern Europe (Albers, 2018).

The notion of a skill-biased and routine-biased framework offers a potential explanation for shifts in interpersonal inequalities. Evidence shows that, in many developed nations, trade tends to favour skilled workers (Burstein and Vogel, 2017). Yet such a skill-based perspective alone cannot account for surging demand for low-skilled workers in certain sectors, nor does it fully explain the loss of mid-level, often office-based roles. Indeed, multiple European countries have documented a "hollowing out" of jobs lying squarely in the middle of the skill distribution (Goos et al., 2009). To clarify this phenomenon, the routine-biased technological change hypothesis (Autor et al., 2003) posits that both technological innovation and trade selectively displace manual or routine tasks, which often fall into that mid-skill bracket (Goos et al., 2009). As a consequence, workers once employed in these occupations may see their wages decline, or may need to retrain, relocate, or accept lower-paying positions (Autor et al., 2013; Goos et al., 2009). The severity of trade's effect on interpersonal income inequality in a region thus depends on how enduring these wage reductions are and how readily these displaced workers can move into new areas of employment.

Meanwhile, a range of additional mechanisms also shape how trade interacts with inequality. In the United States, for instance, exporting activities and foreign direct investment have come under scrutiny for amplifying top-end incomes —particularly those of executives— and thereby driving up overall inequality (Keller and Olney, 2021). The flip side, importing, can also affect wage distribution. A study in Ecuador by Adao et al. (2022) demonstrated that the gains from importing are often most pronounced at higher rungs of the income ladder. Changes in factor taxation, brought about by tighter economic integration, may play a further role in widening inequalities. Bachas et al. (2022) note that since the 1960s, numerous high-income countries have steadily moved towards higher taxation of labour and lower taxation of capital, in part reflecting competition over mobile factors in a globalised environment.

A further contributing factor to wage inequality is the disparity in pay across different firms. Criscuolo et al. (2020) examined wage inequality across 14 OECD nations, finding that half of the observed rise derived from changes in average wages paid by firms, with two-thirds of that variance linked to productivity gains. Such productivity differentials are themselves often entwined with trade, since exporting firms tend to be more productive —and thus better able to pay higher salaries— than non-exporting counterparts (Melitz, 2003; Bernard et al., 2007).

All told, trade can boost regional income inequality through several channels operating in tandem. First, there is the classic neoclassical theory channel: import competition from less developed regions exerts downward pressure on wages and job security for lower-skilled workers in advanced countries (Rigby and Breau, 2008; Breau and Rigby, 2010). Second, there is the erosion of mid-skill jobs through outsourcing and the displacement of routine tasks. Third, specialisation in capital-intensive production may inflate skill premiums, benefiting workers at the higher end of the wage spectrum. Fourth, agglomeration effects —especially in innovative, high-tech industries— can further entrench wage differences if particularly productive firms cluster in certain regions.

While the bulk of empirical work in this area has employed entire countries or their populations as units of analysis, there is an expanding interest in how economic globalisation, including trade, can affect inequality below the national level. Many scholars have taken a global vantage, investigating cross-national trends and implications (Roser and Cuaresma, 2016; Dorn et al., 2018; Hirte et al., 2020). A large-scale meta-analysis by Heimberger (2019) points to economic globalisation leading to a rise —albeit not a monumental one— in income inequality. In so doing, it illustrates the complexity of trade's effects on income distribution, with outcomes shaped by everything from national policies to local industrial structures. Taken together, these strands of research underscore the many ways in

which trade can —and often does— influences regional inequalities, demanding careful consideration in policy design and economic analysis alike.

2.3 The Missing Factor: Types of Trade & the Regional Perspective

The primary aim of this study is to identify precisely which types of trade exert the most decisive influence on changes in intra-regional income inequality and, just as crucially, by how much. Our findings reveal new evidence that the observed positive correlation between shifts in regional inequality and trade levels is overwhelmingly driven by national trade, intra-EU trade, and trade with non-neighbouring regions. Previous investigations of regional inequality at the country level have generally concentrated on the international dimension of economic globalisation, leaving unanswered questions about other forms of exchange. This is particularly the case of exchanges that occur entirely within national frontiers. By drawing upon data that were previously unavailable, this research offers fresh insights into how various strands of trade can differently shape intra-regional disparities.

We selected our trade categories —national, international, EU-based, neighbouring, and non-neighbouring— on account of their shared foundations in geographical proximity, cultural affinity, and institutional structures. Trading with regions that are physically close or institutionally akin often entails lower costs, though disparate economic profiles can lead to pronounced specialisation and labour market shifts. In contrast, dealings with more distant areas beyond the EU —or with the rest of the world— face higher trade frictions but can also reshape regional industries. By separating national and international exchanges, we capture the role played by cultural affinity in facilitating trust, further influencing both the frequency and impact of trade. Ultimately, we posit that the forms of trade accounting for the lion's share of activity —whether due to proximity, institutional fit, or sheer volume— are most likely to alter regional income distributions.

Research into the subnational interplay between trade and interpersonal inequality has often been hindered by a shortage of detailed data on inter-regional flows —especially those taking place within a single country— and on granular measures of local inequality. Our analysis seeks to close this gap, investigating trade's effect on income disparities at the European regional scale. Indeed, while recent inquiries have delved into the broader contours of globalisation, they have typically overlooked how different forms of trade might specifically affect local inequality. As our data confirm, the bulk of observed trade happens within national borders or across EU regions, rather than with distant markets. This underlines both the necessity and the timeliness of a regional lens.

Until now, European research on this topic has been conspicuously limited. Gregory et al. (2022) provide a pioneering examination of regional employment impacts, albeit measuring trade only indirectly and focusing on routine-biased technological change. By contrast, our study marks the first direct assessment of how different forms of trade influence regional income inequality at the NUTS-2 level throughout Europe —an undertaking made possible by newly available datasets on trade and inequality.

As such, this work not only addresses a key gap in the academic literature but also lays the groundwork for evidence-based policymaking in this domain. By probing the nuances of trade types and their region-by-region repercussions, it sheds light on the intricate relationship between trade and income inequality— a relationship of growing relevance for European economies and beyond.

3 Data

The analysis uses a novel dataset covering inter-regional trade flows among 267 European regions at the NUTS-2 level. 2013 is our reference year for trade. The dataset spans the then 28 member states of the EU, offering a fine-grained view of both goods and services traded, not only across national borders but also within individual countries. Compiled by Thissen et al. (2019), the data distinguish between intermediate and final goods, as well as services, based on input–output tables enriched with freight transport, airline, and business travel information. Such detail at the NUTS-2 scale permits an in-depth understanding of how regions engage in trade, whether adjacent or geographically distant, including exchanges that stay within a single nation. We present these trade flows in their absolute values, then normalise them by each region's population to generate our primary variable, trade per capita.

To capture income inequality across these regions, we draw on two core datasets: the European Union Statistics on Income and Living Conditions (EU-SILC) and the Luxembourg Income Study (LIS). Our focus is on post-tax disposable labour income per individual, excluding capital income. Constructing this measure begins by calculating pre-tax factor income —spanning employee cash earnings, self-employment income, and private pensions— before adding unemployment benefits and public pensions, allocated via the OECD equivalence scale. We then subtract taxes and contributions (including cash transfers or wealth taxes) and incorporate other social benefits (such as housing subsidies or family allowances). The result is a disposable income figure that reflects the resources households actually wield after accounting for taxes and benefits, including pensions and unemployment assistance. In our assessment, disposable income better illustrates households' true purchasing power than pre-tax income does, given its coverage of redistribution.

We employ the Gini coefficient to measure and compare income inequality within each region, examining a five-year span from 2013 to 2018. This lets us evaluate whether local income distributions have become more polarised over that period. The Gini coefficient, widely recognised in scholarly literature, condenses the entire income distribution into a single statistic, aiding cross-regional and cross-temporal comparisons. Still, it has certain drawbacks. For instance, it may remain static even as contrary redistributive forces operate in different income tiers, and it frequently places greater emphasis on the middle rather than extremes (Sen, 1997). In addition, relying on EU-SILC survey data can mean underrepresenting the highest earners (Törmälehto, 2017; Ravallion, 2022). We also note that our dataset does not include capital income, which in many cases constitutes a significant revenue source for households.

In scenarios where EU-SILC data are absent or restricted to the NUTS-1 scale (as is true in Germany, Austria, and Spain), we supplement them with LIS-based Gini coefficients. Because trade and inequality data derive from different points in time, we reconcile them under the NUTS 2013 classification. Any region with boundaries that changed over 2013–2016 is excluded due to a lack of direct comparability. Similarly, we must omit the Netherlands and Portugal, as neither EU-SILC nor LIS provides the necessary regional-level inequality details.

Overall, this setup merges a detailed mapping of trade patterns with a representative measure of income distributions. By examining flows of goods and services alongside post-tax household incomes, we build a robust framework for understanding how trade shapes regional inequality across a diverse and evolving European landscape.

4 Descriptive Evidence

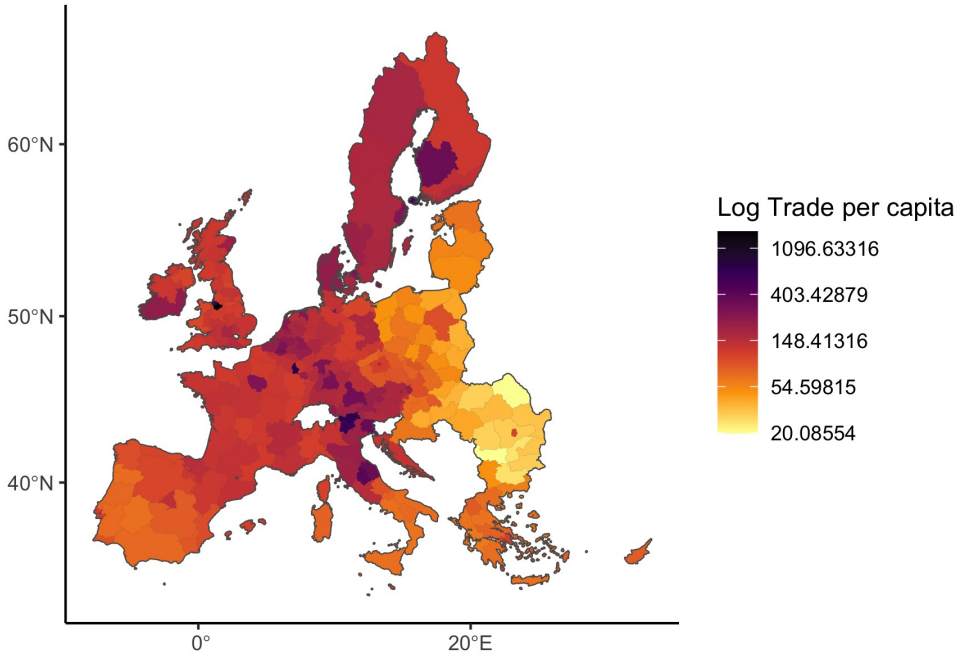
4.1 Geographical Distribution: Trade

Figure 1 offers a visual overview of trade per capita (on a log scale) in 2013 for each NUTS-2 region. We calculate trade per capita by dividing the total value of a region's imports plus exports by its population. Taking the logarithm of this ratio helps address the skewness typically found in trade data, lending a distribution closer to normal and enabling more meaningful comparisons of trade intensity relative to population size.

A clear geographic pattern emerges in Figure 1. Certain regions —particularly in the Benelux, France, Germany, Austria, the United Kingdom, Ireland, and the Nordic trio (Denmark, Finland, Sweden)— display higher trade per capita. Such prominence can stem from strategic locations, robust industrial output, or policy frameworks conducive to external engagement. In contrast, the

log-transformed values in regions such as Romania and Bulgaria are notably lower, likely reflecting factors such as less economic development, weaker infrastructure, or institutional challenges that limit global and inter-regional trade opportunities.

Figure 1: Log trade per capita, NUTS-2 regions, 2013



4.1.1 Types of Trade

In exploring these flows further, we divide trade into three overarching categories, each composed of two distinct types:

1. (**a**) Trade within the EU vs. (**b**) trade with the rest of the world;
2. (**c**) Trade with neighbouring regions vs. (**d**) trade with non-neighbouring regions;
3. (**e**) National (domestic) trade vs. (**f**) international trade.

The first category distinguishes internal EU trade (for 266 regions prior to 2013) from exchanges with countries outside the Union, including Croatia (where data are only available at the national level). As shown by Figure A.1 in the appendix, roughly 96% of total trade occurs within the EU, emphasising its highly integrated single market. In contrast, Figure A.2 indicates that only about 4% happens with the rest of the world, implying that non-EU connections remain comparatively smaller.

Second, we examine whether regions trade with immediate neighbours —defined by shared borders— or with non-neighbouring areas. On average, an EU region counts around 4.5 neighbours.

Despite the potential advantages of proximity and cultural likeness, our data (Figure A.3) suggests that only around 6% of total trade is with these adjacent regions, pointing to more complex drivers than simple geographic closeness. The remaining 94% (Figure A.4) is directed toward non-neighbouring regions, highlighting the scope of more expansive networks that cross multiple frontiers and often override distance-related constraints (Fitjar and Rodríguez-Pose, 2017).

Finally, we differentiate trade within a single country (national) from trade that crosses national borders (international). This distinction proves revealing, given the historical lack of subnational data capturing domestic versus international trade flows in Europe. A significant share of trade takes place inside one's own country, thanks to lower transport costs, cultural commonality, and harmonised regulatory environments (Figure A.5 in the appendix). Internal exchanges usually dominate regional trade portfolios. Conversely, cross-border trade, even within the EU, accounts for a smaller slice (Figure A.6)—a reminder that national frontiers, despite the Union's single market, still carry logistical, administrative, or cultural hurdles.[2]

4.2 Geographical Distribution: Intra-Regional Income Inequality

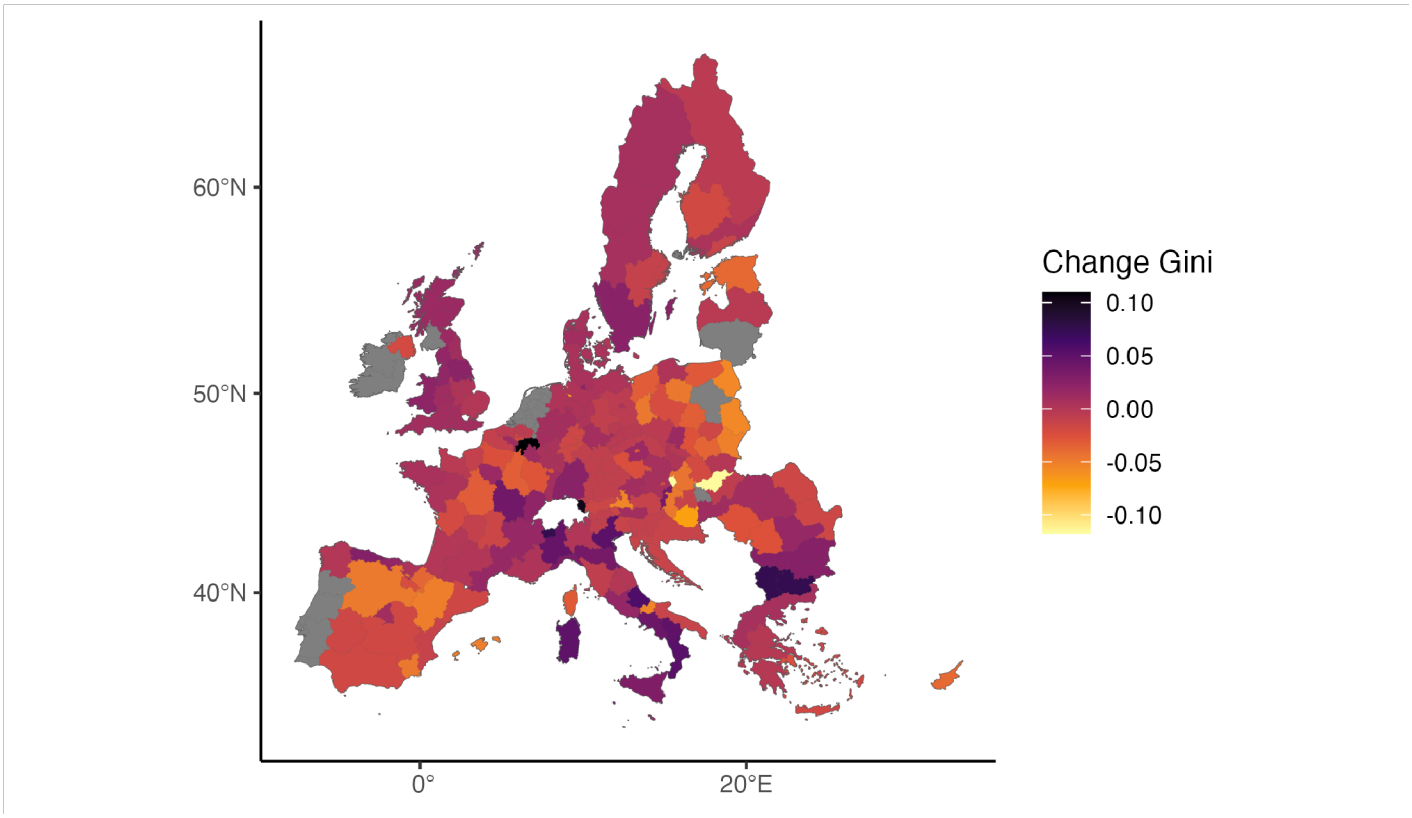
Figure 2 presents the change in intra-regional income inequality, measured via the Gini coefficient, from 2013 to 2018. This draws primarily on EU-SILC data but incorporates figures from the Luxembourg Income Study (LIS) for countries like Germany, Austria, and Spain, where subnational detail is otherwise unavailable. In cases where either 2013 or 2018 data are missing, we substitute the nearest available year to maintain coverage and comparability.[3]

The map in Figure 2 depicts a blend of rising and falling Gini coefficients across Europe. Regions in Italy, the United Kingdom, France, Estonia, and Latvia stand out for having seen notable spikes in inequality, as shown by significant increases in the Gini. In contrast, several regions in Poland, Slovakia, Hungary, and Greece post declines, suggesting that disparities in these locales may have eased somewhat over the period. Our analysis encompasses every region that meets two conditions: a) it has accessible data on regional inequality (excluding Portugal and the Netherlands), and (b) its boundaries remain comparable between 2013 and 2016, as discussed earlier in Section 3.1.

[2] More information on the data can be found in the summary statistics table (Table A.2) as well as in the correlation matrix (Table A.3)

[3] More information in the Appendix, in Section A.1

Figure 2: Change in Gini coefficient, 2013-2018



EU-SILC and LIS data

5 Methodology

The aim of the empirical analysis is to estimate how trade relates to changes in intra-regional income inequality. To do so, we use ordinary least squares (OLS) regressions, guided by the following equation:

$$\Delta Gini_{i,(t+5)-t} = \beta trade_{i,t} + \gamma X_{i,t} + \varepsilon_i \quad (1)$$

Here, $\Delta Gini$ denotes the change in the Gini coefficient for region i between 2013 and 2018; *trade* corresponds to inter-regional trade flows (per capita) in 2013; and X is a collection of control variables measured at the period's outset. Since no time-series data exist for regional trade, we assume trade patterns remain reasonably stable throughout the interval. Because trade values are highly skewed, we use a logarithmic scale for the trade variable. The control variables reflect established theoretical and empirical work. For instance, GDP per capita is included on the understanding (following Stolper and Samuelson, 1941) that the effect of trade on inequality may hinge on a region's development level. We also control for each region's inequality level in 2014, on the premise that those starting with higher inequality might experience greater subsequent shifts. In addition, we include population density —drawing on the New Economic Geography and urban

economics arguments (Fujita et al., 2001)— to capture the idea that more densely populated regions tend to engage in denser trade networks, potentially magnifying inequality changes. Finally, we account for educational composition (via tertiary education share) and industrial structure, mindful that trade can restructure employment and hence inequality (Autor et al., 2013).

Moreover, we examine how different types of trade specifically affect inequality by splitting out the trade variables:

$$\Delta Gini_{i,(t+5)-t} = \beta typetrade_{i,t} + \gamma X_{i,t} + \varepsilon_i \quad (2)$$

Here, *typetrade* refers to six categories of trade: national, international, trade with neighbouring regions, trade with non-neighbouring regions, trade within the EU, and trade with the rest of the world. All are normalised by population and logged (with a small value added where trade is zero). The core hypothesis is that a region's trade composition can have a tangible impact on its income distribution. Following Duranton (1999), we anticipate stronger inequality effects when a region's trade volumes in certain categories —particularly those that require marked specialisation— climb high enough to reshape local labour markets. As shown in Section 4.1.1, most trade occurs inside the EU, within national boundaries, and with non-neighbouring regions, suggesting those realms may exert the greatest influence on intra-regional inequality.

Notably, we do not explicitly address potential endogeneity from reverse causation, whereby shifts in inequality might themselves provoke changes in trade policy or behaviour. In some earlier studies, such as Autor et al. (2013), Hirte et al. (2020), and Ezcurra and Del Villar (2021), researchers have used an instrumental-variable (IV) strategy to tackle these concerns. We follow suit by adopting historical literacy rates from 1880 (e.g., Tabellini, 2010; Rodríguez-Pose and Di Cataldo, 2015) as an instrument. For this proxy to be valid, it must be correlated with trade yet not directly linked to modern-day inequality. While we test for relevance (via the F-statistic) and find it meets the threshold in certain specifications, we cannot definitively confirm exogeneity. Rather, this IV method is used to probe the robustness of our results, not to decree an unequivocally causal relationship.

Our broader objective is to elucidate the association between trade and changing levels of inequality at the regional scale, rather than to assert a strict causal nexus. We deploy a range of controls, grounded in theory and empirical precedent, to minimise omitted-variable bias; however, as our approach is cross-sectional, some hidden confounders may remain. Accordingly, we capture correlations rather than definitive causation, focusing on how robustly trade tracks with, and potentially shapes, intra-regional income disparities.

6 Estimation Results

6.1 Overall Effect

In Table 1, we explore our central research question: how does overall trade affect regional income inequality? Practically, this involves regressing the change in the Gini coefficient on trade per capita (in logarithmic form, due to the skewed distribution of trade data). Model 1 initially incorporates only the trade variable, while subsequent models add further control variables step by step.

Table 1: Statistical models for overall trade.

	(1)	(2)	(3)	(4)
Log(trade pc)	0.0056*	0.0084**	0.0137**	0.0129**
	(0.0032)	(0.0033)	(0.0053)	(0.0051)
Gini		0.1275**	0.1427**	0.1253
		(0.0607)	(0.0690)	(0.0755)
Log(GDP pc)			-0.0088	-0.0186*
			(0.0121)	(0.0101)
Log(pop density)			0.0004	-0.0010
			(0.0016)	(0.0019)
Pop tert educ			-0.0097	
			(0.0212)	
Emp prof services				0.2361**
				(0.1061)
Emp ind				0.0311
				(0.0317)
R^2	0.0153	0.0394	0.0470	0.0629
F-Statistic	3.049	4.107	2.428	3.082
Num. obs.	242	242	241	240
RMSE	0.0284	0.0281	0.0282	0.0281
VIF	1.00	1.16	2.69	2.77

***p < 0.01; **p < 0.05; *p < 0.1, SE clustered at the regional level.

All specifications yield a consistent and significant positive relationship between trade and income inequality. In essence, European regions with higher levels of trade per capita see greater increases in their Gini coefficients. One explanation could be that trade introduces sectoral realignments and labour market shifts, hitting some demographic groups harder than others. We also find that initial inequality correlates positively with subsequent rises, hinting that already unequal regions may experience a compounding effect. Meanwhile, GDP per capita displays a negative link

with changes in inequality, suggesting that more affluent areas —perhaps due to stronger safety nets or greater economic diversification— tend to see smaller distributional shifts. This resonates with the Kuznets curve hypothesis, positing an inverted-U path for inequality as economies mature. Lastly, employment in professional, scientific, and technical fields appears positively tied to inequality changes, conceivably reflecting the rising demand for specialised skills and the resultant wage premiums in those sectors.

6.2 National and International Trade

We next ask whether it matters if a region's trade occurs predominantly within national borders or beyond them. To this end, we compute per capita trade figures for national and international transactions and regress these against changes in the Gini coefficient (Table 2). Models 1 and 3 exclude control variables, whereas Models 2 and 4 include the same controls as in Model 4 of Table 1.

Table 2: Statistical models for national and international trade.

	(1)	(2)	(3)	(4)
Log(national trade pc)	0.006**	0.015**		
	(0.003)	(0.006)		
Log(international trade pc)			-0.001	-0.003
			(0.002)	(0.003)
Controls	N	Y	N	Y
R^2	0.021	0.072	0.000	0.047
F-Statistic	4.016	3.081	0.09881	2.539
Num. obs.	241	240	241	240
RMSE	0.028	0.028	0.029	0.028
VIF	1.00	2.71	1.00	2.21

***p < 0.01; **p < 0.05; *p < 0.1, SE clustered at the regional level. Controls include GDP pc, the level of inequality, population density, scientific employment and industry employment.

The findings show that domestic trade within a country significantly increases regional income inequality. One possible interpretation is that internal markets do not benefit all regions equally. Some might leverage domestic commerce more effectively, thanks to superior infrastructure or broader industrial bases, while others lag behind. Notably, the coefficient's magnitude broadly matches those in Table 1, implying that the overarching link between trade and inequality is largely

driven by intra-national exchanges. In contrast, we find no significant link for international trade. The absence of any discernible relationship may stem from international flows being more uniformly distributed across regions or simply less pivotal in reshaping local economic structures than national trade.

6.3 Trade within the EU vs. Rest of the World

We also examine the influence of intra-EU trade compared with trade beyond Europe's borders (Table 3). Here, we find a robust positive link between trade within the EU and increases in income inequality within a region. The magnitude of economic integration in the EU may well intensify the impact of trade on local economic structures and the distribution of incomes. By contrast, trade with regions outside the EU appears to exert no discernible effect on shifting income inequality. This divergence may reflect variations in the character of trade agreements, the degree of economic integration, and the nature of goods and services exchanged within the EU vis-à-vis the rest of the world.

Table 3: Statistical models for trade with the EU and rest of the world

	(1)	(2)	(3)	(4)
Log(trade EU pc)	0.006*	0.015**		
	(0.003)	(0.006)		
Log(trade ROW pc)			-0.001	-0.003
			(0.002)	(0.003)
Controls	N	Y	N	Y
R^2	0.016	0.067	0.001	0.047
F-Statistic	3.07	3.117	0.1205	2.416
Num. obs.	240	238	240	238
RMSE	0.028	0.028	0.029	0.028
VIF	1.00	2.02	1.00	1.94

***p < 0.01; **p < 0.05; *p < 0.1, SE clustered at the regional level. EU excludes Croatia, as data is available at country level. Controls include GDP pc, the level of inequality, population density, scientific employment and industry employment.

6.4 Neighbouring and Non-Neighbouring Trade

We then turn to trade classified by proximity: the distinction between dealings with neighbouring regions versus those further afield (Table 4). Although trade with neighbouring areas displays a

positive coefficient, it fails to reach statistical significance in explaining shifts in income inequality. This suggests that exchanging goods with immediate neighbours, often in small volumes, may not radically alter a region's economic structure or its distribution of incomes. In contrast, trade with non-neighbouring regions is a statistically significant contributor to mounting income inequality. This is perhaps indicative of more specialised or higher-value transactions with distant regions, sparking economic realignments that can widen the gap between top and bottom earners.

Table 4: Statistical models for trade with neighbours and non-neighbours.

	(1)	(2)	(3)	(4)
Log(trade neighbours pc)	0.001	0.001		
	(0.001)	(0.001)		
Log(trade non-neighbours pc)			0.006*	0.013**
			(0.003)	(0.005)
Controls	N	Y	N	Y
R^2	0.004	0.051	0.017	0.065
F-Statistic	1.175	2.924	3.336	2.873
Num. obs.	239	238	239	238
RMSE	0.029	0.028	0.028	0.028
VIF	1.00	2.06	1.00	2.7

***p < 0.01; **p < 0.05; *p < 0.1, SE clustered at the regional level. Controls include GDP pc, the level of inequality, population density, scientific employment and industry employment. Neighbour means sharing a common border, based on a contiguity matrix.

These findings, taken in concert, suggest that the volume and type of trade pursued by a region can profoundly shape its economic foundations and, in turn, affect its income distribution. Many regions in Europe devote a significant share of their trade to partners within the same country, within the EU, or in more distant non-neighbouring regions. In doing so, they channel substantial resources into producing tradable goods and services. Inevitably, certain industries expand to meet this demand, intensifying the structural shift in local economies. As these industries grow more specialised and dynamic, income gaps widen. Those workers with the required skills and expertise reap rising wages and better prospects, whereas people employed in less directly affected sectors may encounter smaller gains —or none at all— leading to a clear divergence in fortunes within a single region.

By contrast, smaller portions of regional trade —whether with immediate neighbours, countries outside the EU, or anywhere beyond national borders— spark much less of the restructuring that typically feeds larger income disparities. Their relatively limited volumes of commerce dull the

impetus for full-blooded specialisation, so there is no large-scale reallocation of labour. Sectors in regions oriented towards such trade often remain more balanced, diluting any pronounced surge in demand for niche skills. Consequently, the knock-on effect on inequality is milder: these regions may keep a more even or diverse economic base, which moderates differences in compensation across the workforce.

In short, the breadth and particular orientation of a region's trading relationships matter for the evolution of income inequality, not least because they shape the local industrial mix and demand for specific skills. The emphasis on national, intra-EU, or non-neighbouring trade emerges as decisive for cross-regional variations in changes in inequality.

6.5 IV Estimations

We address possible endogeneity —especially reverse causation— by deploying an instrumental variable (IV) strategy. We use historical literacy rates from 1880 as our exogenous instrument for trade. The logic is that literacy rates from that era likely shaped a region's longer-term developmental path, influencing present-day trade patterns and income distribution, but would not themselves be directly affected by current trade or inequality.

Table 5 presents the IV results, together with the first-stage F-statistics to assess the instrument's relevance. For Models 1, 2, 4, and 6, the literacy instrument displays a strong and significant association with the trade variable, supported by F-statistics surpassing the Stock et al. (2003) threshold of 10. This implies that historical literacy helps predict overall trade, along with trade at the national level, trade with non-neighbours, and trade with other EU regions.

The coefficient estimates in these IV specifications are not only positive but also larger than their OLS counterparts, suggesting two explanations. First, the IV method addresses endogeneity, providing a less biased snapshot of the causal weight of trade on inequality. Second, the final sample is smaller, focusing on 153 regions in the EU-15 (due to available historical literacy data). Unsurprisingly, Models 3, 5, and 7—focused on trade with other countries, immediate neighbours, and regions beyond the EU— show no significant effect on inequality.

Overall, this set of IV results accords well with the OLS evidence in Tables 2–5: robust, positive correlations for national trade, trade with non-neighbouring regions, and trade within the EU, when it comes to influencing changes in income inequality. By alleviating endogeneity concerns, these findings underscore the nuanced yet sizeable ways in which trade shapes economic outcomes in Europe's regions.

Table 5: Statistical models for IV estimations for overall trade.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Log(trade pc)	0.100*						
	(0.054)						
Log(national trade pc)		0.074**					
		(0.035)					
Log(international trade pc)			-0.299				
			(0.540)				
Log(trade non-neighbours)				0.079**			
				(0.039)			
Log(trade neighbours)					0.035		
					(0.024)		
Log(trade EU pc)						0.090*	
						(0.046)	
Log(trade ROW pc)							-0.065
							(0.042)
Gini	0.391**	0.293**	-1.814	0.322**	0.549*	0.358**	-0.152
	(0.184)	(0.131)	(3.478)	(0.141)	(0.312)	(0.164)	(0.192)
Log(GDP pc)	-0.103	-0.074*	0.403	-0.080*	-0.068	-0.092*	0.099
	(0.063)	(0.041)	(0.729)	(0.045)	(0.047)	(0.054)	(0.069)
Log(pop density)	0.005	0.006	-0.021	0.007	-0.011	0.005	0.003
	(0.005)	(0.005)	(0.042)	(0.005)	(0.011)	(0.005)	(0.005)
Emp prof services	-0.230	-0.238	1.234	-0.295	0.773	-0.199	0.050
	(0.264)	(0.266)	(2.241)	(0.296)	(0.686)	(0.243)	(0.332)
Emp ind	0.007	0.026	0.356	0.020	-0.069	0.013	0.082
	(0.066)	(0.065)	(0.751)	(0.066)	(0.074)	(0.065)	(0.116)
First stage							
F-Statistic	10.957	18.862	0.316	16.50	2.929	13.752	2.866
R^2	-0.156	-0.013	-17.764	-0.066	-2.051	-0.069	-1.440
F-Statistic	2.19	2.468	2.407	13.014	2.929	16.867	4.853
Num. obs.	153	153	153	153	153	153	153
RMSE	0.034	0.032	0.137	0.033	0.055	0.033	0.049

***p < 0.01; **p < 0.05; *p < 0.1, SE clustered at the regional level.

The IV approach, by mitigating endogeneity concerns, provides a more reliable lens through which to view the intricate interplay of trade and regional inequality. It highlights how specific categories of trade —especially within national borders or across the EU— can alter the local economic landscape

and entrench uneven income distributions. The parallel with our OLS estimates only strengthens the conclusion that, in Europe, trade connections closer to home (either within a country or the EU) carry clear significance for income inequalities at the regional level.

6.6 Sensitivity Checks

To enhance the reliability of our findings, we conduct additional robustness checks on our initial results. These checks are intended to show that the observed effects of trade on regional income inequality are not simply the result of omitted variables or methodological quirks.

In the first and second models of our robustness tests (Table 6), we introduce additional control variables that potentially shape the trajectory of regional income inequality. One such variable is institutional quality. A body of scholarly work, led by Acemoglu et al. (2001) and Ganau and Rodríguez-Pose (2019), has long emphasised that strong institutions can bolster economic outcomes by increasing market efficiency and ensuring fairer competition —both of which can mitigate sharp rises in inequality. Barbero et al. (2021) expand on this premise, arguing that institutional contrasts at the subnational level also matter greatly for trade in Europe. By including institutional quality as a control, we capture the idea that places with better governance may funnel the benefits of trade in ways that curb the uneven distribution of economic gains.

We also incorporate a measure of technological change in Model 2 (Table 6), using patents per capita. This follows research by Johnson (1997) and Autor et al. (2003), indicating that skill-biased and routine-biased technological shifts have a tangible impact on wage structures and the distribution of income. New technologies, often geared towards workers with more advanced skills, can propel upskilling and inflate wage gaps. Hence, regions with robust patenting activity might exhibit a sharper tilt in their wage landscape, with high-skill segments pulling away. By adding patents per capita, we disentangle whether trade effects on inequality are overshadowed or magnified by the concurrent onset of technological advances.

In Model 3 (Table 6), we modify the regression weighting system, shifting from an unweighted specification to one that accounts for population size. The logic here is straightforward: an industrial hub with millions of residents arguably has greater bearing on overall European patterns than a handful of smaller, perhaps more idiosyncratic, regions. In weighting by population, we effectively reduce the risk that a cluster of small outliers —boasting unconventional trade or labour markets— could nudge the headline results in an unrepresentative direction. This lets us see if our main conclusions still hold across a more populace-balanced spectrum of regions.

In all three of these variations —controlling for institutional quality and for technological change, and assigning weights based on population— the fundamental link between trade and regional income inequality remains strongly positive and statistically significant. Even with additional layers of institutional nuance and innovation factors, not to mention a reconfigured sample weighting, the thrust of our initial argument stands: more trade heightens local income gaps. For regions heavily plugged into broader markets, the gains in prosperity are not always shared by all. Ultimately, those endowed with the right resources —be they advanced skills or more effective institutions— are best placed to benefit from trade expansion, leaving others further behind in the evolving regional order.

Table 6: Statistical models to test for robustness: adding institutional quality, patents and population weights.

	(1)	(2)	(3)
Log(trade pc)	0.012**	0.011**	0.013**
	(0.005)	(0.005)	(0.005)
Gini	0.146	0.164**	0.130*
	(0.091)	(0.077)	(0.067)
Log(GDP pc)	-0.018	-0.037**	-0.018**
	(0.013)	(0.014)	(0.007)
Log(pop density)	-0.002	-0.001	0.001
	(0.002)	(0.002)	(0.002)
Emp prof services	0.264**	0.166	0.286**
	(0.113)	(0.107)	(0.116)
Emp ind	0.036	0.004	0.063*
	(0.034)	(0.031)	(0.035)
Inst qual	0.000		
	(0.004)		
Log (Patents)		0.007**	
		(0.003)	
R^2	0.069	0.102	0.112
F-Statistic	2.631	3.623	4.34
Pop weights	N	N	Y
Num. obs.	232	239	240
RMSE	0.028	0.028	0.838
VIF	2.87	3.22	3.39

***p < 0.01; **p < 0.05; *p < 0.1, SE clustered at the regional level.

7 Conclusion and Discussion

In this paper, we set out to examine the relationship between trade and intraregional income inequality across European regions at the NUTS-2 level, a dimension often sidelined in analyses that dwell on national aggregates. By harnessing two fresh datasets —one detailing regional trade patterns and the other measuring intraregional income distribution— we were able to probe not only cross-border exchanges but also subnational trade flows, offering a deeper view of how these dynamics affect inequality.

Our results consistently suggest that greater levels of trade correlate with rising inequality in European regions, with the effect varying by the nature of trading partners. Trade within a single country, with other EU regions, or with non-neighbouring areas represents a major driver of heightened income disparities, whereas more conventional forms of international trade, or trade beyond the EU and with neighbouring regions, do not exhibit a strong correlation (Frankel and Romer, 1999; Silva and Leichenko, 2004). This nuance underscores that the intricate mechanics of regional trade —where geographical, institutional, and cultural proximity matter— are fundamental in determining who gains and who loses from greater economic openness.

Instrumental variable estimations confirm these findings, highlighting a robust and positive association between certain types of trade and the evolving distribution of incomes. Our additional sensitivity checks —incorporating new controls for institutional quality (Acemoglu et al., 2001; Ganau and Rodríguez-Pose, 2019; Barbero et al., 2021) and adjusting the weighting of regions by population size— reinforce that these effects hold across multiple specifications.

Turning to policy implications, this perspective indicates a need for targeted interventions to counteract any adverse social consequences tied to more intensive trade. Although trade —especially within the EU— can be a potent driver of growth and development (Iammarino et al., 2019), it also places strain on local labour markets, particularly for mid-level roles or workers lacking in-demand skills (Autor et al., 2003). Policymakers should consider combining active labour-market programmes and equitable welfare schemes with a recalibrated tax system, thus mitigating the disproportionate burdens faced by those less poised to capitalise on trade-induced opportunities. In this way, regions could harness the benefits of trade while minimising harmful repercussions for workers who risk obsolescence or wage stagnation.

Naturally, our study has its limitations. Chief among them is the cross-sectional character of the trade dataset, which prevents analysis of longitudinal shifts in trading patterns (Thissen et al., 2019). Furthermore, the coverage of EU-SILC and LIS data does not extend to all NUTS-2 regions, narrowing our scope of analysis. Future inquiries might employ panel data, explore inter- versus intra-firm

mechanisms, or delve into sector-specific trajectories to clarify the precise channels by which trade influences inequality.

Still, despite these constraints, our inquiry breaks new ground by honing in on subnational variation in trade within the European context. This local lens —both in terms of data granularity and emphasis on regional relationships— has let us pinpoint how the geography of trade can shape incomes in rather nuanced ways. It complements more standard lines of inquiry, which often focus on country-level import competition or global trade outside the EU (Autor et al., 2013).

Taken together, this research offers a timely and vital reminder that, in an era of accelerating economic integration, the distributional consequences of trade deserve careful scrutiny. By illustrating how particular categories of trade can spur income polarisation within regions, we give policymakers a more precise sense of which levers to pull. In that respect, an enhanced awareness of local conditions may be crucial if Europe aims to marry its ambitions for greater trade with the imperative of inclusive growth, balancing economic dynamism with fairness for all.

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A Appendix

A.1 Inequality data

Due to the absence of income data for 2013 and 2018 for some countries, we complement the observations for these years, thereby maximising the number of available observations. To calculate the change in income inequality, we assign the latest available Gini coefficient to 2013 or 2018. Table A1 provides an overview of the regions and years for which the Gini coefficient has been assigned. This approach ensures that the dataset remains as comprehensive as possible while maintaining consistency across the analysis.

Table A.1: Complementing observations for the Gini coefficient in case of missing data.

Country code	Year missing		Year available
BE	2018		2017
CZ	2018		2016
EL	2018		2016
DK	2018		2016
HU	2013		2012
HU	2018		2015
IT	2013		2010
IT	2018		2016
SI	2013		2012
SI	2018		2015
FI	2018		2016

A.2 Summary Statistics

Table A.2: Summary Statistics for inequality, trade and control variables

Statistic	N	Mean	St. Dev.	Min	Max
Change Gini	242	−0.0004	0.029	−0.118	0.110
Gini	242	0.289	0.037	0.204	0.383
Trade pc	261	144.158	129.392	19.854	1,575.465
Trade national pc	261	129.038	109.727	17.918	1,346.525
Trade international pc	261	23.176	34.895	1.516	405.561
Trade neighbours pc	259	10.425	16.187	0.000	156.738
Trade non-neighbours pc	259	134.097	117.571	15.995	1,418.727
Trade EU pc	259	137.117	116.742	18.764	1,398.845
Trade ROW pc	259	7.405	13.852	0.257	176.620
Popdensity	266	476.662	1,644.133	2.632	20,703.640
GDP pc	266	26.046	14.820	7.634	204.662
Emp prof services	264	0.086	0.029	0.021	0.204
Emp ind	263	0.173	0.072	0.032	0.377

A.3 Types of Trade

A.3.1 EU Trade vs. with the rest of the world

Figure A.1: EU Trade as percentage of all trade, per NUTS-2 region in 2013

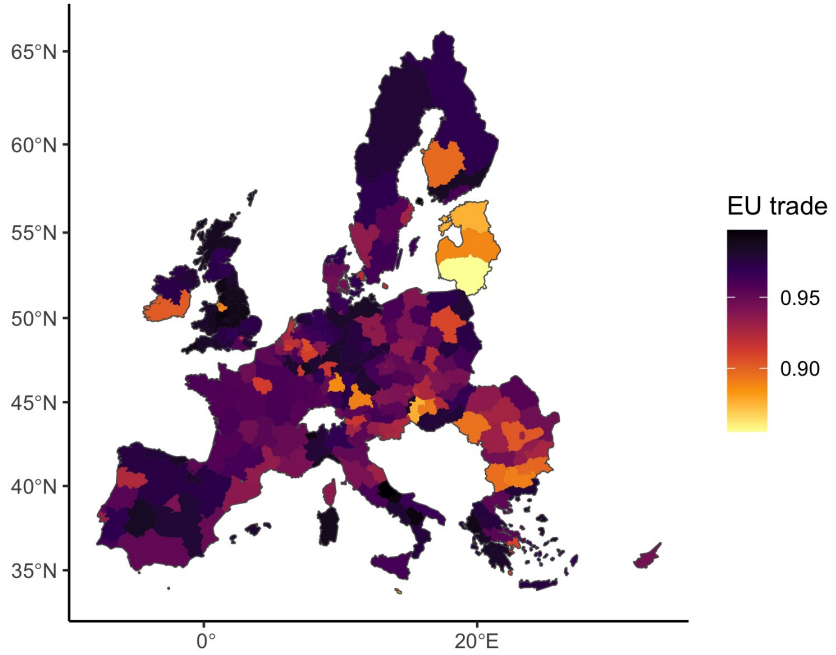
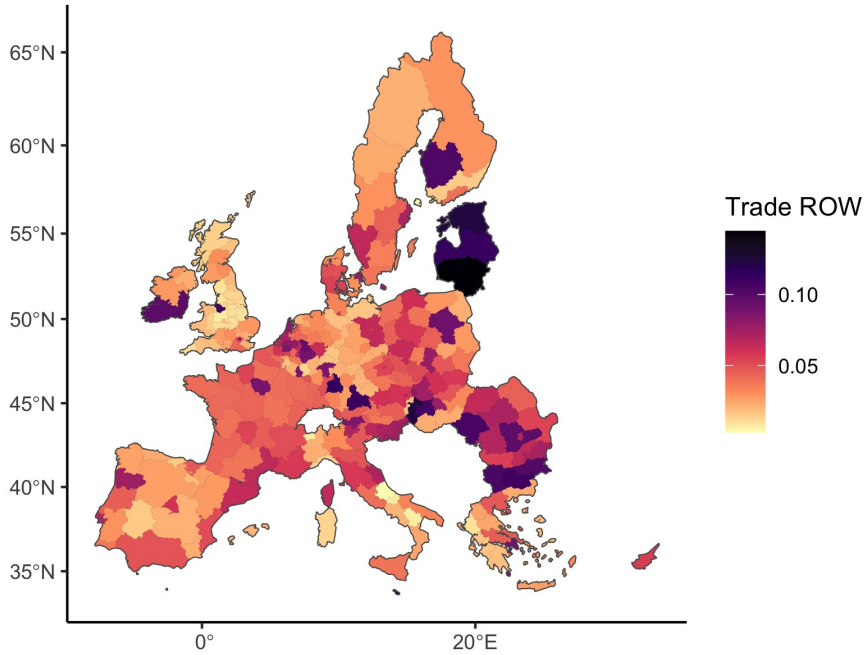


Figure A.2: Trade with the Rest of the World of all trade, per NUTS-2 region in 2013



A.3.2 Trade with neighbouring regions vs. non-neighbouring regions

Figure A.3: Trade with neighbouring as percentage of all trade, per NUTS-2 region in 2013

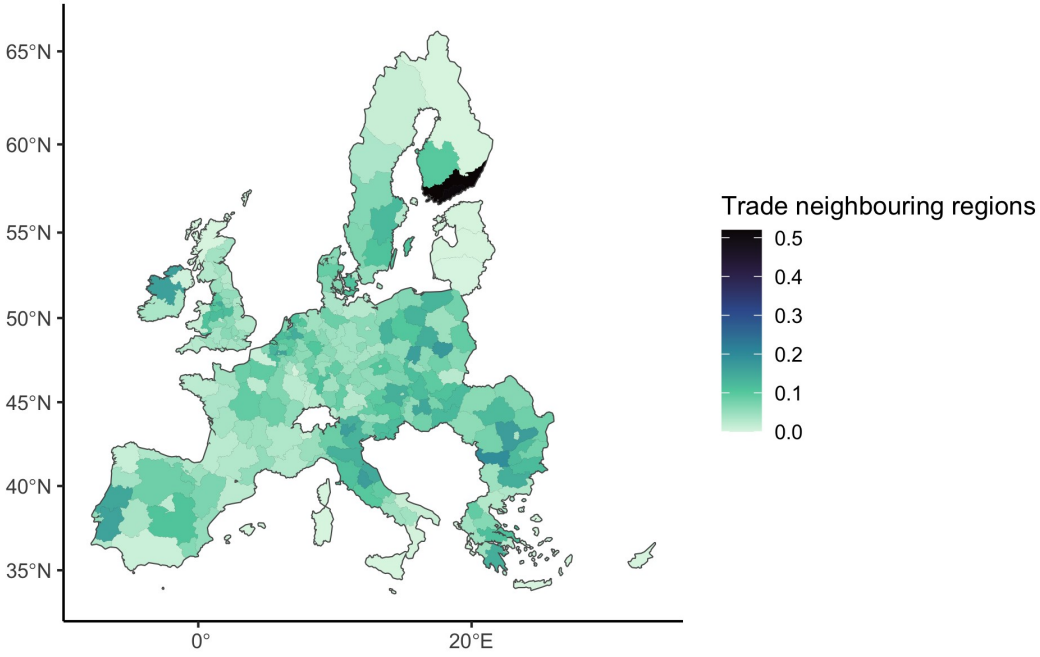
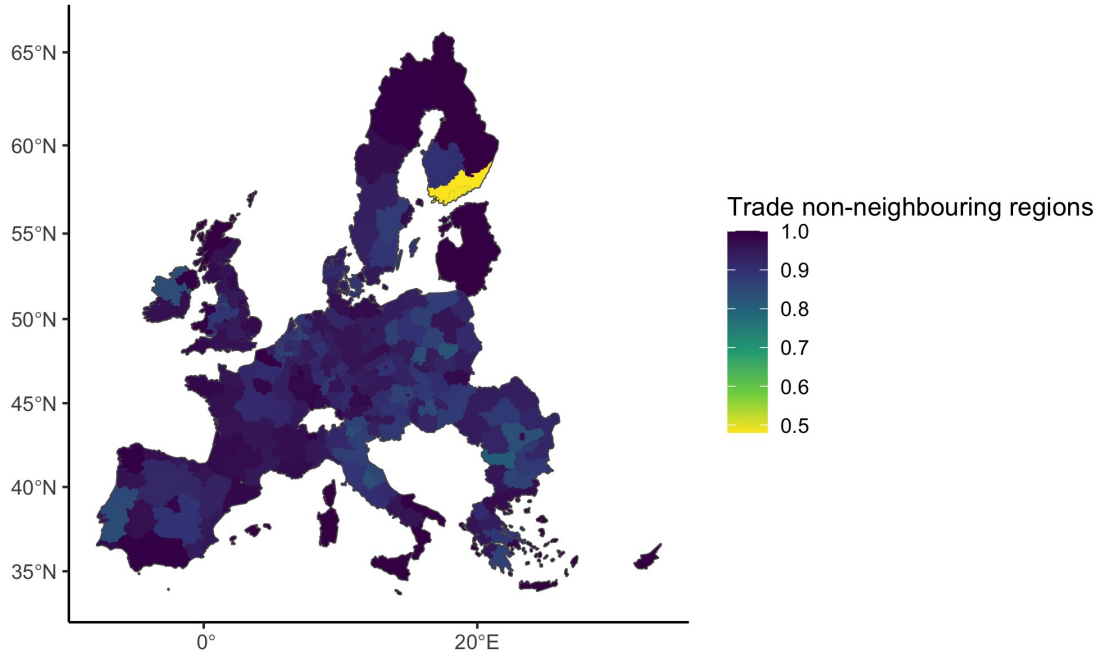


Figure A.4: Trade with non-neighbouring regions as percentage of all trade, per NUTS-2 region in 2013



A.3.3 National trade vs. international trade

Figure A.5: National Trade as percentage of all trade, per NUTS-2 region in 2013

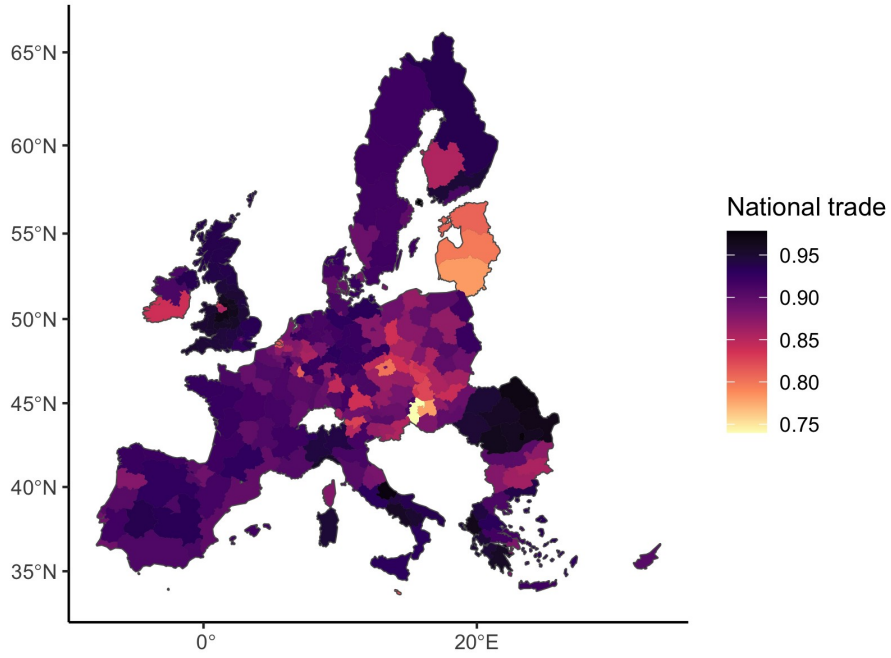
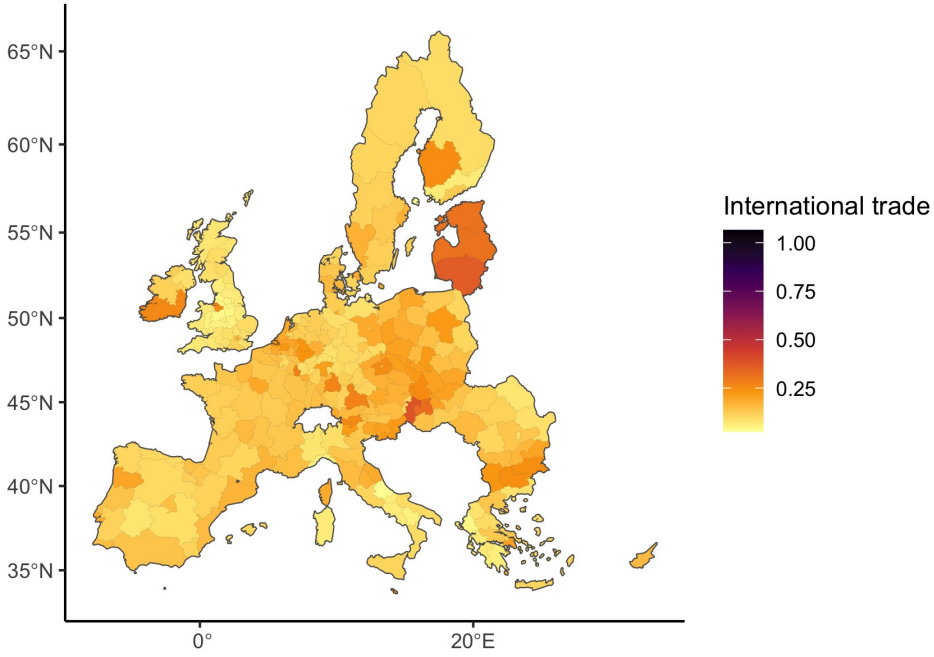


Figure A.6: International Trade as percentage of all trade, per NUTS-2 region in 2013



A.4 Correlation Matrix

Table A.3: Correlation Matrix for inequality, trade and control variables

	ΔGini	Gini	Trade pc	Popden.	GDP pc	Emp prof services	Emp ind
ΔGini	1.00	0.10	0.09	0.00	0.04	0.17	-0.08
Gini	0.10	1.00	-0.20	0.20	-0.02	0.07	-0.26
Trade pc	0.09	-0.20	1.00	0.13	0.39	0.38	-0.14
Popden.	0.00	0.20	0.13	1.00	0.79	0.45	-0.28
GDP pc	0.04	-0.02	0.39	0.79	1.00	0.62	-0.25
Emp prof services	0.17	0.07	0.38	0.45	0.62	1.00	-0.53
Emp ind	-0.08	-0.26	-0.14	-0.28	-0.25	-0.53	1.00

A.5 Further Sensitivity Checks

We conduct two additional sensitivity checks to reinforce the robustness of our findings. First, we remove extreme trade values from the dataset, as illustrated in Figures A.1–A.6. This adjustment excludes four regions —Estonia, Latvia, Lithuania, and the Helsinki-Uusimaa region— which exhibit particularly high trade values that could skew the analysis. Model 1 presents the regression results after this exclusion. The findings remain in line with those reported in Table 1, with coefficient sizes remaining stable and statistical significance unaffected.

Second, given that inequality data for 2013 or 2018 is unavailable for some regions, we have imputed the closest available year to ensure continuity in our dataset. To verify the robustness of this approach, we conduct an additional check by entirely excluding the regions listed in Table A1, ensuring that only those with directly observed Gini coefficient changes over the five-year period remain in the analysis. The results are reported in Model 2. The coefficient remains comparable in magnitude to the main results, though it is statistically significant at the 10% level rather than at a higher confidence threshold. This likely reflects a loss of statistical power due to a reduction in sample size exceeding 25%.

Overall, these additional checks confirm that the relationship between trade and income inequality remains stable, suggesting that the observed effects are not merely artefacts of outlier regions or missing data adjustments.

Table A.4: Further sensitivity checks

	(1)	(2)
Log(trade pc)	0.0121**	0.0165*
	(0.0052)	(0.0071)
Gini	0.1332*	0.0945
	(0.0782)	(0.0916)
Log(GDP pc)	-0.0181*	-0.0270**
	(0.0103)	(0.0114)
Log(popdensity)	-0.0015	0.0008
	(0.0019)	(0.0020)
Emp prof services	0.2579**	0.3030**
	(0.1121)	(0.1235)
Share emp ind	0.0358	0.0945**
	(0.0323)	(0.0409)
R^2	0.0654	0.0987
Num. obs.	236	170
RMSE	0.0282	0.0250

***p < 0.01; **p < 0.05; *p < 0.1, SE clustered at the regional level.