BAFFI RESEARCH CENTER

Working Paper Master Theses Series

Trade Liberalization and Regional Disparities: How Did the EU Enlargement Waves Affect Regional Inequalities?

Vincenzo Cantarella | 2026

Università Bocconi
BAFFI
Centre on Economics, Finance and Regulation

Trade Liberalization and Regional Disparities: How Did the EU Enlargement Waves Affect Regional Inequalities?

Vincenzo Cantarella

April 2026

Abstract

This study analyses whether the trade liberalization associated with the 2004 and 2007 EU enlargement waves was linked to higher regional inequalities within EU member states. More specifically, it examines whether the increase in trade openness connected to the enlargement process was associated with a more unequal spatial distribution of economic activity within countries. The analysis focuses on the years surrounding enlargement and extends to the pre-accession period in order to capture part of the trade integration that had already taken place before formal entry into the EU.

The empirical strategy relies on two complementary models. First, a country-level model estimates the relationship between trade openness and regional inequality, measured through the population-weighted Gini index of NUTS3 regional GDP per capita. Second, a regional-level heterogeneous growth model investigates whether trade openness affected regional growth differently depending on regions' initial position within the national GDP per capita distribution. The analysis considers trade openness towards EU partners as a whole, while also distinguishing between trade with old member states and new member states.

The results show that deeper trade openness with EU partners is generally associated with higher levels of regional inequality within member states. This relationship is robust across several specifications with year fixed effects and alternative inequality measures, although it is weaker once country fixed effects are introduced. Disaggregating trade openness shows that openness towards new member states displays the strongest and most robust association with regional disparities. The heterogenous regional growth model provides only limited evidence on the underlying mechanism, suggesting that divergence was driven more by relatively weaker growth in lagging regions than by disproportionate gains in leading regions.

Overall, this study suggests that enlargement-driven European trade integration was associated with a more uneven distribution of economic activity within countries. These findings highlighted the need to address the territorial consequences of European integration in order to preserve both economic cohesion and political support for the European project.

Table of Contents

1. Introduction

Over the past years, the rise of protectionist and nationalist movements has emerged as one of the most pressing challenges for global and regional international institutions. While globalization and trade liberalization have generated undeniable aggregate gains (Frankel & Romer, 1999), these benefits have often been unevenly distributed among people (Dreher & Gaston, 2008) and regions (Ezcurra & Del Villar, 2021) within the countries involved. This unequal distribution had important political consequences, and one of the most striking examples can be found in Europe. The Brexit referendum of 2016 has temporarily interrupted the process of European integration, leading to a phase of fragmentation that culminated in the United Kingdom's exit from the European Union. However, while the European disintegration halted there, the rise of Eurosceptic and nationalist parties continued (Sotiriou et al., 2025). Rodríguez-Pose (2018) explains these movements with the "revenge of the places that don't matter", referring to those areas that the process of economic integration has left behind. This suggests that economic integration cannot be separated from its political consequences, which may in turn undermine it. Therefore, the growth of territorial disparities makes it necessary to investigate whether this uneven development is directly related to economic integration, as it may threaten both economic and political cohesion.

The European Union provides a suitable case to study the regional effects of economic integration, as it represents the most ambitious regional integration project in the world. It does not limit itself to the removal of trade tariffs, but it goes further, liberalizing the movement of goods, services, capital and people, while constantly reducing its internal barriers to trade through institutional and legislative harmonisation. Thus, the trade shock associated with the EU accession goes far beyond that generated by a standard free trade agreement. In this context, the two enlargement waves of the 2000s can be considered major economic shocks which may have radically altered the economies of the countries affected, both of established and new members. Moreover, the EU is not only an economic project with the sole objective of economic growth, but also a political project grounded in the objective of spreading well-being among all its citizens,

reducing inequalities across its territories. For these reasons, analysing the effect that the accession of new member states (MSs) may have on the geographical distribution of economic activity is not only justified by purely economic reasons, but it is also a political matter, given the values on which the EU is founded and the possible adverse political consequences of rising disparities.

This thesis addresses this question directly by investigating whether the trade liberalization associated with the 2004 and 2007 enlargement waves, and with the previous pre-accession agreements, exacerbated regional inequalities within EU Members. More specifically, it studies whether the progressive increase in trade openness linked to the enlargement process, including both the pre-accession phase and the formal entry into the EU, was associated with a more unequal spatial distribution of economic activity. By focusing on these distributive consequences of enlargement-driven trade integration, this study seeks to assess whether the European project has fulfilled its promises of economic convergence or whether it has contributed to increasing regional inequalities, fuelling political discontent.

Despite the existence of several works on trade and inequality, much of the literature tends to focus on the effects of trade with the world as a whole rather than just on trade with a specific group of partners (e.g. Ezcurra & Del Villar, 2021). Conversely, those studies that focus on European integration often concentrate only on particular types of regions, such as border versus inland areas, without considering more directly the broader implications for regional disparities within countries (e.g. Brülhart et al., 2018). This thesis aims to contribute to this literature and to fill this gap by conducting a cross-country analysis of the effects of enlargement-driven trade on regional inequalities within EU member states. For this purpose, the 2004 and 2007 enlargement waves provide an especially suitable case study because of the unprecedented number of countries involved and because most of the new entrants were former Eastern Bloc economies with very different characteristics from the established MSs. These countries were transitioning towards a liberal market economy, and they were starting from significantly lower levels of development than those of Western EU countries.

These factors made these enlargement waves a substantial shock for both old and new Members, with potentially important consequences for trade patterns and for internal distribution of economic activity.

For this reason, the empirical analysis of this thesis focuses on the years surrounding the enlargement process and extends well before formal accession in order to capture the effects of the Interim and Europe agreements. The broader dataset spans from 1991 to 2011, although the exact time span varies across specifications depending on data availability. The empirical strategy is based on two complementary models. The first is a country-level model of regional inequality, which studies the relationship between trade openness with EU partners and the evolution of regional disparities within countries. It also distinguishes between openness towards the old member states and openness towards the new member states, in order to assess whether the effects differ according to the level of development of the trade partners. The second is a regional-level model of heterogenous growth which investigates whether trade openness affected the growth performance of regions differently depending on their initial position within the national distribution of GDP per capita. These two models make it possible not only to evaluate whether European trade integration is associated with stronger regional inequalities, but also to explore one of the possible mechanisms through which this may have happened.

The contributions of this study are threefold. First, it supplements the empirical literature in economic geography by showing how different groups of European trade partners may have different associations with regional disparities. Second, it enriches the literature on European integration, analysing whether enlargement-driven trade openness was linked to higher regional inequalities, but also whether these effects were accompanied by heterogenous regional dynamics. Third, it informs political economy debates by showing a direct link between further trade integration and regional disparities which, according to a growing body of literature, are connected to Euroscepticism and political discontent.

This thesis is structured as follows. Chapter 2 reviews the theoretical and empirical literature on trade, regional inequality, European integration, and the political consequences of regional disparities. Chapter 3 outlines the research design, presenting the construction of the main variables of this study and the empirical methodology. Chapter 4 presents the main empirical results, together with a series of robustness checks and it discusses the limitations of the empirical models adopted. Finally, Chapter 5 draws the main conclusions of the thesis, discussing their broader economic and political implications.

2. Literature Review and Theoretical Framework

2.1. Key Theoretical Models

The theoretical relationship between trade liberalization and regional inequality has long been debated, with various approaches leading to significantly different results. Initially, urban system models based on classical perfectly competitive markets (e.g. Henderson (1982) and Rauch (1989; 1991)) have concluded that trade should lead to convergence in regional outcomes, as resources would be reallocated efficiently. In a second wave of studies, New Economic Geography (NEG) models, mainly based on Krugman (1991), have preferred to use monopolistically competitive markets and have often reached opposite conclusions regarding the extent to which trade liberalization results in regional convergence or divergence.

Classical and Neoclassical models have long focused on the study of agglomeration economies. As McCann & van Oort (2019) outlined, the main agglomeration forces found by this stream of literature are related to local knowledge spillovers, scale economies, lower search costs of workers, and backward and forward linkages between firms and consumers. The Urban system models have been founded on the idea of these agglomeration forces and were based on neoclassical assumptions such as constant returns to scale, homogeneous goods, and perfect mobility of goods and workers (Brülhart, 2011). Rauch (1991) makes a model where the main pull-factor of cities is city-level scale economies, which are external to firms, while the factor pushing firms and workers away from cities is the congestion cost. In this model, cities are located on a straight line, which makes them increasingly farther from the border, raising their trade costs. Once trade barriers are reduced, the cities located closer to the border will progressively specialise in those goods for which the country has a comparative advantage and will engage in international trade, making these cities increasingly larger. Whereas, cities farther from the border will only produce autarkic goods, and their size will be smaller than that of the other cities. Despite the evident regional divergence effect outlined by this and other Urban system models, international trade is not supposed to have any regional distributive effect since factors

of production (workers) are perfectly mobile, and this will equalise wages across regions (Brülhart, 2011). Thus, these models are unable to explain regional divergences in terms of income, but only in terms of dimensions.

In response to this significant limitation, the New Economic Geography emerged as a framework to better explain the effects of trade liberalization on regional inequalities, considering that a part of the workforce may be immobile and that perfect competition may be a too strong assumption. Krugman (1991) introduced forward and backward linkages as central agglomeration mechanisms within a monopolistic competition setting. The forward linkages are given by the love for variety of consumers, who, consequently, will prefer to locate closer to many producers. At the same time, firms, operating in a monopolistically competitive framework, will seek to produce in a plant which is as close as possible to a large number of consumers to save on transport and fixed costs. According to this school, trade liberalization has the effect of loosening the impact of these linkages as consumers are exposed to a larger number of goods coming also from abroad, and firms have a larger pool of consumers abroad. However, different models tend to reach different conclusions regarding the final effect of trade liberalization, depending on the assumptions they make.

Krugman & Livas Elizondo (1996) seek to explain the strong agglomeration in Mexico City when trade barriers were very high, followed by a regional dispersion once the country opened to trade. They model a country with two regions, and they add the rest of the world as a third region. The model assumes that centrifugal forces are commuting costs and higher land rents in agglomerated regions. Moreover, they assume that both manufacturing and agricultural workers are mobile. This leads them to conclude that when trade costs are very high, there is an incentive to agglomerate given by the forward and backward linkages. Though, once trade is liberalised, this incentive is reduced and it is offset by the centrifugal forces, making firms more dispersed across space.

Nevertheless, several successive studies have reached different conclusions by changing some of the assumptions. Paluzie (2001) adopts a similar model, which

assumes immobile farmers that also operate as a dispersion force instead of commuting costs and high rents. Her model concludes that trade liberalization fosters internal agglomeration, increasing regional inequalities. Another extension is offered by Crozet & Koenig Soubeyran (2004), who consider the case in which the two home regions are unequally distant from the border. They also assume that the more intense competition arising from the concentration of many firms in a region acts as a dispersion force. They conclude that when trade barriers are reduced, firms are more likely to relocate and agglomerate in the border region. This effect is more significant the stronger is the degree of liberalization, the larger the size of the foreign market and the more complementary the sectoral composition of the foreign market. Interestingly, their model was made to analyse the agglomeration patterns in Romania between 1991 and 1998. Finally, a further extension comes from Behrens et al. (2007) using a model with two countries and two symmetrical regions to explain the impact that internal transport and external trade costs have on regional disparity and welfare. They conclude that the effect of trade liberalisation generally fosters internal dispersion and spatial economic convergence. However, this effect depends on the interaction between the level of internal transport and external trade costs, which could lead to different equilibria and welfare distributions.

In general, these theoretical models offer a nuanced view of the regional implications of decreasing trade barriers, with contrasting predictions that depend mainly on the assumptions made and on the country's geography (Brülhart, 2011). Specifically, more substantial spatial inequalities seem to relate to immobile factors, asymmetric market access and agglomeration economies. Overall, these studies predict their equilibrium by studying the way trade impacts the main agglomeration forces, such as forward and backward linkages and economies of scale, and the main dispersion forces, such as congestion costs, land rents, and increased competition.

2.2. Empirical Evidence on Trade and Regional Disparities

To get a clearer idea of the impact that trade can have on regional disparities, it is helpful to analyse some of the most relevant empirical studies in this field. Several

cross-country studies have been conducted in previous years on the link between trade and regional inequalities, but, as shown by Brülhart (2011), most of them were focused on the impact of trade on city sizes and did not find any statistically significant effect.

Over the past decade, instead, there was a surge of cross-country analyses using different indices that capture regional GDP per capita inequalities. The most extensive is the study of Ezcurra & Del Villar (2021), which employs a dataset of 142 countries across the world that predicts regional GDP through satellite night-light images over the period 1992-2016. Proxying the global integration of a country with the KOF index, which is a measure based on economic flows across countries and restrictions on trade, they find evidence that globalization significantly increases the level of inequalities within a country. Their results hold with a set of controls, with an IV framework that uses the incidence of globalisation in neighbouring countries as an instrument, and with several robustness checks, which show that the effect is more pronounced in middle-income countries. Ezcurra & Rodriguez-Pose (2013) reach similar conclusions with a smaller pool of countries, highlighting that the association is stronger in low- and middle-income countries. Further supporting evidence is given by Ezcurra & Rodriguez-Pose (2014), who focus on a smaller dataset of 22 emerging countries. However, they evaluate only the impact of a higher level of trade openness, finding similar results on the increase of spatial inequality. Moreover, their research offers a more detailed regional analysis that highlights how greater trade openness particularly depresses the economy of poorer regions. Rodriguez-Pose (2012) adds a dynamic analysis to his study over a pool of 28 countries in a sample with a strong European bias. His dynamic panel, supported by a large set of controlling variables, finds that the effect of trade openness on regional disparities is more substantial in the medium- and long-term for those countries where the richest regions coincide with those that have the best foreign market access. Finally, Rodriguez-Pose & Gill (2006), with a simple correlation study, find that the relationship between trade and spatial inequalities is significant only when it comes with a sectoral shift of trade from the primary sector to manufacturing. Collectively, this set of studies provides compelling

evidence that trade liberalization and economic integration with the world produce spatial divergence within countries, which is worsened by the interaction with several structural factors, most of which are present in developing countries.

Complementing this cross-country evidence, some country-specific studies further underline the heterogeneous regional impacts of trade integration. Zhang & Zhang (2003), analysing spatial inequalities in China between 1986 and 1998, show that foreign trade and FDI are responsible for a large part of the widening of regional disparities. This effect is attributed to the unequal distribution of production factors and different market access. In the US, Silva & Leichenko (2004) find that cheaper imports and exports made the regions with import-competing manufacturing industries worse off, exacerbating spatial disparities. Similarly, Breau and Rigby (2010) documented that in Canada, the adverse effects of import competition on the wages of low-skilled workers are not distributed evenly across space. Overall, these case studies reinforce the idea that the benefits of trade liberalization are geographically concentrated, and that this is true also for two of the most developed countries, Canada and the US. Coherently with all this evidence, the larger trade flows arising from the European integration and enlargement-driven trade liberalization are hypothesised to increase regional inequalities in the EU MSs.

2.3. Empirical Evidence on Regional Disparities and European Integration

While the cross-country and country-specific evidence analysed so far point to a general pattern of geographically uneven gains from trade liberalization and globalisation, given the central focus of this thesis on the European Union, it is key to look at specific empirical works conducted within this setting. The EU represents a unique case to analyse as it represents the best example of regional integration in the world, and it is mainly composed of some of the most developed countries in the world. Its successive enlargement waves and the deepening of its market integration provide a quasi-natural experiment setting that several authors have exploited to understand whether European integration has benefited all regions evenly or if there have been winning and losing regions.

In this sense, Petrakos et al. (2005), in one of the earliest studies in this field, with data from 1981 to 1997 of 8 EU countries, found inconclusive evidence of the impact of European integration on regional disparities. Specifically, they found that trade integration increased regional disparities just in two countries: France and Spain, while in the other MSs, there was either no impact or a decrease in disparities. These results, however, are contrasted by most of the successive empirical studies; this can be explained by the fact that the following research employed more advanced methodological settings with the idea of retrieving causal effects rather than simple correlations. For instance, the fall of the Iron Curtain and the EU enlargement to CEE countries have acted as a significant trade shock for both new and old members of the EU. Brülhart et al. (2018) use this setting to analyse the impact of opening trade to CEE countries in the 1990s on the Austrian border regions. They found that international trade with CEE countries had differential effects on Austrian regions: it improved employment and wages in regions bordering CEE countries compared to others. Comparable results were obtained by Crozet & Koenig Soubeyran (2004), analysing how agglomeration patterns changed in Romania after 1991. Regions with better access to CEE and EU markets were found to have larger urban growth than others.

Two cross-country studies were made by Kallioras & Petrakos (2010) and Monastiriotis et al. (2017) to evaluate the effects of pre-accession agreements and the consequent trade integration in new EU MSs. The research of Kallioras & Petrakos (2010) outlines how the regions that had an initial stronger integration with the EU-15 countries (MSs before 2004) had been more exposed to trade competition, which hampered their growth more than in other areas. At the same time, the study finds that the winning regions of this pre-accession period were the ones bordering the EU-15 states and the capital regions, while areas at the periphery were not as able to attract industrial activity, undermining their economies. Monastiriotis et al. (2017), through an event-study approach that analyses the effects of the different phases of the accession process of CEE countries into the EU on regional growth, obtain comparable results

with the more peripheral and less diversified regions that were negatively affected. In particular, their analysis describes how the different accession phases influenced regional disparities in distinct ways: while early association agreements led towards regional convergence, the pre- and post-accession phases enhanced regional inequality. This is also confirmed by Mitze & Breidenbach (2024) who analyse the effects of all the EU enlargement waves from 1981 to 2014 through a static and dynamic difference-in-differences. They show how the border regions in each enlargement wave benefited in terms of labour productivity, agglomeration effects, economic growth, and innovation rates. In particular, the results on labour productivity and agglomeration are mainly found in the 1995 and 2004 waves, and the labour productivity gains are mostly among old MSs. All of these results, once again, show how the benefits of European integration are not evenly spread among regions within countries, but they depend on their location and other regional-specific characteristics. Considering this, this research hypothesises that the length of the borders with EU countries will have an impact on the distribution of regional wealth within countries. Countries with a smaller EU border will be more likely to concentrate their economic activity in these areas with better market access, leading to more substantial regional inequalities.

Two more studies disentangle how the effects on regional disparities also rely on the development level of trade partners. Petrakos et al. (2016) study how countries participating in the European Neighbourhood Policy are affected by trade with the EU. They find that deeper integration with EU-27 countries increases their level of regional disparities. However, when they separate the trade between the richest and poorest EU countries, they find that regional inequalities are intensified only by trade with the richest ones. Conversely, trade with the poorest EU countries has a counterbalancing effect. Rodríguez-Pose & Sotiriou (2021), analysing how trade from different areas of the world affected regional growth in Greece, show that trade with EU countries negatively affected the growth of the more developed Greek regions, while trade with the rest of the world had the opposite effect. They explain this with the largest share of

tradable industries in the most developed areas, which are not able to compete with more developed European countries. However, the effect on regional inequalities in this case is mixed, as trade with the EU seems to lead to a convergence to the bottom. On the contrary, trade with the rest of the world leads to divergence, as less developed regions are not affected by either trade, while developed regions benefit only from the latter. In light of this evidence, this study hypothesises that the impact on regional disparities of increasing trade openness coming from the EU enlargement will have differential effects depending on the level of development of the European trade partners taken into consideration.

In sum, this European evidence suggests that trade liberalization through EU integration has brought uneven regional gains, shaped by geographical characteristics, sectoral specialization, and partners' development level. However, few of these studies have analysed the general effect on regional inequalities within countries, which, according to the evidence from this body of literature, does not point to a clear direction, as they depend on the starting level of development of the winning (or losing) regions.

2.4. Political Consequences of Regional Inequalities

The spatial distribution of the economy within a country not only affects economic opportunities but also has tangible political consequences (Rodríguez-Pose, 2018). A growing body of literature has shown how voting behaviour, and more specifically the rise of populist movements, relate to regional disparities. Given the evidence that trade integration can generate uneven regional gains, it becomes essential to explore whether and how this can translate into political discontent, populist mobilisation, and Eurosceptic movements. Therefore, understanding this is crucial for assessing the broader impact of regional divergence in the EU.

A line of research links persistent economic decline in left-behind regions with the rise of protest voting. Rodriguez-Pose (2018) talks of "the revenge of the places that don't matter" as the wave of protest exhibited mainly through the ballots that hit numerous countries. Among his examples there are developing countries with very high internal

disparities, such as Southeast Asian and Latin American countries, where the populist wave coming from the regions with the lowest economic opportunities has led, in some cases, such as those of Peru and Colombia, even to armed conflicts (Rodríguez-Pose, 2018). Despite having lower levels of internal disparities, European countries have also been later affected by this wave, with the clearest example being the Brexit vote, where the revenge came from the declining regions in the North and East of England (Rodríguez-Pose, 2018). Colantone & Stanig (2018) link the populist and nationalist wave with the adverse effects of globalization that affect some regions more than others. In particular, analysing the impact of an import shock from China in Western European countries, they find that the regions more affected by this shock, with economic losses in import-competing sectors, exhibit a more protectionist electorate, which is more likely to shift its vote to the right towards economic nationalist parties. Moreover, by also examining the impact of the European import shock, they surprisingly find that trade with EU15 countries reduced this wave, while trade with less developed EU12 countries enhanced it. Instead, Sotiriou et al. (2025) obtain opposite results, showing that higher integration with the most advanced EU countries increases distrust of the EU. These findings highlight that trade partners matter not only for the development of regional inequalities, as seen before, but also for their political consequences, even though it is not clear whether trade with less or more developed European countries enhances distrust and nationalist voting.

In the EU, the relationship between economic geography and its political consequences often takes the form of Euroscepticism. A large strand of literature shows how rising regional inequalities and declining regional economic opportunities are strongly connected with the rise of distrust towards the EU, sharing the use of a related question in the Eurobarometer survey (Lenzi & Perucca, 2021; Mayne & Katsanidou, 2023; Sotiriou et al., 2025). Mayne & Katsanidou (2023) show that the link between declining regions and Euroscepticism has gotten stronger only in the past decade, after the 2007 financial crisis, probably because of the dashed hopes of an EU that would favour the development of less developed regions. These results are

partially questioned by Vasilopoulou & Talving (2024), who conclude that distrust in the EU does not follow a linear path but is higher in middle-income regions. Moreover, they highlight the importance of considering increasing growth paths as a driver of higher trust in these areas. Finally, Rodríguez-Pose et al. (2024) analyse the impact of being in a region stuck in a development trap on voting for Eurosceptical parties. This condition is defined as being in a state of economic stagnation in terms of income, productivity and employment, while lagging behind other national and European regions. Living in these regions significantly increases the likelihood of voting for strongly Eurosceptical parties, and this probability increases up to 8 times if they have been stuck in this condition for decades.

Taken together, these studies indicate that regional economic inequalities and lack of opportunities can have significant political repercussions, particularly in shaping public support for European integration. These findings underscore the importance of understanding whether EU integration is a driver of these inequalities to understand further if voters are right in blaming the EU for the perceived higher level of regional disparities.

3. Research Design

3.1. Data

To assess the impact of the trade liberalization arising from the European enlargement on regional inequalities within EU member states, this study constructs two main sets of variables representing the degree of regional inequality and the degree of trade openness. Given the focus of this thesis on the 2004 and 2007 enlargement waves and considering the constraints imposed by data availability, the analysis extends well before formal accession in order to take into account the effects of the previous accession agreements, namely the Interim and Europe Agreements, which, among other objectives, had the purpose of easing trade between the former EU members and the applicant countries. The dataset therefore spans the period from 1991 to 2011. The choice of these two enlargement waves is justified by the fact that they include the largest enlargement in the EU's history, with ten countries joining in 2004 and two additional ones in 2007. Given the large number of new member states involved, these accessions are likely to have substantially altered the pre-existing trade patterns both in the old and in the new member states. The extended time span of the data makes it possible to consider not only the post-accession impact on intra-EU trade, but also part of the gradual trade integration that had already started during the pre-accession phase. However, due to data limitations affecting some countries and variables, the empirical models presented in this thesis employ different time spans, seeking to strike a balance between data availability, broad country coverage, and the need to preserve a sufficiently long pre- and post-accession period for the analysis.

To study the degree of regional inequalities in each country, this thesis employs data from the ARDECO database, which is managed by the European Commission and includes yearly regional data at the levels NUTS1, NUTS2 and NUTS3, for the EU and other European countries. Specifically, it will employ NUTS3 data, which is the data at the smallest aggregation level, so that it is possible to include as many EU countries as possible in the sample. The sample will be composed of all EU 2007 MSs except Luxembourg, Cyprus and Malta, which have been excluded because they have only

two NUTS3 regions. Figure 1 shows the distribution of NUTS3 GDP per capita, expressed in purchasing power standards (PPS) and indexed to the national average (=100) for a sample of EU countries. Overall, the figure suggests a growing top-end skewness over time, indicating that the upper tail of the regional income distribution becomes more pronounced. This pattern is particularly evident in new entrant member states such as Hungary, Poland and Romania, but it also emerges from 1999 in some old members, including Belgium and France, where the median regional GDP per capita declines relative to the national average.

Nevertheless, this figure alone provides limited insight into the overall distribution. To get a better description of regional inequalities, following Rodríguez-Pose (2012) and Ezcurra & Del Villar (2021) this research resorts to the population-weighted Gini index of regional GDP:

$$Gini_{ct} = \frac{\sum_{i=1}^{N_c} \sum_{j=1}^{N_c} p_{ict} p_{jct} |y_{ict} - y_{jct}|}{2\mu_{ct}}$$

Here, c and t are the country and the year in consideration, N_c is the number of NUTS3 regions in the country, p is the population share of the region on the national population,

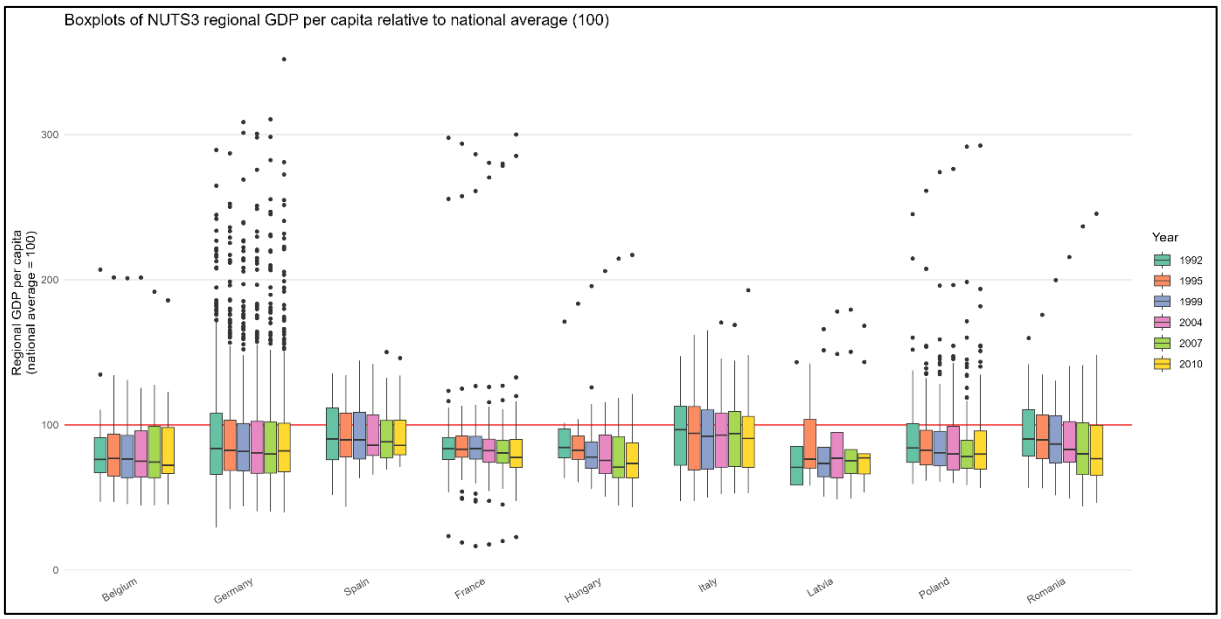

Figure 1. *Boxplots of NUTS3 regional GDP per capita (PPS) distribution, indexed by the national average (=100), for a sample of EU countries in 1999, 2004, 2007 and 2011. Author's own elaboration.*

y is the GDP per capita of the region, and μ is a weight such that $\mu_{ct} = \sum_{j=1}^{N_c} p_{jt} y_{jt}$. This measure ensures comparability with previous studies in this field. Moreover, this index satisfies the scale independence property, the Pigou-Dalton transfer principle, and it is population-weighted so that changes in inequality are appropriately weighted by the population of each region (Ezcurra & Del Villar, 2021). Table 1 reports the Gini indices for the same group of countries shown in Figure 1 and highlights how the largest increases in regional inequalities occurred mainly in the new entrant countries, while core countries had only limited changes, often in different directions. In particular, substantial increases can be observed in countries such as Hungary, Poland and Romania, whereas countries such as Belgium and Germany display either a small reduction or modest fluctuations over time. Among the possible causes of these regional divergence patterns are technological change and increasing economic integration (Bathelt, Buchholz, & Storper, 2024; Cantwell & Zaman, 2024).

This thesis focuses on the analysis of the relationship between regional inequalities and the rising trade integration driven by the EU enlargement. To capture this effect, it uses an index that captures the degree of trade openness. This is built with data from

Table 1. Regional inequality (Gini index) by country

Selected countries and years

	Gini index						Percentage change				
Country	1992	1995	1999	2004	2007	2010	92-95 (%)	95-99 (%)	99-04 (%)	04-07 (%)	07-10 (%)
Belgium	0.200	0.198	0.200	0.204	0.199	0.193	−1.1	0.9	2.1	−2.1	−3.2
Germany	0.260	0.227	0.229	0.227	0.225	0.217	−12.8	1.0	−0.7	−0.9	−3.7
Spain	0.120	0.123	0.134	0.120	0.118	0.122	2.0	9.4	−10.5	−1.4	3.2
France	0.175	0.174	0.173	0.177	0.180	0.198	−0.8	−0.1	1.8	2.2	9.9
Hungary	0.175	0.194	0.228	0.243	0.263	0.266	10.8	17.5	6.5	8.2	1.2
Italy	0.154	0.175	0.174	0.173	0.171	0.181	13.7	−0.5	−0.8	−1.4	6.2
Latvia	0.204	0.172	0.230	0.240	0.240	0.219	−15.8	33.8	4.7	−0.1	−8.8
Poland	0.197	0.203	0.209	0.212	0.219	0.224	3.2	2.9	1.6	3.5	2.0
Romania	0.157	0.166	0.189	0.202	0.239	0.243	5.8	14.0	6.5	18.6	1.7

Source: Author's elaboration.

***Table 1**. Gini Index of Regional GDP (NUTS3) and Percentage Variations for a sample of EU countries in 1999, 2004, 2007, 2011, 2016. Author's own elaboration.*

Eurostat on the imports and exports of each EU MS in the sample, divided by partner country. The trade openness measure follows a well-established approach in the literature to capture the effects of trade liberalization (e.g. Petrakos et al., 2005; Rodríguez-Pose, 2012; Ezcurra & Rodríguez-Pose, 2014). However, the literature approach is slightly modified in order to construct three indices capturing the degree of trade openness of each EU country in the sample with three different groups of partners: the EU27 countries (member states in 2007), the old EU member states (EU15, i.e. those that joined before 2004) and the new EU member states (EU12, i.e. those that entered in the 2004 and 2007 enlargement waves). These indices are computed by summing imports and exports with the relevant group of partners and dividing the total by the nominal GDP of the reporting country:

$$OPEN_{EU27,i,t} = \frac{\sum_{j=1}^{EU_{27}} IMP_{i,j,t} + \sum_{j=1}^{EU_{27}} EXP_{i,j,t}}{GDP_{i,t}}$$

$$OPEN_{EU15,i,t} = \frac{\sum_{j=1}^{EU_{15}} IMP_{i,j,t} + \sum_{j=1}^{EU_{15}} EXP_{i,j,t}}{GDP_{i,t}}$$

$$OPEN_{EU12,i,t} = \frac{\sum_{j=1}^{EU_{12}} IMP_{i,j,t} + \sum_{j=1}^{EU_{12}} EXP_{i,j,t}}{GDP_{i,t}}$$

Here, EU27, EU15 and EU12 denote the three groups of countries described above; i and t refer respectively to the reporting country and the year in which the index is constructed; $IMP_{i,j,t}$ and $EXP_{i,j,t}$ represent, respectively, the value in euros of imports and exports of country i with partner country j in year t, while $GDP_{i,t}$ indicated the nominal GDP of country i in year t in euros. Since GDP and trade data come from different sources, they were originally reported in different currencies, namely euros and US dollars. In order to ensure consistency when building the trade openness index, this thesis converts all trade values originally expressed in US dollars into euros using the yearly average EUR (ECU) / USD exchange rate.

Figure 2 shows the evolution of the three trade openness indices for three groups of countries: the EU15 (i.e. the members of the EU before 2004), the EU10 countries that

joined in 2004, and the EU2 countries that joined in 2007. Overall, the figure suggests that trade integration with the EU was already rising before formal accession, especially for the new member states, indicating that the Interim and Europe Agreements had already started to reshape trade patterns. This trend is particularly visible in the openness indices with the EU27 and the EU15, where both the EU10 and the EU2 countries display an upward trajectory already in the pre-accession years, while the old member states follow a less marked increasing path. By contrast, the years after accession appear to be characterised by a more stable, and in some cases

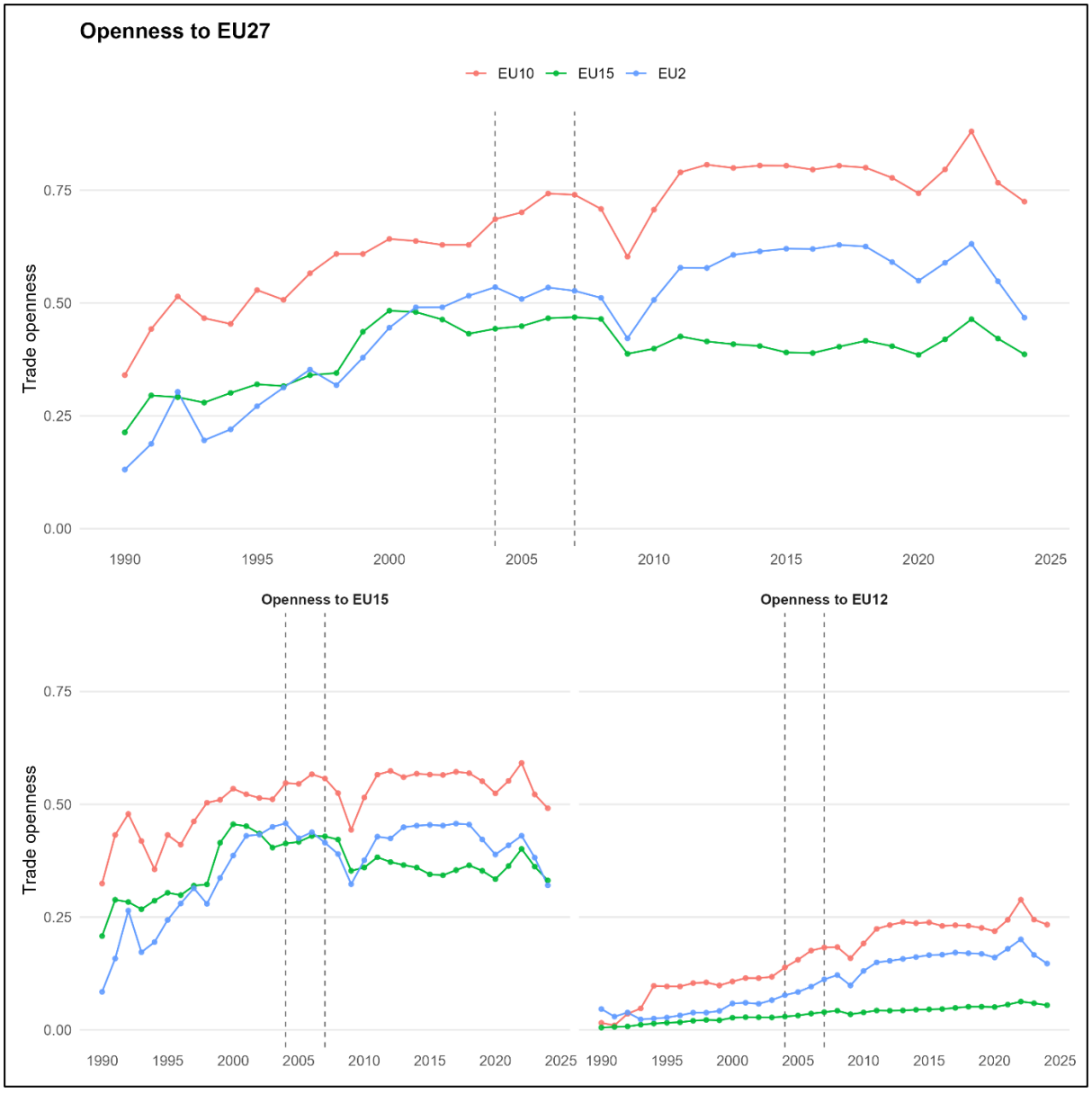

***Figure 2**. Average Trade Openness index of the whole sample, EU15, EU10 (2004) and EU2 (2007) countries with EU27, EU15 and EU12 as trade partners. Author's own elaboration.*

slightly declining, trend for most groups of countries, suggesting that a large part of the trade integration process had already taken place before formal entry into the EU.

The pattern is different when considering trade openness with the EU12 countries, which appears to increase more steadily over time for all groups, despite remaining at a much lower level than openness with the EU15. In particular, this upward trend seems more marked in the years following formal accession for the EU10 and EU2 groups, whereas the EU15 countries exhibit only a limited and gradual increase in their openness towards the EU12 group. In general, therefore, the figure suggests that the formal accession did not produce an abrupt break in overall intra-EU trade openness, as much of the adjustment had already occurred in the pre-accession years, but it did reinforce the integration process among new member states. Finally, all three groups show a visible decline in openness around the years of the Great Recession, followed by a recovery in the subsequent period.

In addition to analysing the impact of trade openness on country-level regional inequalities, this thesis also explores whether the enlargement process affected the growth performance of regions within the same country in different ways. To do so, it examines heterogeneous regional growth within countries associated with the trade shock caused by the EU enlargement and the previous accession agreements. Building on the same ARDECO NUTS3 panel used to compute the country-level inequality indices, this thesis uses the growth rate of GDP per capita as a measure of regional economic performance, which is defined in logarithmic terms as follows:

$$\Delta \ln\left(GDPpc_{ic,t}\right) = \ln\left(GDPpc_{ic,t}\right) - \ln\left(GDPpc_{ic,t-1}\right)$$

Here i denotes the NUTS3 region, c the country, and t the year. This transformation has two advantages: it is directly interpretable as an approximate percentage growth rate, and it reduces the influence of level differences across differences, which is important in a sample where countries exhibit different development paths.

To test whether trade openness is associated with different growth dynamics across the regional income distribution, this thesis defines two time-invariant indicators

capturing a region's initial position within its national distribution of GDP per capita. For each country c, regions are ranked according to their level of GDP per capita in a baseline year, which should ideally precede as much as possible the beginning of the integration process. In order to account for data availability constraints and to capture the initial trade effects of the *Interim* and *Europe* agreements, this analysis uses 1993 as the baseline year, while alternative definitions are considered in the robustness checks section. On the basis of this within-country ranking, two dummy variables are created: $Top10_i^{pre}$ which takes the value 1 if region i belongs to the richest decile of regions in country c, and 0 otherwise; $Bottom50_i^{pre}$, which takes value 1 if region i lies in the poorest half of the national distribution, and 0 otherwise. These variables are then used in the empirical specifications to distinguish the regional growth effects of trade openness across different parts of the national income distribution.

3.2. Methodology

3.2.1. National level inequality model

This section outlines the empirical strategy used to assess the relationship between the trade liberalization associated with the 2004 and 2007 EU enlargement waves and regional inequalities within EU MSs. To estimate this, the methodology of this thesis employs a multivariate Ordinary Least Squares (OLS) regression model:

$$(1) \quad INEQ_{ct} = \alpha + \beta_1 OPEN_{EU27,ct} + \gamma X_{ct} + \lambda_t + \varepsilon_{ct}$$

Here, the dependent variable is the measure of regional inequalities outlined in the previous section: the population-weighted Gini index of regional GDP per capita for the country c in year t. The primary independent variable in the model is the index representing intra-EU27 (2007) trade openness for the country c at time t. The coefficient of interest of this analysis is β_1, as it captures the association between trade openness and regional disparities, given the other variables in the model. An alternative specification is also used to capture separately the effects of trade openness with EU15 and EU12 countries, which could not be included before because of multicollinearity:

$$(2) \quad INEQ_{ct} = \alpha + \delta_1 OPEN_{EU15,ct} + \delta_2 OPEN_{EU12,ct} + \gamma X_{ct} + \lambda_t + \varepsilon_{ct}$$

In this model, the two main explanatory variables are the degree of openness with EU15 and EU12 countries for the country c at time t. The coefficients of interest in this case are δ_1 and δ_2, representing the relationship between inequalities and these trade openness indices. The remaining components are common to both models and are:

- a constant term α not explained by the model,
- a vector of control variables X_{ct} which may influence regional disparities and may act as confounding variables, biasing the estimation.
- year fixed effects (λ_t) to capture common shocks across all countries in a given year, such as the Great Recession and the following debt crisis.
- The error term ε_{ct}, which is assumed to have a conditional expected value equal to zero, such that $E(\varepsilon_{ct} \mid X) = 0$. As the variance of the error term may not be constant across observations, the model is estimated using heteroskedasticity-robust standard errors.

The vector of control variables includes the degree of trade openness with the rest of the world $OPEN_{ROW}$, calculated similarly to the previous openness indices, and it considers the trade with Extra EU (2007) countries as partners. Controlling for this variable is crucial, as it could act as a possible confounding factor. Indeed, as evidenced by several authors (e.g. Ezcurra & Rodríguez-Pose, 2013; Ezcurra & Rodríguez-Pose, 2014) globalization and trade openness with the world are associated with an increasing level of regional inequalities. Moreover, this variable may also be correlated with the level of European trade openness since countries that are not much integrated with the world may have internal trade barriers that also reduce their trade integration with EU countries. Hence, including this variable is relevant to avoid a biased estimate of the coefficients β_1, δ_1 and δ_2.

Following other similar studies (Ezcurra & Rodríguez-Pose, 2014; Ezcurra & Del Villar, 2021), the logarithm of GDP per capita (PPS) and its squared term are also included as a proxy for the level of development of the country. This is considered to influence

the magnitude of the effect of trade openness on regional disparities, as less developed countries generally have more substantial impacts (Rodríguez-Pose & Gill, 2006; Rodríguez-Pose, 2012). Moreover, the level of development was found to directly influence the level of regional inequalities, with a non-linear relationship, according to a significant body of literature (e.g. Williamson, 1965; Barrios & Strobl, 2009). Specifically, they find that regional inequalities will tend to increase at the beginning of economic development and, while reaching a certain level of development, they will tend to decrease. Given that EU MSs are at different development levels, it is crucial to control for this variable to avoid omitting a possible confounding factor.

Williamson (1965) also shows that regional inequalities may depend on the size of the country, and they are more likely to be found in larger countries. Since European countries differ a lot in terms of size, this analysis will control for this variable, proxying it with the population of the country, as similar research has previously done (Ezcurra & Rodríguez-Pose, 2013; Ezcurra & Rodríguez-Pose, 2014).

Despite calculating the regional inequality index on comparable sets of regional units, i.e. NUTS3 regions, defined by standard criteria established by the European Commission, there is still a certain level of national discretion which could influence the choice of these units and, therefore, the dependent variable. Consequently, this model controls for the number of NUTS3 units of each country.

To test the previous hypothesis on the impact that the length of the EU border may have on regional disparities, the model introduces a variable that measures the length in hundreds of Km of the border with EU countries.

The government spending as a share of GDP, excluding defence spending, is used as a proxy for the redistributive capacity of the state. This proxy is widely employed in the literature to capture the government's ability to reduce regional disparities through interregional transfer programmes, which are assumed to be proportional to its total expenditures (e.g. Rodríguez-Pose, 2012; Petrakos, Tsiapa, & Kallioras, 2016). Due to missing data, the UK is excluded from this analysis.

In addition, this thesis controls for the amount of EU funds expenditure received by each country as a share of national GDP. This variable is built using data on EU payments at the NUTS2 level, which are then aggregated at the national level. Rather than using the raw annual payments, this analysis employs a modelled annual expenditure measure, which has been developed by the European Commission to provide a more realistic approximation of the yearly profile of actual expenditure and is therefore more suitable for the purposes of this analysis. Including this control is important because EU-funded expenditure often has the claimed objective to reduce regional disparities by supporting investment and development in lagging regions.

Finally, two dummy variables for the countries joining the EU either in 2004 or 2007 are included. This is useful as these groups of countries have followed similar integration paths, different from the other MSs. Moreover, since inequality is measured at the country level, including country-fixed effects would imply that the coefficients are identified only through within-country variation over time, absorbing all time-invariant cross-country differences. Given the limited time variation of the main explanatory variables, this would considerably reduce the identifying variation available in the data. For this reason, the baseline specification does not include country fixed effects and instead introduces these dummies for the countries joining the EU in 2004 and 2007, in order to control for some broad idiosyncratic characteristics shared by these groups of countries.

By controlling for all these factors, this empirical model seeks to isolate the specific effect of rising EU trade integration on changes in regional disparities, considering the joint effect of some possible confounding factors. However, the risk of omitted variable bias is still possible, as some unobservable factors, such as shifts in the composition of trade (Rodríguez-Pose & Gill, 2006) or internal transport infrastructure (Behrens, et al., 2007) may influence both the dependent and the independent variables. To strengthen the analysis and the results, some robustness checks will be performed. These will include the re-estimation of the model using alternative measures of regional

inequality, clustering standard errors by country, and including country fixed effects in the baseline model.

3.2.2. Heterogeneous regional growth model

To complement the country-level analysis of regional inequalities, this thesis also examines whether the trade shock associated with the EU enlargement and the preceding accession agreements produced heterogeneous effects on regional growth within countries. The aim is to test whether greater trade openness is associated with different GDP per capita growth rates depending on a region's initial position in the national income distribution. For this purpose, the analysis employs a panel model at the NUTS3 regional level, where the dependent variable is the yearly growth rate of regional GDP per capita, measured with the previously explained log difference. The baseline specification can be written as follows:

$$(3)\ \Delta \ln(GDPpc_{ict}) = \alpha + \mu_c + \lambda_t + \beta OPEN_{EU27,ct} + \phi_1 Top10_{ic}^{pre} + \phi_2 Bottom50_{ic}^{pre} + \theta_T\left(OPEN_{EU27,ct} * Top10_{ic}^{pre}\right) + \theta_B\left(OPEN_{EU27,ct} * Bottom50_{ic}^{pre}\right) + \gamma X_{ict} + \varepsilon_{ict}$$

Here i denotes the NUTS3 region, c the country, and t the year. The model controls for country and year fixed effects, which are represented, respectively, by the variables μ_c and λ_t. Country fixed effects account for time-invariant national characteristics that may influence regional growth, such as institutional differences, geography, or long-run development patterns. Whereas year-fixed effects control for shocks common to all countries in a given year, such as the global financial crisis or other macroeconomic events affecting the whole sample.

The coefficient β captures the association between trade openness and regional growth for the baseline group, namely those regions that do not belong either to the richest decile or to the poorest half of the national distribution. The interaction coefficients θ_T and θ_B are the main parameters of interest. A positive and statistically significant θ_T would indicate that initially richer regions benefit more from trade

openness in terms of growth, while a negative and significant θ_B would suggest that poorer regions grow less than the baseline group when openness increases. In both cases, the results would be consistent with a divergence effect within countries. Also, a positive and significant difference $\theta_T - \theta_B$ may be a sign of unequal effects of trade on regional growth.

As in the country-level analysis, this thesis also estimates an alternative specification in which trade openness with EU partners is separated into openness with the old member states and openness with the new member states. This specification makes it possible to assess whether the heterogeneous regional growth effects differ according to the group of European trade partners considered. In particular, it allows the analysis to verify whether trade integration with the new member states had a stronger differential effect on initially richer or poorer regions than trade with the established EU15 countries.

The vector of controls X_{ict} includes some of the confounding factors included in the previous analysis, adapted to the regional setting. In particular, it controls for trade openness with the rest of the world, the level of national development, proxied by the logarithm of GDP per capita and its squared term, country size, proxied by population, and the logarithm of the amount of modelled EU funds expenditure per capita at the NUTS 2 level. Including these variables helps isolate the relationship between intra-EU trade openness and regional growth heterogeneity from other factors that may simultaneously affect regional economic performance.

Finally, since the main explanatory variables vary at the country-year level, while the unit of observation is the region-year, standard errors are clustered at the country level. This correction is necessary to account for the fact that regions belonging to the same country are exposed to the same trade openness shock in each year, which may generate correlated error terms within countries.

4. Empirical Results and Discussion

4.1. Main findings – National level inequality model

Table 2 presents the results of the different specifications of the regression models previously outlined in equations (1) and (2), all estimated with year fixed effects and heteroskedasticity-robust standard errors. A first look at the baseline specification in column (1) confirms the initial expectation that greater trade openness with EU27 partners is significantly associated with higher levels of regional inequalities. This result is reinforced in column (2), where the inclusion of trade openness with the rest of the world slightly increases the magnitude of the coefficient of $OPEN_{EU27}$, while the coefficient of $OPEN_{ROW}$ is negative but not statistically significant. At a higher level, these first results suggest that deeper trade integration within the EU is associated with a more unequal internal distribution of economic activity across regions.

Table 2. Regression results of the impact of EU trade openness on regional inequalities. Dependent variable: Gini index.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
open_eu27	0.033***	0.040***										0.074***
	(0.007)	(0.009)										(0.008)
open_row		-0.023	-0.021	-0.046***	-0.032*	-0.015	-0.007	-0.008	-0.025*	-0.029*	-0.011	-0.012
		(0.016)	(0.018)	(0.017)	(0.016)	(0.017)	(0.018)	(0.016)	(0.015)	(0.015)	(0.017)	(0.017)
open_eu15			0.017*	0.034***	0.031***	0.072***	0.066***	0.079***	0.080***	0.074***	0.069***	
			(0.010)	(0.010)	(0.010)	(0.008)	(0.009)	(0.009)	(0.009)	(0.008)	(0.008)	
open_eu12			0.128***	0.039*	0.005	0.042*	0.028	0.103***	0.071***	0.146***	0.145***	
			(0.020)	(0.022)	(0.024)	(0.023)	(0.024)	(0.027)	(0.027)	(0.034)	(0.038)	
ln_gdp_pc				-0.030***	0.329***	0.351***	0.361***	0.452***	0.499***	0.856***	0.958***	1.019***
				(0.004)	(0.113)	(0.115)	(0.114)	(0.126)	(0.123)	(0.164)	(0.168)	(0.164)
ln_gdp_pc^2					-0.019***	-0.021***	-0.021***	-0.027***	-0.030***	-0.049***	-0.055***	-0.059***
					(0.006)	(0.006)	(0.006)	(0.007)	(0.007)	(0.008)	(0.009)	(0.008)
pop_million						0.001***	0.001***	0.001***	0.000	0.000	0.000	-0.000
						(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
eu_border							0.000*	0.000*	0.000	0.000	0.000*	0.001**
							(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
enl_04								-0.036***	-0.032***	-0.037***	-0.044***	-0.037***
								(0.008)	(0.008)	(0.008)	(0.008)	(0.007)
enl_07								-0.026**	-0.025**	-0.027**	-0.033***	-0.031**
								(0.011)	(0.011)	(0.012)	(0.012)	(0.012)
n_units									0.000***	0.000***	0.000***	0.000***
									(0.000)	(0.000)	(0.000)	(0.000)
modelled_eufunds_share_gdp										-0.003	-0.004	-0.005
										(0.003)	(0.003)	(0.003)
gov_spend_share_gdp											0.069	0.053
											(0.046)	(0.044)
Num.Obs.	440	440	440	440	440	440	440	440	440	330	287	287
R2	0.137	0.139	0.164	0.241	0.254	0.449	0.451	0.477	0.532	0.736	0.758	0.752
R2 Adj.	0.096	0.096	0.120	0.199	0.211	0.415	0.417	0.442	0.498	0.709	0.732	0.728
Countries	24	24	24	24	24	24	24	24	24	22	21	21
Country FE	No	No	No	No	No	No	No	No	No	No	No	No
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

* p < 0.1, ** p < 0.05, *** p < 0.01

Standard errors in parentheses.

Heteroskedasticity-robust standard errors.

Table 2*. Regression results inequality model. Dependent variable: Gini index of regional GDP. Robust Standard errors in parentheses. Author's own elaboration*

The decomposition of European trade openness into trade with old and new member states provides a more nuanced picture. Column (3) shows that both $OPEN_{EU15}$ and $OPEN_{EU12}$ are positively associated with regional inequalities, but the coefficient of openness with the new member states is considerably larger. This suggests that trade integration with the post-2004 entrants had a stronger association with the increase in regional disparities than trade with the old member states. At the same time, the explanatory power of this specification improves relative to the simpler model with only $OPEN_{EU27}$, indicating that distinguishing between partner groups helps explain cross-country variation in regional inequality more effectively.

When controlling for the level of development, the results become more articulated. In column (4), where the logarithm of GDP per capita is added in linear form, the coefficient of $OPEN_{EU12}$ declines substantially but remains weakly significant, while $OPEN_{EU15}$ remains positive and statistically significant. However, the coefficient of $OPEN_{EU12}$ becomes statistically insignificant when considering also the squared term of GDP per capita. This suggests that part of the stronger association initially captured by openness towards the new member states is likely to be related to the different levels of development of the countries involved. The introduction of this variable confirms the existence of a non-linear relationship between development and regional inequality, in line with the hypothesis advanced by Williamson (1965) and Barrios & Strobl (2009). The positive coefficient of the linear term and the negative coefficient of the squared term indicate an inverted-U relationship, whereby regional disparities tend to increase up to a certain level of development and then decrease.

The addition of further structural controls does not alter the broad direction of the main findings, although it affects their magnitude and significance. In column (6), population has a relatively small but positive and statistically significant coefficient, consistent with Williamson's (1965) argument that larger countries are more likely to experience uneven regional development. Once this variable is introduced, the coefficient of $OPEN_{EU12}$ becomes positive and weakly significant again, while $OPEN_{EU15}$ remains positive and strongly significant. The EU border variable, added in column (7), is

positive and weakly significant, but its magnitude is extremely small, and its significance is not robust across subsequent specifications. Therefore, this variable does not provide clear support for the previous hypothesis that a longer border with EU countries should reduce regional disparities by spreading market access more evenly across space.

The two dummies identifying countries that joined the EU in 2004 and 2007 are both negative and statistically significant when added in column (8). This indicates that, ceteris paribus, the countries belonging to these two enlargement waves tend to display lower levels of regional inequality than the baseline group of old member states. Notably, when these two variables are included in the model, the magnitude of the two coefficients of interest δ_1 and δ_2 strongly increases and turns both the coefficients statistically significant at the 1% level. Moreover, the coefficient of $OPEN_{EU12}$ becomes larger than the other. The number of NUTS3 units used to estimate the Gini index, introduced in column (9), has a positive but very small coefficient, suggesting that the degree of national discretion in the definition of territorial units does not substantially affect the estimates. Overall, the principal openness coefficients remain stable in the more complex specifications, and both $OPEN_{EU15}$ and $OPEN_{EU12}$ continue to display a positive association with regional inequalities.

The last part of the table includes additional controls related to public expenditure of national governments and the EU, which could be considered proxies for the redistribution capabilities of national and supranational institutions. However, these variables are not available for all the countries in our sample, and their inclusion means that some countries must be dropped. In column (10), the inclusion of modelled EU funds expenditure as a share of national GDP reduces the sample by two countries (Ireland and Lithuania are not available), but it does not materially change the main estimates. The coefficient of this variable is negative, going in the expected direction of association with lower regional inequalities, but it is not statistically significant. Column (11) further adds government spending as a share of GDP. This time, the coefficient goes against the expected direction; in fact, a higher government

expenditure seems to be correlated with higher levels of regional inequalities. However, this coefficient is not statistically significant and therefore does not provide clear evidence of an association between public expenditure and regional disparities. Also in this case, the main openness variables continue to be positively associated with inequality, and the coefficient of $OPEN_{EU12}$ remains substantially larger than that of $OPEN_{EU15}$.

Finally, column (12) re-estimates the full model on the same reduced sample with $OPEN_{EU27}$ as the main regressor. The coefficient $OPEN_{EU27}$ remains positive and strongly significant, confirming that the positive association between European trade openness and regional inequalities is not driven only by the simpler model used in the earlier columns, strengthening the overall interpretation of the results.

Taken together, the findings of Table 2 confirm the initial hypothesis that deeper trade integration within the EU is associated with higher levels of regional inequality within member states. This result is robust to the inclusion of year fixed effects, heteroskedasticity robust standard errors, and to a broad set of control variables. Moreover, the distinction between old and new member states suggests that the association is generally stronger in the case of trade openness with new member states, although this difference is not equally strong in all specifications. This supports our initial hypothesis that the impact of trade liberalization on regional inequalities depends on the level of development of European trade partners considered. In particular, trade with new, less developed, member states appears to be more strongly associated with internal geographical divergence than trade with the established, more developed, members. This contrasts with the evidence provided by Petrakos et al. (2016) for the ENP countries, where trade with most developed EU countries was associated with higher internal inequalities, whereas trade with the poorest EU countries had a counterbalancing effect. Nonetheless, in this thesis, both trade with new and old members is associated with stronger regional divergence. Conversely, this pattern is not reflected in the trade openness with the rest of the world, which displays a consistently negative sign but is statistically significant only in some

specifications, pointing to a possible – but less robust – association with regional convergence. At the same time, the variables intended to capture the redistribution capacity of national and EU government do not show any statistically significant association with regional inequalities in the most complete models. Overall, the explanatory power of the regressions improves considerably across specifications, reaching an adjusted R^2 of 0.732 in the fullest disaggregated model and 0.728 in the corresponding aggregate EU27 specification. In summary, the evidence suggests that European trade integration had an unequalising effect on the spatial distribution of economic activity, with a particularly strong role played by trade openness towards the new member states.

4.2. Main findings – Heterogeneous regional growth model

As previously explained, this thesis extends the analysis on the effect of European trade openness on regional inequalities with a further model that studies whether trade openness affected regional growth heterogeneously, depending on the initial position of each region within the national distribution of GDP per capita. Table 3 presents the main results of the model, estimated according to equation (3) using the 1993 distribution of regional GDP per capita to construct the $Top10^{pre}$ and the $Bottom50^{pre}$ indicators, and then analysing regional growth over the period 1994-2010. The table reports different specifications, all estimated with country and year fixed effects, with and without the full set of controls, as well as with the distinction between specifications with the aggregate measure of European openness ($OPEN_{EU27}$) and the separate openness indices with EU15 and EU12 partners.

A first look at the baseline specification in columns (1) and (3), which use as main regressor $OPEN_{EU27}$ without controls, suggests that higher European trade openness is positively associated with regional GDP per capita growth. In both cases, the coefficient of $OPEN_{EU27}$ is positive and statistically significant, indicating that greater integration with EU partners is associated with faster growth for the baseline group of regions. Moreover, according to the interaction terms in these specifications, there's

no statistically significant difference in the regional growth between the baseline group and the $Top10^{pre}$ group in both the specifications. This is an important result, as it does not support the hypothesis that trade liberalization is associated with stronger regional inequality because the gains from integration are disproportionately concentrated in the initially richest areas. Similarly, the coefficient of the $Bottom50^{pre}$ is also statistically insignificant, indicating that poorer regions do not display a significantly different growth response to European trade openness compared with the middle group.

However, the results of the model change when the full set of controls is introduced in columns (2) and (4). In these specifications, the coefficient of $OPEN_{EU27}$ loses

Regression results (1993 Flag - 1994 to 2010): Heterogeneous regional growth model

	No controls	Full controls	No controls	Full controls	No controls	Full controls	No controls	Full controls
	EU27: Top10 only		EU27: Top+Bottom		EU15+EU12: Top10 only		EU15+EU12: Top+Bottom	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
open_eu27	0.116**	-0.021	0.118**	-0.015				
	(0.045)	(0.048)	(0.046)	(0.049)				
open_eu27 × top10_pre	0.004	0.001	0.001	-0.002				
	(0.003)	(0.003)	(0.003)	(0.004)				
open_eu27 × bottom50_pre			-0.005	-0.006*				
			(0.004)	(0.003)				
open_eu15					0.068	0.008	0.071	0.011
					(0.051)	(0.068)	(0.051)	(0.068)
open_eu12					0.370*	-0.254	0.373*	-0.230
					(0.208)	(0.186)	(0.207)	(0.187)
open_eu15 × top10_pre					0.003	0.001	0.000	-0.001
					(0.004)	(0.003)	(0.003)	(0.003)
open_eu12 × top10_pre					0.009	0.000	0.007	-0.009
					(0.019)	(0.026)	(0.021)	(0.031)
open_eu15 × bottom50_pre							-0.005	-0.004
							(0.003)	(0.002)
open_eu12 × bottom50_pre							-0.005	-0.019
							(0.013)	(0.015)
open_row		0.207***		0.206***		0.217***		0.215***
		(0.067)		(0.066)		(0.068)		(0.068)
ln_gdp_pc		-0.141		-0.126		-0.009		-0.001
		(0.505)		(0.502)		(0.534)		(0.533)
ln_gdp_pc_sq		0.011		0.010		0.004		0.004
		(0.028)		(0.028)		(0.029)		(0.029)
population_mln		-0.005***		-0.005***		-0.005***		-0.005***
		(0.002)		(0.002)		(0.002)		(0.002)
ln_modelled_eufunds_pc		0.002		0.001		0.002*		0.002
		(0.001)		(0.001)		(0.001)		(0.001)
top10_pre	-0.001	-0.001	0.002*	0.002	-0.001	-0.001	0.002**	0.002
	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)	(0.002)
bottom50_pre			0.006**	0.006***			0.006**	0.005***
			(0.002)	(0.002)			(0.002)	(0.001)
Observations	20012	16262	20012	16262	20012	16262	20012	16262
R-squared	0.374	0.418	0.375	0.419	0.377	0.419	0.378	0.420
Adj. R-squared	0.372	0.416	0.373	0.417	0.375	0.417	0.377	0.418
Countries	24	22	24	22	24	22	24	22
Region FE	Yes (country_code)	Yes (country_code)	Yes (country_code)	Yes (country_code)	Yes (country_code)	Yes (country_code)	Yes (country_code)	Yes (country_code)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

* p < 0.1, ** p < 0.05, *** p < 0.01.

Standard errors clustered at the country level.

Region and year fixed effects included as specified.

***Table 3**. Regression results heterogenous growth model. Dependent variable: Variation of the log of regional GDP (NUTS3). Variables Top10 and Bottom50 according to 1993 distribution of regional GDP. The analysed period spans from 1994 to 2010. Author's own elaboration.*

significance and turns slightly negative, suggesting that the positive association found in the simpler models is not robust once other relevant variables are considered. Moreover, the interaction between $OPEN_{EU27}$ and $Top10^{pre}$ remains statistically insignificant in both specifications, confirming the absence of evidence that the richest regions systematically benefitted more from trade openness in terms of growth. By contrast, the interaction between $OPEN_{EU27}$ and $Bottom50^{pre}$ becomes negative and weakly significant in column (4). This result may indicate that regions belonging to the poorest half of the national distribution in 1993 experienced a less favourable growth response to European trade openness than the baseline group. Although this effect is quite modest and not very strong, it points towards a possible mechanism through which trade integration may have contributed to regional divergence: not by disproportionately accelerating the growth of the richest regions, but rather by weakening the growth performance of the poorest ones. This result is broadly consistent with the evidence of Ezcurra & Rodriguez-Pose (2014), who show that greater trade openness tends to affect poorer regions more negatively, and a wider literature which highlights the weaker performance of more peripheral and less diversified areas during the integration process (Kallioras & Petrakos, 2010; Monastiriotis, Kallioras, & Petrakos, 2017).

Columns (5) to (8) decompose the trade openness index into trade openness with EU15 and EU12 countries. In the specifications without the full set of controls – (5) and (7) – the coefficient of $OPEN_{EU12}$ is positive and weakly significant, while that of $OPEN_{EU15}$ is positive but statistically insignificant. This initial result suggests that trade integration with new member states may have been more strongly associated with regional growth than trade with the old members. Nevertheless, the interaction terms with $Top10^{pre}$ and $Bottom50^{pre}$ are both statistically insignificant, indicating that there's no differential effect of growth between the baseline group and both the richest and poorest regions.

Once the full set of controls is added in columns (6) and (8), the results become even weaker. The coefficient of $OPEN_{EU12}$ turns negative in both specifications, while the

coefficient of $OPEN_{EU15}$ remains positive but insignificant throughout. This change suggests that the positive association previously observed for openness with new member states is sensitive to the inclusion of other controls and should therefore be interpreted with caution. More importantly, none of the interaction terms between openness and the initial regional position variables is statistically significant in these specifications. This result means that once trade openness is split between old and new member states, the weak evidence of heterogenous effects on regional growth found in column (4) disappears. This stands in contrast with the previously obtained evidence from the inequality model, where the distinction between EU15 and EU12 openness seemed to be important and robust. Therefore, while the country-level analysis clearly suggested that both the openness with the new member states and old member states were associated with regional divergence, this regional growth model is less able to identify a precise within-country mechanism driving this result.

The control variables included in the model offer some additional insights. In all the specifications with full controls, the coefficient of $OPEN_{ROW}$ is positive and statistically significant, indicating that greater openness with the rest of the world is associated with faster regional growth. The population variable also has a negative and statistically significant coefficient, suggesting that regions in more populous countries tend to grow more slowly, ceteris paribus. Conversely, the coefficients of the development variables are not statistically significant in these specifications, providing no clear evidence of a non-linear relationship between the level of development and regional growth in this model. The coefficient of modelled EU funds expenditure per capita is positive and weakly significant only in column (6), while it is statistically insignificant across every other specification. Finally, the coefficients of the dummies $Top10^{pre}$ and $Bottom50^{pre}$ are also worth noting. While the latter is positive and statistically significant in all the specifications, the former is only weakly significant or insignificant. This suggests that, ceteris paribus, regions belonging to the poorest half of the national distribution tended to grow faster than the middle group over the considered period. Nonetheless, the specification (4) shows that, despite poorer regions were experiencing a process of

partial convergence, this was weakened in countries that became more open to European trade.

Overall, the results of Table 3 provide only limited evidence in support of the hypothesis that European trade openness affected regional growth heterogeneously depending on the initial positions of regions within the national income distribution during the pre-accession and accession years. In particular, the model does not show that the initially richest regions systematically benefited more from trade integration, but it presents some weak evidence that poorer regions may have experienced a less favourable growth response to rising European openness. Nonetheless, these findings are not robust across all specifications, and therefore, they should be interpreted with caution.

Some additional evidence emerges when the same model is re-estimated focusing on pre-accession and immediate accession years, namely on the period 1994-2005. In this case, shown in Table 4, some coefficients that were previously insignificant turn statistically significant, suggesting that the heterogeneous regional growth effects of European trade openness may have been more pronounced before, rather than after, formal accession. In particular, in the specifications (1) and (2) using the aggregate $OPEN_{EU27}$ index and only the $Top10^{pre}$ indicator, the interaction term between these two variables becomes positive and statistically significant, both with and without controls. This indicates that, during this considered period, regions initially belonging to the top decile of the national income distribution tended to benefit more from rising European openness in terms of growth. When the $Bottom50^{pre}$ dummy variable is also included, the previous evidence on the richest region becomes weaker, but the interaction between $OPEN_{EU27}$ and $Bottom50^{pre}$ turns negative and weakly significant in the full specification of column (4), suggesting that poorer regions may have experienced a less favourable growth response to trade integration.

The disaggregated specifications from column (5) to column (8) provide some additional insights. Once European trade openness is separated between trade with the EU15 and the EU12, the interaction between $OPEN_{EU12}$ and $Top10^{pre}$ becomes

positive and statistically significant in column (5) and (7). This may indicate that richer regions were able to benefit disproportionately from the increase in trade openness with the new member states, despite the significance of the coefficients does not survive the inclusion of controls. By contrast, the interaction between $OPEN_{EU15}$ and $Top10^{pre}$ remains insignificant in all specifications, indicating that the richest region did not experience any heterogenous growth effect driven by trade integration with the old member states. However, in the specifications including both the top and the bottom dummies (7) and (8), the interaction between $OPEN_{EU15}$ and $Bottom50^{pre}$ is negative and statistically significant. This indicates that stronger trade integration with the old member states may have been associated with relatively weaker growth in the poorest

Regression results (1993 Flag - 1994 to 2005): Heterogeneous regional growth model

	No controls	Full controls	No controls	Full controls	No controls	Full controls	No controls	Full controls
	EU27: Top10 only		EU27: Top+Bottom		EU15+EU12: Top10 only		EU15+EU12: Top+Bottom	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
open_eu27	0.108**	0.048	0.115**	0.058				
	(0.045)	(0.049)	(0.045)	(0.049)				
open_eu27 × top10_pre	0.014**	0.008*	0.008	0.002				
	(0.006)	(0.005)	(0.006)	(0.004)				
open_eu27 × bottom50_pre			-0.012	-0.012*				
			(0.008)	(0.006)				
open_eu15					0.073*	0.069	0.080*	0.076
					(0.042)	(0.065)	(0.043)	(0.064)
open_eu12					0.415*	-0.141	0.419*	-0.103
					(0.225)	(0.218)	(0.225)	(0.221)
open_eu15 × top10_pre					0.009	0.006	0.002	0.000
					(0.005)	(0.004)	(0.004)	(0.003)
open_eu12 × top10_pre					0.057***	0.033	0.054**	0.019
					(0.019)	(0.032)	(0.023)	(0.045)
open_eu15 × bottom50_pre							-0.013*	-0.010***
							(0.006)	(0.003)
open_eu12 × bottom50_pre							-0.006	-0.032
							(0.023)	(0.044)
open_row		0.174		0.172		0.190		0.186
		(0.107)		(0.106)		(0.112)		(0.112)
ln_gdp_pc		0.256		0.275		0.336		0.347
		(0.386)		(0.380)		(0.364)		(0.360)
ln_gdp_pc_sq		-0.006		-0.007		-0.011		-0.011
		(0.021)		(0.021)		(0.020)		(0.020)
population_mln		-0.004		-0.004		-0.005		-0.005*
		(0.003)		(0.003)		(0.003)		(0.003)
ln_modelled_eufunds_pc		0.004		0.003		0.004*		0.003
		(0.002)		(0.002)		(0.002)		(0.002)
top10_pre	-0.006**	-0.003**	-0.000	0.001	-0.006**	-0.003**	-0.000	0.001
	(0.002)	(0.001)	(0.002)	(0.001)	(0.002)	(0.001)	(0.001)	(0.002)
bottom50_pre			0.010**	0.008***			0.010**	0.008***
			(0.004)	(0.002)			(0.004)	(0.002)
Observations	14332	11282	14332	11282	14332	11282	14332	11282
R-squared	0.281	0.339	0.285	0.341	0.283	0.339	0.287	0.341
Adj. R-squared	0.279	0.336	0.283	0.338	0.281	0.337	0.285	0.339
Countries	24	22	24	22	24	22	24	22
Region FE	Yes (country_code)	Yes (country_code)	Yes (country_code)	Yes (country_code)	Yes (country_code)	Yes (country_code)	Yes (country_code)	Yes (country_code)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

* p < 0.1, ** p < 0.05, *** p < 0.01.

Standard errors clustered at the country level.

Region and year fixed effects included as specified.

***Table 4**. Regression results heterogenous growth model. Dependent variable: Variation of the log of regional GDP (NUTS3). Variables Top10 and Bottom50 according to 1993 distribution of regional GDP. The analysed period spans from 1994 to 2005. Author's own elaboration*

regions, compared to the baseline regions. Taken together, these results suggest that the pre-accession phase may have been characterized by a more visible unequal distribution of the gains from trade integration across countries.

A possible explanation for this stronger evidence in this more limited timeframe is that the impact of trade liberalization was likely more concentrated in the years in which the Interim and the Europe Agreements were progressively reducing market barriers. During this period, the regions that were already more developed may have been able to exploit better new trade opportunities and to capture the gains from integration more rapidly than others. Once the post-accession years are included, these initial heterogeneous effects appear to weaken, possibly because they are partially absorbed by the progressive extensions of integration benefits to a wider set of regions. Overall, the stronger pre-accession results seem to be broadly consistent with the literature reviewed in Chapter 2, which highlights how the earlier phases of European integration and market opening often benefited the better positioned and less peripheral regions (Monastiriotis, et al., 2017).

4.3. Robustness Checks

To test the robustness of the baseline results, the inequality model is re-estimated using clustered standard errors, and alternative measures of regional inequality. In particular, the baseline specification with the Gini index is estimated again using standard errors clustered at the country level and country-fixed effects. This correction should take into account the structure of the data, which presents yearly data from different countries, which may have different idiosyncratic characteristics. Moreover, following a significant strand of the literature, the analysis is replicated using two alternative inequality measures : the population-weighted coefficient of variation (CV) (e.g. Petrakos et al., 2005; Rodríguez-Pose, 2012) and the Theil's second measure of inequality, $T(0)$ (Ezcurra & Rodríguez-Pose, 2013; Ezcurra & Rodríguez-Pose, 2014). These indices differ in the way they summarise the distribution of regional GDP per capita, but, like the Gini index, they are scale-independent and suitable for comparing regional disparities across countries and over time. Table 5 reports the full-control

specifications across the three inequality measures with country-clustered standard errors.

The first two columns of Table 5 present the Gini specifications estimated with country-clustered standard errors. Overall, the main findings of the baseline analysis remain

Full-controls specifications using different inequality indices

	(1) Gini	(2) Gini	(3) CV	(4) CV	(5) Theil (0)	(6) Theil (0)
open_eu27	0.074***		0.122***		0.033***	
	(0.018)		(0.031)		(0.009)	
open_eu15		0.069***		0.109***		0.027**
		(0.018)		(0.032)		(0.010)
open_eu12		0.145*		0.310**		0.114**
		(0.083)		(0.114)		(0.052)
open_row	-0.012	-0.011	0.043	0.044	0.013	0.014
	(0.038)	(0.037)	(0.062)	(0.063)	(0.024)	(0.023)
ln_gdp_pc	1.019***	0.958**	3.320***	3.156***	0.712***	0.642**
	(0.352)	(0.367)	(0.710)	(0.715)	(0.228)	(0.237)
ln_gdp_pc^2	-0.059***	-0.055***	-0.185***	-0.176***	-0.040***	-0.037***
	(0.018)	(0.019)	(0.038)	(0.038)	(0.012)	(0.012)
pop_million	-0.000	0.000	0.000	0.000	-0.000	0.000
	(0.001)	(0.001)	(0.001)	(0.001)	(0.000)	(0.000)
eu_border	0.001	0.000	0.005***	0.005***	0.001*	0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.000)	(0.000)
enl_04	-0.037*	-0.044**	-0.053	-0.072	-0.014	-0.023
	(0.018)	(0.020)	(0.043)	(0.044)	(0.013)	(0.013)
enl_07	-0.031	-0.033	-0.034	-0.039	-0.014	-0.016
	(0.028)	(0.027)	(0.056)	(0.050)	(0.020)	(0.018)
n_units	0.000***	0.000***	0.000	0.000	0.000**	0.000**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
modelled_eufunds_share_gdp	-0.005	-0.004	-0.046***	-0.043***	-0.006	-0.004
	(0.007)	(0.007)	(0.015)	(0.014)	(0.004)	(0.004)
gov_spend_share_gdp	0.053	0.069	0.200	0.245	0.035	0.054
	(0.130)	(0.134)	(0.256)	(0.264)	(0.076)	(0.077)
Num.Obs.	287	287	287	287	287	287
R2	0.752	0.758	0.832	0.838	0.766	0.784
R2 Adj.	0.728	0.732	0.815	0.821	0.743	0.761
Countries	21	21	21	21	21	21
Country FE	No	No	No	No	No	No
Year FE	Yes	Yes	Yes	Yes	Yes	Yes

* p < 0.1, ** p < 0.05, *** p < 0.01

Country clustered standard errors in parentheses.

***Table 5**. Regression results of the impact of EU trade openness on different measures of regional inequalities (Gini, CV and T(0)). Country clustered standard errors. Author's own elaboration.*

substantially unchanged. Trade openness with EU27 partners continues to display a positive and statistically significant coefficient, confirming that deeper European trade integration is associated with higher levels of regional inequality. When openness is decomposed between the EU15 and the EU12, both variables remain positively associated with regional disparities, and the coefficient of $OPEN_{EU12}$ is still larger than that of $OPEN_{EU15}$, despite becoming weaker in statistical significance, suggesting some caution in interpreting the precision of this estimate. This test confirms that the unequalising association of intra-EU trade openness is not driven by the choice of heteroskedasticity-robust standard errors alone, but it survives also when standard errors are clustered at the country level.

Columns (3) and (4) re-estimate the model using the coefficient of variation as the dependent variable, which is computed as follows:

$$CV_{ct} = \frac{\sqrt{\sum_{i=1}^{N_c} p_{it}(y_{it} - \mu_{ct})^2}}{\mu_{ct}}$$

The results are broadly consistent with those obtained with the Gini index. In the aggregate specification, $OPEN_{EU27}$ retains a positive and strongly significant coefficient, while in the disaggregated model both $OPEN_{EU15}$ and $OPEN_{EU12}$ are positive and statistically significant. Importantly, also in this specification, the coefficient of openness towards the EU12 is considerably larger than that of openness towards the EU15, with a coefficient that is almost three times that of $OPEN_{EU15}$. This indicates that the stronger association between trade with the new member states and regional disparities is not specific to the Gini index, but it also emerges when inequality is measured with the coefficient of variation. The magnitude of the coefficients is not directly comparable with those of the Gini model, but it is important to notice the consistency of the signs and of the significance of the coefficients.

A similar picture emerges when Theil's second measure of inequality $T(0)$ is used, as shown in columns (5) and (6). This index is computed as follows:

$$T(0)_{ct} = \sum_{i=1}^{N_c} p_{it} \log\left(\frac{\mu_{it}}{y_{ct}}\right)$$

Also in this case, $OPEN_{EU27}$ has a positive and statistically significant coefficient in the aggregate specification. In the disaggregated specification, both $OPEN_{EU15}$ and $OPEN_{EU12}$ remain positive and statistically significant, with the coefficient of openness towards the new member states which is around four times larger than that of openness towards the old member states. Therefore, the main results of this thesis survive also when using the Theil's index, which is more sensitive to changes in the tails of the distribution than the Gini and thus captures a slightly different aspect of regional divergence. The fact that the same general results emerge across all three measures suggests that the baseline findings are not driven by the way in which regional disparities are summarised.

Finally, another robustness check consists in re-estimating the baseline Gini specification by including both country and year fixed effects, while clustering standard errors at the country level. This is notably a more demanding specification, as it

Regression results on regional inequalities with country and year FE. Dependent variable: Gini index.

	(1)	(2)	(3)
open_eu27	0.054	0.062	
	(0.036)	(0.037)	
open_row		-0.036	-0.033
		(0.028)	(0.026)
open_eu15			0.022
			(0.035)
open_eu12			0.264***
			(0.084)
Num.Obs.	440	440	440
R2	0.866	0.868	0.878
R2 Adj.	0.851	0.853	0.864
Countries	24	24	24
Country FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes

* p < 0.1, ** p < 0.05, *** p < 0.01

Standard errors in parentheses.

Standard errors clustered at the country level.

***Table 6**. Regression results of the impact of EU trade openness on the Gini index of regional inequalities, using country and year FE. Country clustered standard errors. Author's own elaboration*

identifies the relationship between trade openness and regional inequalities only through within-country variation over time. The results of this test are reported in Table 6, and they still point in the same general direction as the baseline analysis, although with weaker statistical significance. In particular, the coefficient of $OPEN_{EU27}$ remains positive in the first two columns, but it is no longer statistically significant once country fixed effects are introduced. Similarly, when trade openness is decomposed between the two groups of European partners, the coefficient of $OPEN_{EU15}$ remains positive but statistically insignificant, while that of $OPEN_{EU12}$ is positive and statistically significant. This suggests that, even after controlling for unobserved and time-invariant country characteristics, trade openness towards the new member states continues to be associated with higher levels of regional inequality, whereas the estimate of the association between regional inequalities and trade with EU15 countries is no longer significant. This provides additional support to the finding that the unequalising effect of European trade integration is driven more clearly by openness towards the new member states than by openness towards the old members. At the same time, the coefficient of $OPEN_{ROW}$ remains negative but statistically insignificant in all the specifications.

Finally, a robustness check is also performed on the heterogeneous regional growth model by redefining the $Top10^{pre}$ and the $Bottom50^{pre}$ indicators using alternative baseline years. This is important because the initial position of each region within the national income distribution is a key element of the empirical strategy, and the results may partially depend on the specific year chosen to construct these classifications. For this reason, the model is re-estimated by using 1991, 1995 and 2000 as alternative baseline years, while restricting the sample accordingly so that the analysis always begins after the chosen baseline year. Since regional data are not equally available across countries over time, the specification based on the 1991 classification includes a smaller sample of countries, whereas the later classifications allow a broader country coverage, but they shorten the time span of the analysis.

The results of this test are shown in Table 7, and they suggest that the evidence on heterogeneous regional growth is broadly consistent when using different baseline years. In the aggregate specifications using $OPEN_{EU27}$, the coefficient of the interaction between the European trade openness index and $Top10^{pre}$ is never statistically significant, similarly to what is found in the most complete specifications in Tables 3 and 4. This confirms that the initial evidence in favour of a systematically stronger

Regression results: Heterogenous growth effects across alternative base-year classifications

	EU27	EU15+EU12	EU27	EU15+EU12	EU27	EU15+EU12
	1991 Flag, 1993 to 2010		1995 Flag, 1996 to 2010		2000 Flag, 2001 to 2010	
	(1)	(2)	(3)	(4)	(5)	(6)
open_eu27	-0.041		-0.027		-0.068	
	(0.042)		(0.050)		(0.081)	
open_eu27 × top10_pre	-0.002		0.004		0.002	
	(0.003)		(0.004)		(0.004)	
open_eu27 × bottom50_pre	-0.015		-0.004*		-0.004	
	(0.010)		(0.002)		(0.003)	
open_eu15		-0.006		0.009		-0.035
		(0.062)		(0.072)		(0.102)
open_eu12		-0.358*		-0.311*		-0.287*
		(0.198)		(0.172)		(0.148)
open_eu15 × top10_pre		0.001		0.001		-0.002
		(0.002)		(0.002)		(0.003)
open_eu12 × top10_pre		-0.031		0.027		0.032
		(0.024)		(0.024)		(0.020)
open_eu15 × bottom50_pre		-0.011*		-0.004**		-0.004*
		(0.005)		(0.002)		(0.002)
open_eu12 × bottom50_pre		-0.053		-0.002		-0.001
		(0.067)		(0.013)		(0.020)
open_row	0.236***	0.260***	0.208***	0.219***	0.249**	0.249**
	(0.080)	(0.080)	(0.068)	(0.068)	(0.105)	(0.103)
ln_gdp_pc	-0.237	-0.049	-0.128	0.032	-1.090*	-0.959
	(0.493)	(0.501)	(0.530)	(0.547)	(0.621)	(0.624)
ln_gdp_pc_sq	0.017	0.007	0.010	0.002	0.064*	0.057
	(0.027)	(0.027)	(0.029)	(0.030)	(0.035)	(0.035)
population_mln	-0.004**	-0.005***	-0.005***	-0.006***	-0.002	-0.003
	(0.001)	(0.002)	(0.002)	(0.002)	(0.003)	(0.003)
ln_modelled_eufunds_pc	0.003	0.004*	0.001	0.002**	0.002	0.002*
	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)
top10_pre	0.002	0.002	0.000	0.000	0.000	0.000
	(0.002)	(0.002)	(0.001)	(0.001)	(0.002)	(0.002)
bottom50_pre	0.010**	0.010**	0.004***	0.004***	0.004**	0.004**
	(0.004)	(0.004)	(0.001)	(0.001)	(0.002)	(0.002)
Observations	17606	17606	15516	15516	11406	11406
R-squared	0.392	0.394	0.367	0.370	0.416	0.417
Adj. R-squared	0.390	0.392	0.365	0.368	0.414	0.415
Countries	20	20	24	24	24	24
Region FE	Yes (country_code)	Yes (country_code)	Yes (country_code)	Yes (country_code)	Yes (country_code)	Yes (country_code)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes

* p < 0.1, ** p < 0.05, *** p < 0.01.

Standard errors clustered at the country level.

All specifications report Top+Bottom interactions with full controls.

***Table 7**. Regression results heterogenous growth model using alternative baseline years to define the variables Top10 and Bottom50. Author's own elaboration*

growth effect for the initially richest regions is not robust to changes in the way top and bottom groups are defined. By contrast, the interaction between $OPEN_{EU27}$ and $Bottom50^{pre}$ remains negative in all three specifications but is weakly significant only when the 1995 classification is used. Although this result is not strong enough to be considered fully robust, it is consistent with the results from Tables 3 and 4, and with the interpretation advanced in the main analysis that the unequalising effect of European trade openness may have operated more through a relatively weaker growth performance of poorer regions.

The disaggregated specifications with $OPEN_{EU15}$ and $OPEN_{EU12}$ provide further support for this interpretation. The interactions of both openness indices with $Top10^{pre}$ are never statistically significant, again in line with the most complete specifications of Table 3-4. Therefore, the unequalising effect of higher trade openness does not appear to be associated with relatively stronger growth in the top 10 percent of regions. By contrast, when looking at the interactions with $Bottom50^{pre}$ regions, the coefficient of $OPEN_{EU12}$ is never statistically significant, while that of $OPEN_{EU15}$ is negative and weakly significant across all specifications, consistently with what is found in Table 4. This confirms that regions initially belonging to the poorest half of the national distribution tended to experience a less favourable growth response to increasing trade openness with the EU15 countries.

Taken together, these robustness checks broadly confirm the results of the heterogeneous regional growth model, despite revealing some sensitivity to the choice of the baseline year used to classify regions. In particular, the weaker growth performance of poorer regions appears to be the most stable result, especially in relation to trade openness with the EU15 countries. On the other hand, these checks do not confirm the weak evidence found in the initial, most basic specification that initially richer regions have benefitted more from trade openness.

4.4. Limitations

Despite the robustness checks performed in the previous sections, some limitations of the empirical analysis should still be acknowledged. First, neither the country-level inequality model nor the heterogeneous regional growth model can establish with certainty a causal relationship between European trade openness and regional outcomes. Although both analyses rely on OLS multivariate regression models with a broad set of controls, including year and country fixed effects, and several robustness checks, they cannot fully rule out the possibility of omitted variable bias or endogeneity. In particular, unobserved country-specific factors that vary over time such as institutional reforms or domestic development strategies may still affect both the degree of trade openness and the evolution of regional disparities. For this reason, the estimated coefficients should be interpreted as conditional associations rather than as definitive causal effects.

A second limitation concerns the nature of the European integration process itself. Although this thesis includes the pre-accession period and therefore captures part of the effects of the Interim and Europe Agreements, the increase in trade openness cannot be linked directly to a single and clearly identifiable shock. European integration was a gradual process, in which trade patterns may have changed both in anticipation of formal accession and progressively after it. Consequently, the empirical models of this thesis do not isolate the effects of the 2004 and 2007 enlargement waves alone, but rather, they capture the broader process of trade integration surrounding them. This makes it difficult to distinguish precisely the effects of pre-accession liberalization, formal accession and later adjustment dynamics.

A further limitation is highlighted in the robustness checks section with the usage of country-fixed effects in the first model on regional inequalities. In fact, the baseline model was estimated without country-fixed effects to preserve the cross-country variation, and when these are included in the model, the coefficients of the main regressors become smaller and lose statistical significance, with the exception of the $OPEN_{EU12}$ coefficient. This suggests that the association between trade openness and

regional disparities is more robust when considering trade with new member states. At the same time, the broader relationship between European trade openness and regional inequalities may be partially driven by persistent differences across countries, rather than only by within-country changes over time. Therefore, although the country fixed-effects specification strengthens the credibility of the main results on $OPEN_{EU12}$, it also indicates that some of the baseline findings should be interpreted with caution.

The heterogeneous regional growth model presents an additional limitation which relates to the construction of the $Top10^{pre}$ and $Bottom50^{pre}$ indicators. Although this approach offers a way to distinguish between initially richer and poorer regions, it inevitably simplifies the underlying income distribution and may hide relevant heterogeneity within each group. Moreover, the robustness checks show that some results are sensitive to the choice of the baseline year used to define these classifications.

Another possible issue is related to data availability and sample composition. The number of countries and observations changes across some specifications because not all variables are available for all countries and years. This is especially relevant among the new member states, where data coverage was less precise and extensive in the earlier years of the analysis. As a result, part of the variation in coefficients across specifications may reflect changes in sample composition rather than only substantive differences in the underlying relationships.

Finally, this thesis considers only one main dimension of regional economic performance, namely GDP per capita. Although this is the most widely used indicator in the literature on regional inequalities and convergence, it does not fully capture other relevant aspects of regional well-being such as wages, productivity, employment, or access to public services. Therefore, the results of this analysis should be interpreted as evidence on the spatial distribution of economic activity rather than on regional welfare in a broader sense.

In general, while this thesis provides robust evidence of an association between deeper European trade integration and regional divergence, these findings should be interpreted with caution, considering that they do not offer a full proof of causality and remain subject to some limitations imposed by the gradual nature of the European integration process, data availability and other constraints of the empirical models adopted.

5. Conclusion

This thesis had the objective of studying the relationship between enlargement-driven trade liberalization and the evolution of regional inequalities within EU member states. The central question was whether the 2004 and 2007 enlargement waves, together with the gradual trade integration already fostered by the previous Interim and Europe Agreements, contributed to a more unequal geographical distribution of economic activity within countries. This was not merely an economic issue, but also a political one, since uneven regional development and regional stagnation have been linked in the literature to the rise of Eurosceptic and nationalist movements. In order to address this question, this study focused on the period surrounding the enlargement process and extended well before formal accession to capture part of the effects of the pre-accession agreements. The empirical strategy relied on two models. The first was a country-level model of regional inequalities, aimed at estimating the relationship between European trade openness and the evolution of regional disparities within countries. The second was a regional-level model of heterogeneous growth, designed to test whether trade openness affected differently the growth performance of regions depending on their initial position within the national distribution of GDP per capita. Both empirical strategies used multivariate OLS regression models to capture the effect of EU trade openness, controlling for several confounding factors and using year-fixed effects and – limitedly to the second model – also country-fixed effects.

The findings of this research are somewhat aligned with the literature, but they partially question it in some points. First, the country-level inequality model shows that deeper trade openness with EU partners is associated with higher levels of regional disparities within member states. This result confirms the initial hypothesis that European trade integration has not benefited all regions in the same way. It is also consistent with the findings of the literature on a link between regional divergence and trade openness, even though this study focuses on the narrower context of the European Union rather than on global integration as a whole (e.g. Rodríguez-Pose, 2012; Ezcurra & Del Villar, 2021). This association is also coherent with some of the NEG models, such as

Paluzie (2001) and Crozet & Koenig Soubeyran (2004), which suggest that trade liberalization may strengthen agglomeration dynamics and spatial concentration. This result is also confirmed by some of the robustness checks with alternative inequality measures and clustered standard errors, confirming that this general result is not driven by the specific index used to summarise regional disparities. Nonetheless, this result did not survive the inclusion of country-fixed effects, and for this reason, it should be taken with care.

Second, disaggregating trade with old and new members highlights an important asymmetry. Throughout the baseline model and the robustness checks, trade openness with the EU12 countries tends to display a stronger association with regional inequalities than openness with established members (EU15), even though this difference is not equally pronounced in all specifications. In the more complex robustness checks, including both country and year fixed effects, the coefficient of trade openness with new member states is positive, and it is the only one that remains statistically significant. This suggests that the diverging effect of European trade integration is more robust when considering openness towards the new member states. This result supports the initial hypothesis that the effects of trade liberalization depend on the level of development of the trade partners involved. In particular, trade integration with new, less developed member states seems to exacerbate more regional disparities than integration with the established EU members. This could help explain the link between trade with EU15 countries and reduced support for protectionist and nationalist parties found by Colantone & Stanig (2018). And, conversely, it could give a reason for their result of higher support for nationalist parties associated with higher EU12 trade. At the same time, this finding contrasts with the evidence provided by Petrakos et al. (2016) for the ENP countries, where trade with richer EU partners was found to be more inequality-enhancing.

Finally, quite surprisingly, the results are less clear-cut when considering trade openness with the rest of the world. In the inequality model, the coefficient of extra-EU openness is generally negative, but it is not strongly significant across all specifications

and loses robustness in the more complete models and in some of the robustness checks. Therefore, this finding partially questions the results of the main literature on the negative impact of global trade on regional inequalities (e.g. Ezcurra & Del Villar, 2021). This difference could be explained by the fact that this thesis focuses on the EU, which is mainly composed of developed countries, while the literature findings are stronger when focusing on developing countries. A further explanation could be that extra-EU trade, involving higher shipping costs, reduces the importance of places with better market access, contributing to a more homogenous distribution of economic activity.

The second model, which studies heterogeneous regional growth effects of trade openness, adds a further layer to the analysis. Generally, it provides only limited evidence that European trade openness systematically benefitted the initially richest regions more than the others. On the other hand, it offers more consistent evidence that poorer regions may have experienced a less favourable growth response, especially in relation to trade openness with the EU15 and, in some specifications, to broader European openness. Moreover, by restricting the analysis to the pre-accession years, these heterogeneous effects appear slightly clearer, suggesting that the earlier phase of market opening may have generated a more uneven distribution of the gains from integration. Overall, these results indicate that the effect of European trade integration on regional disparities may have operated more through a relatively weaker performance of poorer regions, rather than with a growth boost to the richest regions. This interpretation is broadly consistent with Ezcurra & Rodriguez-Pose (2014) and with the literature emphasising the weaker performance of more peripheral and less diversified areas during the trade integration process (Kallioras & Petrakos, 2010; Monastiriotis, Kallioras, & Petrakos, 2017).

The results of the two empirical models are complementary. The first model shows in a relatively robust way that deeper European trade integration is associated with stronger regional inequalities within member states, especially when openness towards new member states is considered. The second model adds to this one by

providing a more cautious explanation of the within-country mechanism behind this result, pointing to the slower growth of poorer regions, which may have been less able to benefit from the European integration process, particularly in the earlier stages of market opening.

The implications of this thesis go far beyond economics and have significant political consequences for the sustainability of the European project. If enlargement-driven trade integration appears to have contributed to a more uneven spatial distribution of economic activity, then it may also have reinforced some of the territorial discontent as described in the political economy literature in Chapter 2. In fact, several studies connect regional economic divergence and stagnation to rising Euroscepticism and distrust towards the EU (e.g. Rodríguez-Pose, 2018; Sotiriou et al., 2025). In this sense, the findings of this thesis suggest that the distributive consequences of European integration deserve greater attention, not only because of their economic significance, but also because of their potential impact on political cohesion. While these results do not imply that integration should be reversed, they highlight the presence of some adverse effects correlated with integration which should be addressed to guarantee the political sustainability of the European project. While Structural Funds and national redistribution policies already constitute some mechanisms with the purpose of encouraging regional convergence, this analysis shows that they do not appear to have the intended effect. This considered, the argument advanced by Iammarino et al. (2019), which emphasises the need to focus more on “place-sensitive” development policies rather than on simple transfers, appears particularly relevant. Such policies should be tailored to regional characteristics, leveraging local comparative advantages. Moreover, they should acknowledge that a certain level of agglomeration is inevitable, and as a consequence they should try to spread agglomeration gains in as many places as possible.

In conclusion, this thesis has provided evidence of the existence of a link between enlargement-driven trade openness and a more unequal distribution of economic activity within EU member states, with a particularly strong role played by trade

openness towards new members. It also indicates that these higher inequalities may have occurred through a relatively weaker growth performance of poorer regions rather than through a stronger growth in the richest ones. This study contributes to the literature by linking the enlargement process to country-level regional inequalities and to heterogeneous regional growth dynamics within countries. These findings should therefore be considered as a starting point for further research on the distributive consequences of European economic integration and enlargement, and on possible policy solutions.

Bibliography

Alonso Villar, O. (1999). Spatial distribution of production and international trade: a note. *Regional Science and Urban Economics, 29*, 371-380. doi:10.1016/S0166-0462(98)00041-6

Barrios, S., & Strobl, E. (2009). The dynamics of regional inequalities. *Regional Science and Urban Economics, 39*, 575-591. doi:10.1016/j.regsciurbeco.2009.03.008

Bathelt, H., Buchholz, M., & Storper, M. (2024). The nature, causes, and consequences of inter-regional inequality. *Journal of Economic Geography, 24*(3), 353-374. doi:10.1093/jeg/lbae005

Behrens, K., Gaigné, C., Ottaviano, G. I., & Thisse, J.-F. (2007). Countries, regions and trade: On the welfare impacts of economic integration. *European Economic Review, 51*(5), 1277-1301. doi:10.1016/j.euroecorev.2006.08.005

Breau, S., & Rigby, D. L. (2010). International trade and wage inequality in Canada. *Journal of Economic Geography, 10*, 55-86. doi:10.1093/jeg/lbp016

Brülhart, M. (2011). The spatial effects of trade openness: a survey. *Rev World Econ, 147*, 59-83. doi:10.1007/s10290-010-0083-5

Brülhart, M., Carrère, C., & Robert-Nicoud, F. (2018). Trade and towns: Heterogeneous adjustment to a border shock. *Journal of Urban Economics, 105*, 162-175. doi:10.1016/j.jue.2017.09.005

Brülhart, M., Crozet, M., & Koenig, P. (2004). Enlargement and the EU Periphery: The Impact of Changing Market Potential. *World Economy*, 853-875. doi:10.1111/j.1467-9701.2004.00632.x

Cantwell, J., & Zaman, S. (2024). International knowledge connectivity and increasing concentration of innovation in major global cities. *Journal of Economic Geography, 24*(3), 415-440. doi:10.1093/jeg/lbae013

Colantone, I., & Stanig, P. (2018). The Trade Origins of Economic Nationalism: Import Competition and Voting Behavior in Western Europe. *American Journal of Political Science, 62*(4), 936-953. doi:10.1111/ajps.12358

Crozet, M., & Koenig Soubeyran, P. (2004). EU enlargement and the internal geography. *Journal of Comparative Economics, 32*, 265-279. doi:10.1016/j.jce.2004.02.009

Dreher, A., & Gaston, N. (2008). Has Globalization Increased Inequality? *Review of international economics, 16*(3), 516-536. doi:10.1111/j.1467-9396.2008.00743.x

Ezcurra, R., & Del Villar, A. (2021). Globalization and spatial inequality: Does economic integration affect regional disparities? *The Annals of Regional Science, 67*, 335-358. doi:10.1007/s00168-021-01050-5

Ezcurra, R., & Rodríguez-Pose, A. (2013). Does Economic Globalization affect Regional Inequality? A Cross-country Analysis. *World Development, 52*, 92-103. doi:10.1016/j.worlddev.2013.07.002

Ezcurra, R., & Rodríguez-Pose, A. (2014). Trade Openness and Spatial Inequality in Emerging Countries. *Spatial Economic Analysis, 9*(2), 162-182. doi:10.1080/17421772.2014.891155

Frankel, J. A., & Romer, D. (1999). Does Trade Cause Growth? *The American economic review, 89*(3), 379-399. doi:10.1257/aer.89.3.379

Henderson, J. V. (1982). Systems of cities in closed and open economies. *Regional Science and Urban Economics, 12*(3), 325-350. doi:10.1016/0166-0462(82)90022-9

Iammarino, S., Rodríguez-Pose, A., & Storper, M. (2019). Regional Inequality in Europe: evidence, theory and policy implications. *Journal of Economic Geography, 19*(2), 273-298. doi:10.1093/jeg/lby021

Kallioras, D., & Petrakos, G. (2010). Industrial growth, economic integration and structural change: evidence from the EU new member-states regions. *The Annals of Regional Science, 45*, 667-680. doi:10.1007/s00168-009-0296-5

Krugman, P. (1991). Increasing Returns and Economic Geography. *Journal of Political Economy, 99*(3), 483-499. doi:10.1086/261763

Krugman, P., & Livas Elizondo, R. (1996). Trade policy and the third world metropolis. *Journal of Development Economics, 49*(1), 137-150. doi:10.1016/0304-3878(95)00055-0

Lenzi, C., & Perucca, G. (2021). People or Places that Don't Matter? Individual and Contextual Determinants of the Geography of Discontent. *Economic Geography, 97*(5), 415-445. doi:10.1080/00130095.2021.1973419

Mayne, Q., & Katsanidou, A. (2023). Subnational economic conditions and the changing geography of mass Euroscepticism: A Longitudinal Analysis. *European Journal of Political Research, 62*, 742-760. doi:10.1111/1475-6765.12528

McCann, P., & van Oort, F. (2019). Chapter 1: Theories of agglomeration and regional economic growth: a historical review. In R. Capello, & P. Nijkamp, *Handbook of Regional Growth and Development Theories* (pp. 6-23). Edward Elgar.

Mitze, T., & Breidenbach, P. (2024). The complex regional effects of macro-institutional change: evidence from EU enlargement over three decades. *Review of World Economics, 160*, 1443-1475. doi:10.1007/s10290-024-00528-6

Monastiriotis, V., Kallioras, D., & Petrakos, G. (2017). The regional impact of European Union association agreements: an event-analysis approach to the case of Central and Eastern Europe. *Regional Studies, 51*(10), 1454-1468. doi:10.1080/00343404.2016.1198472

Paluzie, E. (2001). Trade policy and regional inequalities. *Papers in Regional Science, 80*, 67-85. doi:10.1111/j.1435-5597.2001.tb01787.x

Petrakos, G., Rodríguez-Pose, A., & Rovolis, A. (2005). Growth, integration, and regional disparities in the European Union. *Environment and Planning, 37*, 1837-1855. doi:10.1068/a37348

Petrakos, G., Tsiapa, M., & Kallioras, D. (2016). Regional inequalities in the European Neighborhood Policy countries: The effects of growth and integration. *Environment and Planning C: Government and Policy, 34*, 698-716. doi:10.1177/0263774X15614730

Rauch, J. E. (1989). Increasing returns to scale and the pattern of trade. *Journal of International Economics, 26*(3), 359-369. doi:10.1016/0022-1996(89)90009-3

Rauch, J. E. (1991). Comparative Advantage, Geographic Advantage and the Volume of Trade. *The Economic Journal, 101*(408), 1230-1244. doi:10.2307/2234438

Rodríguez-Pose, A. (2012). Trade and Regional Inequality. *Economic Geography, 88*(2), 109-136. doi:10.1111/j.1944-8287.2012.01147.x

Rodríguez-Pose, A. (2018). The revenge of the places that don't matter (and what to do about it). *Cambridge Journal of Regions, Economy and Society, 11*, 189-209. doi:10.1093/cjres/rsx024

Rodríguez-Pose, A., & Gill, N. (2006). How Does Trade Affect Regional Disparities? *World Development, 34*(7), 1201-1222. doi:10.1016/j.worlddev.2005.12.003

Rodríguez-Pose, A., & Sotiriou, A. (2021). Trading with richer and poorer countries: trade integration and regional inequality in Greece. *The Annals of Regional Science, 67*, 697-725. doi:10.1007/s00168-021-01062-1

Rodríguez-Pose, A., Dijkstra, L., & Poelman, H. (2024). The Geography of EU Discontent and the Regional Development Trap. *Economic Geography, 100*(3), 213-245. doi:10.1080/00130095.2024.2337657

Silva, J. A., & Leichenko, R. M. (2004). Regional Income Inequality and International Trade. *Economic Geography, 80*(3), 261-286. doi:10.1111/j.1944-8287.2004.tb00235.x

Sotiriou, A., Petrakos, G., & Alexiou, S. (2025). The drivers of regional discontent in the EU. *Global Challenges & Regional Science*. doi:10.1016/j.gcrs.2024.100002

Vasilopoulou, S., & Talving, L. (2024). Euroscepticism as a syndrome of stagnation? Regional inequality and trust in the EU. *Journal of European Public Policy, 31*(6), 1494-1515. doi:10.1080/13501763.2023.2264891

Williamson, J. G. (1965). Regional Inequality and the Process of National Development: A Description of the Patterns. *Economic Development and Cultural Change, 13*(4), 1-84. doi:10.1086/450136

Zhang, X., & Zhang, K. H. (2003). How Does Globalisation Affect Regional Inequality within A Developing Country? Evidence from China. *Journal of Development Studies, 39*(4), 47-67. doi:10.1080/713869425

Data Sources

ARDECO:

Regional NUTS Population data:

https://territorial.ec.europa.eu/ardeco-api-v2/rest/export/SNPTD?versions=2024&unit=Persons&format=csv-table

Regional NUTS GDP per capita:

https://territorial.ec.europa.eu/ardeco-api-v2/rest/export/SUVGDP?versions=2024&unit=PPS&format=csv-table

Eurostat:

Nominal GDP data:

https://ec.europa.eu/eurostat/databrowser/view/nama_10_gdp__custom_19843912/default/table

Government spending:

https://ec.europa.eu/eurostat/databrowser/bookmark/82e946ca-d450-4462-bf5f-e27b4a4c5e33?lang=en

Exchange rate EUR (ECU) / USD

https://ec.europa.eu/eurostat/databrowser/view/ert_bil_eur_a/default/table?lang=en

European Commission:

Cohesion Funds:

https://cohesiondata.ec.europa.eu/Other/Historic-EU-payments-annual-timeseries-regionalise/tc55-7ysv/about_data

Historic GDP data:

https://economy-finance.ec.europa.eu/economic-research-and-databases/economic-databases/ameco-database/download-annual-data-set-macro-economic-database-ameco_en#domestic-product

UN Comtrade:

Trade data in USD:

https://comtradeplus.un.org/TradeFlow?Frequency=A&Flows=X&CommodityCodes=TOTAL&Partners=56&Reporters=380&period=1998&AggregateBy=none&BreakdownMode=plus

CIA:

Border length:

https://www.cia.gov/the-world-factbook/about/archives/2022/field/land-boundaries/