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Europeanization vs. Globalization? A Deeper Look into Income and Employment Embodied in Intra-European Trade

¿Europeización versus globalización? Una mirada más profunda al empleo y renta incorporada en el comercio intra-europeo

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Abstract

Production processes are nowadays increasingly global, implying interdependent structures linking goods, processes and countries. Traditional economic blocks and sectoral intra-country linkages coexist with increasing worldwide dependencies. Recent literature supports the hypothesis of a new

globalization process taking place in the late 1990s and the 21st century, centred on the consolidation of increasingly competitive macro-regions at a global level, with a growing specialization of countries within them. We propose a multiregional input-output (MRIO) model of the European Union (EU) to analyse whether the generation of employment and income in Europe in recent decades can be defined as a process that is mainly regional or global (involving countries within the region versus countries outside Europe). Our results show that intra-EU trade is an important factor contributing to income and employment growth, more oriented to intermediate inputs, in the same way as extra-EU trade, despite the fact that some European countries are more specialized in final goods, mainly driven by high-income EU countries.

Keywords: Multiregional input-output; Global value chains; Intra-EU trade; Income; Employment; Globalization.

Resumen

Los procesos de producción son hoy en día cada vez más globales, lo que implica estructuras interdependientes que vinculan bienes, procesos y países. Los bloques económicos tradicionales y los vínculos sectoriales dentro del país coexisten con dependencias mundiales crecientes. La literatura reciente respalda la hipótesis de un nuevo proceso de globalización que tuvo lugar a fines de los años 90 y el siglo XXI, centrado en la consolidación de macro-regiones cada vez más competitivas a nivel global, con una creciente especialización de los países dentro de ellas. Proponemos un modelo multirregional input-output (MRIO) de la Unión Europea (UE) para analizar si la generación de empleo e ingresos en Europa en las últimas décadas se puede definir como un proceso que es principalmente regional o global. Nuestros resultados muestran que el comercio intracomunitario es un factor importante que contribuye al crecimiento de los ingresos y el empleo, más orientado a los inputs intermedios, de la misma manera que el comercio extracomunitario, a pesar del hecho de que algunos países europeos están más especializados en productos finales, principalmente demandados por países de altos ingresos de la UE.

Palabras clave: Multiregional input-output; cadenas globales de valor; Comercio intra-europeo; Renta; Empleo; Globalización.

Clasificación JEL: D57, F6, F66.

1. Introduction

Trade has been traditionally considered a key factor for the growth of economies, encouraging country specialization and competitiveness. The positive impact of international trade on economic growth has been widely documented in economic literature from both the theoretical and the empirical points of view (Barro, 1991; Frankel and Romer, 1999; Grossman and Helpman, 1997; Keller, 2002). Recent papers highlight the important links between economic integration and growth as a result of the increasing exchanges of goods, technologies, and ideas which act as incentives for knowledge acquisition and diffusion, also offering greater potential market opportunities and affecting international prices (Grossman and Helpman, 2015). The role of trade as an active driver of economic growth in an increasingly globalized economy has been acknowledged by public institutions and citizens worldwide. As the European Commission recognizes, "trade and investment flows spread new ideas and innovation, new technologies and the best research, leading to improvements in the products and services that people and companies use" (European Commission, 2012).

Production processes are nowadays characterized by an important international fragmentation, which implies an increasingly interdependent structure linking products, goods, processes and countries (see Yu et al., 2013 and Duarte et al. 2018). This increasing globalization of production, often involving large geographical and sectoral distances between the production and the consumption, has brought to the fore the need for accounting and analysing production structures and international links in this complex framework. Traditional economic blocks and strong intra-regional links coexist with increasing world dependencies, this having associated impacts on the location and distribution of employment and income. In this line, Los et al. (2013) show evidence in this phenomenon using a new distribution index of value added, which they call the international production fragmentation (IPF). They find a clear increase of fragmentation in the production of most manufacturing goods in Europe, from 1995 to 2008, with a temporary reduction in this index after the international crisis. In the same way, the work of Diaz-Mora et al. (2016) establishes the importance of fragmentation in the production across European countries, showing that economic, sectoral, location and technological differences play an important role in the trade of the EU countries. In addition, Timmer et al. (2014) conduct a study of global

value chains by different factors for the period 1995 to 2008 with 560 final products from 14 manufacturing industries of 40 countries around the world. They show an evidence of increasing international fragmentation due to the increase in the foreign value added share in the total value added of studied countries and demonstrate that global value chains started with the advance of emerging economies as major suppliers of intermediate inputs. In the same way, Los et al. (2015) carry out an analysis of global production chains to show if international fragmentation occurs between countries within the same region or is really a global process that includes all countries and they find that it is a globalized process since 1995, however it has been weakly interrupted by the financial crisis of 2008. Additionally, Millet et al. (2011) show, in the European Union context, that trade is fundamental to explain the evolution of countries, paying special attention to the analysis of intra-European trade with its closest neighbours. This is also the work of Pomfret and Sourding (2018) where they perform an analysis of North American, European and East Asian value chains to contrast them. They obtain a rapid growth of value chains activity in the last years, especially more in East Asian emerging market economies than in European economies. In this same line, Suder et al. (2015) present a study on localization patterns of value-added trade in East Asia and they show, throughout input-output techniques from a value chain perspective, that a great interdependence between developed and developing regions due to the increase in the trade of intermediate inputs.

In this context, recent literature supports the concept of a new globalization centred in large regions (see Fernández Núñez et al., 2017), which are acquiring technological knowledge of the production processes that in the past they began to carry out only because of their competitive advantage in the form of low wages. In this way, there would be a consolidation of increasingly competitive macro-regions at a global level, within which there would be a growing specialization of countries. Thus, high-income countries would benefit from the production and trade of final and/or high-value-added goods while other countries operate as input suppliers to the former or as factories of low-value-added goods (Los et al., 2015; Baldwin, 2016; Frigant and Zumpe, 2017). Moreover, this new globalization is causing very different and unpredictable impacts within the economic sectors (Baldwin, 2016).

Our work builds on this literature and proposes a multiregional input-output (MRIO) model of the European Union (EU) to analyse whether the generation of employment and income in Europe in the recent past can be defined as a process that is mainly regional or global (involving countries within the region versus countries outside Europe), what patterns have characterized this process, and which European countries have benefitted from this process of integration (and how). We are also interested in the economic effects associated with the evolution of vertical trade in Europe (defined as the trade in intermediate goods that are part of an international production network, Hummels et al., 2001) in comparison to the trade in final goods. In this line, our paper aims to contribute to the current debate on trade patterns and the

evolution of trade relations between European countries and non-European countries, as well as, providing an integrated approach to study the similarities and differences that exist within the European block.

The European Union as a whole is the largest economy in the world and the largest trading block (WTO Statistics, 2016). With its highs and lows, the European Union experience has been seen by other world areas (African Union, ASEAN, Mercosur, etc.) as probably the most successful process of regional integration, with positive effects on the employment, income and wellbeing of its citizens. In this regard, it seems relevant to evaluate the strength of its trade and the associated impacts on employment and income.

Recent improvements in calculating the income and employment associated with EU exports, like the use of multiregional frameworks empirically supported by extensive world databases (WIOD, OECD, GTAP, EORA), have become critical when analysing the impact of trade policies (Rueda-Cantuche et al., 2013). The impact of extra-EU exports on income and employment has recently received attention in the literature (Rueda-Cantuche et al., 2013; Arto et al., 2015). However, there are no previous studies on the European employment and value added embodied in intra-EU trade. For these reasons, our paper focuses on this latter point, particularly on the analysis of the different country patterns found over a long period of economic growth in Europe and the first years of the international crisis.

The period chosen, 1995-2011, is a period of exceptional historical interest, as it represents the consolidation of the EU common market, the monetary union, and the first decades after the accession to the EU of eastern European economies.

Our results suggest that intra-EU trade has been an important factor contributing to the income and employment growth in the EU, extra-EU trade has turned out to be a key driver for the whole EU, and different country patterns regarding the orientation of trade can be identified. Additionally, trade within the EU is more oriented to intermediate inputs like in the extra-EU trade, however in this last case, there are some countries more specialized in final goods.

The rest of the paper is structured as follows. In Section 2, we describe the methodology adopted for quantifying the employment and value added (VA) embodied in intra-EU exports over the years 1995 to 2011. In Section 3, we describe the data used in this paper. In Section 4, we present and discuss the main results of the analysis, with a focus on the different country patterns observed. Section 5 closes the paper with a review of the main conclusions.

2. Methodology

As already mentioned, the main objective of our work is to analyze the income and employment generated in Europe and embodied in intra-EU trade, paying special attention to the temporal evolution of this intra-EU trade

and the different country patterns observed. The starting point is a MRIO model, following a multi-sectoral and multiregional analysis, which enables us to study changes in intra-European trade patterns between 1995 and 2011. Basic references for this framework are Isard (1951) and Miller and Blair (2009). Empirically we make use of the World Input-Output Database (WIOD) (Timmer et al., 2015). This database covers 27 EU Member States, 13 other major countries and the Rest of the World as an aggregated region. The WIOD has a breakdown of 35 industries for each country, which covers the overall economy, including agriculture, mining, construction, utilities, 14 manufacturing industries and 17 services industries.

Below we present the main features of the methodological approach adopted. For an easier understanding, we start by considering the world economy divided into two blocks; countries 1 and 2 belong to the EU block and countries 3 and 4 are non-EU countries.

$$\mathbf{Z}=\begin{bmatrix}\mathbf{Z}^{11} & \mathbf{Z}^{12} & \mathbf{Z}^{13} & \mathbf{Z}^{14}\\ \mathbf{Z}^{21} & \mathbf{Z}^{22} & \mathbf{Z}^{23} & \mathbf{Z}^{24}\\ \mathbf{Z}^{31} & \mathbf{Z}^{32} & \mathbf{Z}^{33} & \mathbf{Z}^{34}\\ \mathbf{Z}^{41} & \mathbf{Z}^{42} & \mathbf{Z}^{43} & \mathbf{Z}^{44}\end{bmatrix};\quad \mathbf{f}=\begin{bmatrix}\mathbf{f}^{11}+\mathbf{f}^{12}+\mathbf{f}^{13}+\mathbf{f}^{14}\\ \mathbf{f}^{21}+\mathbf{f}^{22}+\mathbf{f}^{23}+\mathbf{f}^{24}\\ \mathbf{f}^{31}+\mathbf{f}^{32}+\mathbf{f}^{33}+\mathbf{f}^{34}\\ \mathbf{f}^{41}+\mathbf{f}^{42}+\mathbf{f}^{43}+\mathbf{f}^{44}\end{bmatrix};\quad \mathbf{x}=\begin{bmatrix}\mathbf{x}^{1}\\ \mathbf{x}^{2}\\ \mathbf{x}^{3}\\ \mathbf{x}^{4}\end{bmatrix};\quad \mathbf{w}=\begin{bmatrix}\mathbf{w}^{1}\\ \mathbf{w}^{2}\\ \mathbf{w}^{3}\\ \mathbf{w}^{4}\end{bmatrix}$$

As usual in a MRIO model, the relationship between **x**, **Z** and **f** is defined by $\mathbf{x}=\mathbf{Z}\mathbf{i}+\mathbf{f}$, i being a column vector of ones of the appropriate dimension. We denote by **w** a generic vector of inputs (labour, value added, etc). The input-output equation of the global economy in a multiregional context can be expressed as:

$$\mathbf{x}=\mathbf{A}\mathbf{x}+\mathbf{f} \tag{1}$$

where **x** represents the total output of each country and sector, **A** is the multiregional matrix of technical coefficients and **f** is the total final demand by sector and country. In terms of the Leontief inverse, the solution of the model will be given by:

$$\mathbf{L}=\left(\mathbf{I}-\mathbf{A}\right)^{-1} \text{ so that } \mathbf{x}=(\mathbf{I}-\mathbf{A})^{-1}\mathbf{f}=\mathbf{L}\mathbf{f} \tag{2}$$

Let us now focus on the EU block. We denote it by $\mathbf{x}^{\mathbf{EU}}=\begin{bmatrix}\mathbf{x}^{1}\\ \mathbf{x}^{2}\end{bmatrix}$. Similarly, we can define $\mathbf{w}^{\mathbf{EU}}=\begin{bmatrix}\mathbf{w}^{1}\\ \mathbf{w}^{2}\end{bmatrix}$, $\mathbf{F}^{\mathbf{EU,EU}}=\begin{bmatrix}\mathbf{f}^{11} & \mathbf{f}^{12}\\ \mathbf{f}^{21} & \mathbf{f}^{22}\end{bmatrix}$ and

$$\mathbf{E}^{\mathbf{EU,noEU}}=\begin{bmatrix}\mathbf{e}^{13} & \mathbf{e}^{14}\\ \mathbf{e}^{23} & \mathbf{e}^{24}\end{bmatrix}=\begin{pmatrix}\mathbf{f}^{13}+\mathbf{Z}^{13}\mathbf{i} & \mathbf{f}^{14}+\mathbf{Z}^{14}\mathbf{i}\\ \mathbf{f}^{23}+\mathbf{Z}^{23}\mathbf{i} & \mathbf{f}^{24}+\mathbf{Z}^{24}\mathbf{i}\end{pmatrix},$$

where $\mathbf{F}^{\mathbf{EU,EU}}$ represents the final demand of European countries and $\mathbf{E}^{\mathbf{EU,noEU}}$ includes the final demand made by European countries to no European

countries. This subdivision of the final demand is necessary to continue in the analysis by parts of the European trade.

The matrix of EU intermediate inputs will be $\mathbf{Z}^{EU} = \begin{bmatrix} \mathbf{Z}^{11} & \mathbf{Z}^{12} \\ \mathbf{Z}^{21} & \mathbf{Z}^{22} \end{bmatrix}$

Based on these matrices, we can derive the corresponding $\mathbf{A}^{EU}$ matrix,

$$\mathbf{A}^{EU} = \mathbf{Z}^{EU}\left(\hat{\mathbf{x}}^{EU}\right)^{-1} = \begin{bmatrix} \mathbf{A}^{11} & \mathbf{A}^{12} \\ \mathbf{A}^{21} & \mathbf{A}^{22} \end{bmatrix}$$

This matrix represents the domestic technology of the EU (considering the EU countries and their relationships as internal components). The choice of this representation of the world economies in two blocks (EU countries and non-EU countries) is due to the fact that using alternatively national country tables would not account for EU spillover effects and otherwise, using the global IO table would incur in double counting of the value added embodied in the goods crossing the border more than twice (Arto et al, 2015).

Thus, for a certain final demand

$$\mathbf{f}^{EU} = \begin{bmatrix} \mathbf{f}^{11} + \mathbf{f}^{12} + \mathbf{e}^{13} + \mathbf{e}^{14} \\ \mathbf{f}^{21} + \mathbf{f}^{22} + \mathbf{e}^{23} + \mathbf{e}^{24} \end{bmatrix}$$

$$= \begin{bmatrix} \mathbf{f}^{11} + \mathbf{f}^{12} + (\mathbf{Z}^{13}\mathbf{i} + \mathbf{f}^{13}) + (\mathbf{Z}^{14}\mathbf{i} + \mathbf{f}^{14}) \\ \mathbf{f}^{21} + \mathbf{f}^{22} + (\mathbf{Z}^{23}\mathbf{i} + \mathbf{f}^{23}) + (\mathbf{Z}^{24}\mathbf{i} + \mathbf{f}^{24}) \end{bmatrix} = \mathbf{F}^{EU,EU}\mathbf{i} + \mathbf{E}^{EU,noEU}\mathbf{i} = \mathbf{f}^{EU,EU} + \mathbf{e}^{EU,noEU}$$

it holds that

$$\mathbf{x}^{EU} = \mathbf{A}^{EU}\mathbf{x}^{EU} + \mathbf{f}^{EU} \tag{3}$$

In terms of the Leontief inverse, the solution of the model will be given by:

$$\mathbf{x}^{EU} = \left(\mathbf{I} - \mathbf{A}^{EU}\right)^{-1}\mathbf{f}^{EU} = \mathbf{L}^{EU}\mathbf{f}^{EU} = \begin{pmatrix} \mathbf{L}^{11} & \mathbf{L}^{12} \\ \mathbf{L}^{21} & \mathbf{L}^{22} \end{pmatrix}\mathbf{f}^{EU} \tag{4}$$

Thus, if $\mathbf{w}$ represents a vector of value added (the same holds for employment), considering the value added directly generated in the EU, we can define the following coefficients:

$\mathbf{v}^{EU'} = \mathbf{w}^{EU'}\left(\hat{\mathbf{x}}^{EU}\right)^{-1}$, and their corresponding diagonalized form $\hat{\mathbf{v}}^{EU} = \begin{pmatrix} \hat{\mathbf{v}}^{1} & \mathbf{0} \\ \mathbf{0} & \hat{\mathbf{v}}^{2} \end{pmatrix}$ (5)

Thus, we can obtain the embodied and the direct value added in the EU generated by the intra-EU final demand and the extra-EU exports to non-EU countries as follows.

Let us define the following flow matrices which contain, in a disaggregated way, the value added (or employment) generated in the EU and incorporated into all the EU goods (domestically consumed, traded within the EU, and exported to non-EU countries).

$$\hat{\mathbf{v}}^{EU}\mathbf{L}^{EU}\hat{\mathbf{f}}^{EU} = \begin{pmatrix} \hat{\mathbf{v}}^{1} & \mathbf{0} \\ \mathbf{0} & \hat{\mathbf{v}}^{2} \end{pmatrix}\begin{pmatrix} \mathbf{L}^{11} & \mathbf{L}^{12} \\ \mathbf{L}^{21} & \mathbf{L}^{22} \end{pmatrix}\begin{pmatrix} \mathbf{f}^{11}+\mathbf{f}^{12} & 0 \\ 0 & \mathbf{f}^{21}+\mathbf{f}^{22} \end{pmatrix} + \begin{pmatrix} \hat{\mathbf{v}}^{1} & \mathbf{0} \\ \mathbf{0} & \hat{\mathbf{v}}^{2} \end{pmatrix}\begin{pmatrix} \mathbf{L}^{11} & \mathbf{L}^{12} \\ \mathbf{L}^{21} & \mathbf{L}^{22} \end{pmatrix}\begin{pmatrix} \mathbf{e}^{13}+\mathbf{e}^{14} & 0 \\ 0 & \mathbf{e}^{23}+\mathbf{e}^{24} \end{pmatrix} \quad (6)$$
$$= \mathbf{\Omega}^{EU,EU} + \mathbf{\Omega}^{EU,noEU}$$

We can view these matrices from two different perspectives, the "consumer" and the "producer" perspectives

1) (*Consumption perspective*) the column sums over the rows of each $\mathbf{\Omega}$ matrix show the embodied value added (or employment) by exporting country independently of where the value added (or employment) is generated (or located). This is the type of measure useful for footprint analysis where, for instance, exports of one specific country lead to the generation of value added (or emissions) across other countries.

2) (*Production perspective*) the row sums over the columns of each $\mathbf{\Omega}$ matrix can be interpreted as the embodied value added (or employment) in a country due to its intra-European final exports and its extra-European total exports, independently of the user.

Below we derive the corresponding mathematical expressions for each one of the two perspectives shown above.

Consumption perspective

Equations 7 and 8 provide the detailed mathematical expressions of the column sums of the $\mathbf{\Omega}$ matrices for intra-European trade ($\mathbf{\Omega}^{EU,EU}$) and for extra-European trade ($\mathbf{\Omega}^{EU,noEU}$). Let us denote them as $\boldsymbol{\omega}^{EU,EU'}$ and $\boldsymbol{\omega}^{EU,noEU'}$, respectively.

$$\boldsymbol{\omega}^{EU,EU'} = \mathbf{i}'\mathbf{\Omega}^{EU,EU} = \begin{pmatrix} \mathbf{v}^{1'} & \mathbf{v}^{2'} \end{pmatrix}\begin{pmatrix} \mathbf{L}^{11} & \mathbf{L}^{12} \\ \mathbf{L}^{21} & \mathbf{L}^{22} \end{pmatrix}\begin{pmatrix} \mathbf{f}^{11}+\mathbf{f}^{12} & 0 \\ 0 & \mathbf{f}^{21}+\mathbf{f}^{22} \end{pmatrix} =$$
$$\begin{pmatrix} \mathbf{v}^{1'}\mathbf{L}^{11}+\mathbf{v}^{2'}\mathbf{L}^{21} & \mathbf{v}^{1'}\mathbf{L}^{12}+\mathbf{v}^{2'}\mathbf{L}^{22} \end{pmatrix}\begin{pmatrix} \mathbf{f}^{11}+\mathbf{f}^{12} & 0 \\ 0 & \mathbf{f}^{21}+\mathbf{f}^{22} \end{pmatrix} = \quad (7)$$
$$= \begin{pmatrix} \mathbf{v}^{1'}\mathbf{L}^{11}\mathbf{f}^{11}+\mathbf{v}^{2'}\mathbf{L}^{21}\mathbf{f}^{11}+\mathbf{v}^{1'}\mathbf{L}^{11}\mathbf{f}^{12}+\mathbf{v}^{2'}\mathbf{L}^{21}\mathbf{f}^{12} & \mathbf{v}^{1'}\mathbf{L}^{12}\mathbf{f}^{21}+\mathbf{v}^{2'}\mathbf{L}^{22}\mathbf{f}^{21}+\mathbf{v}^{1'}\mathbf{L}^{12}\mathbf{f}^{22}+\mathbf{v}^{2'}\mathbf{L}^{22}\mathbf{f}^{22} \end{pmatrix}$$

$$\boldsymbol{\omega}^{EU,noEU'} = \mathbf{i}'\mathbf{\Omega}^{EU,noEU} = \begin{pmatrix} \mathbf{v}^{1'} & \mathbf{v}^{2'} \end{pmatrix}\begin{pmatrix} \mathbf{L}^{11} & \mathbf{L}^{12} \\ \mathbf{L}^{21} & \mathbf{L}^{22} \end{pmatrix}\begin{pmatrix} \mathbf{e}^{13}+\mathbf{e}^{14} & 0 \\ 0 & \mathbf{e}^{23}+\mathbf{e}^{24} \end{pmatrix} =$$
$$\begin{pmatrix} \mathbf{v}^{1'}\mathbf{L}^{11}+\mathbf{v}^{2'}\mathbf{L}^{21} & \mathbf{v}^{1'}\mathbf{L}^{12}+\mathbf{v}^{2'}\mathbf{L}^{22} \end{pmatrix}\begin{pmatrix} \mathbf{e}^{13}+\mathbf{e}^{14} & 0 \\ 0 & \mathbf{e}^{23}+\mathbf{e}^{24} \end{pmatrix} = \quad (8)$$
$$= \begin{pmatrix} \mathbf{v}^{1'}\mathbf{L}^{11}\mathbf{e}^{13}+\mathbf{v}^{2'}\mathbf{L}^{21}\mathbf{e}^{13}+\mathbf{v}^{1'}\mathbf{L}^{11}\mathbf{e}^{14}+\mathbf{v}^{2'}\mathbf{L}^{21}\mathbf{e}^{14} & \mathbf{v}^{1'}\mathbf{L}^{12}\mathbf{e}^{23}+\mathbf{v}^{2'}\mathbf{L}^{22}\mathbf{e}^{23}+\mathbf{v}^{1'}\mathbf{L}^{12}\mathbf{e}^{24}+\mathbf{v}^{2'}\mathbf{L}^{22}\mathbf{e}^{24} \end{pmatrix}$$

The outcome of (7) can be split into three main parts for the first component:

a) Value added embodied in country 1 (EU country) due to its sales to the domestic market (not to be included as intra-European trade): $\mathbf{v}^{1'}\mathbf{L}^{11}\mathbf{f}^{11}$

b) Value added embodied in country 2 (EU country) due to its intermediate exports to country 1 (EU country): $\mathbf{v}^{2'}\mathbf{L}^{21}\mathbf{f}^{11} + \mathbf{v}^{2'}\mathbf{L}^{21}\mathbf{f}^{12}$

c) Value added embodied in country 1 (EU country) due to its exports of final goods to country 2 (EU country): $\mathbf{v}^{1'}\mathbf{L}^{11}\mathbf{f}^{12}$

And similarly, for the second component: $\mathbf{v}^{2'}\mathbf{L}^{22}\mathbf{f}^{22}$, $\mathbf{v}^{1'}\mathbf{L}^{12}\mathbf{f}^{22}+\mathbf{v}^{1'}\mathbf{L}^{12}\mathbf{f}^{21}$ and $\mathbf{v}^{2'}\mathbf{L}^{22}\mathbf{f}^{21}$, respectively. Hence, we can decompose the embodied value added generated over all countries due to the final use of a specific EU country (i.e. column sums of the $\mathbf{\Omega}$ matrix) into four components: embodied value added in an EU country due to its sales to its domestic economy ($\boldsymbol{\omega}_{dom}^{\mathbf{EU,EU'}}$); embodied value added in other EU countries due to their intermediate exports to an EU country ($\boldsymbol{\omega}_{\text{int}}^{\mathbf{EU,EU'}}$); embodied value added in an EU country due to its exports of final goods to other EU countries ($\boldsymbol{\omega}_{fin}^{\mathbf{EU,EU'}}$); embodied value added in an EU country due to its exports of final and intermediate goods to non-EU countries ($\boldsymbol{\omega}^{\mathbf{EU,noEU'}}$).

In matrix form, equations 7 and 8 can be combined in this way:

$$\mathbf{i'\Omega}=\boldsymbol{\omega}^{\mathbf{EU,EU'}}+\boldsymbol{\omega}^{\mathbf{EU,noEU'}}=\boldsymbol{\omega}_{dom}^{\mathbf{EU,EU'}}+\boldsymbol{\omega}_{\text{int}}^{\mathbf{EU,EU'}}+\boldsymbol{\omega}_{fin}^{\mathbf{EU,EU'}}+\boldsymbol{\omega}^{\mathbf{EU,noEU'}}=$$

$$=\begin{pmatrix}\mathbf{v}^{1'} & \mathbf{v}^{2'}\end{pmatrix}\begin{pmatrix}\mathbf{L}^{11} & 0\\ 0 & \mathbf{L}^{22}\end{pmatrix}\begin{pmatrix}\mathbf{f}^{11} & \mathbf{0}\\ \mathbf{0} & \mathbf{f}^{22}\end{pmatrix}+\begin{pmatrix}\mathbf{v}^{1'} & \mathbf{v}^{2'}\end{pmatrix}\begin{pmatrix}0 & \mathbf{L}^{12}\\ \mathbf{L}^{21} & 0\end{pmatrix}\begin{pmatrix}\mathbf{f}^{11}+\mathbf{f}^{12} & \mathbf{0}\\ \mathbf{0} & \mathbf{f}^{21}+\mathbf{f}^{22}\end{pmatrix}+$$

$$+\begin{pmatrix}\mathbf{v}^{1'} & \mathbf{v}^{2'}\end{pmatrix}\begin{pmatrix}\mathbf{L}^{11} & 0\\ 0 & \mathbf{L}^{22}\end{pmatrix}\begin{pmatrix}\mathbf{f}^{12} & \mathbf{0}\\ \mathbf{0} & \mathbf{f}^{21}\end{pmatrix}+\boldsymbol{\omega}^{\mathbf{EU,noEU'}}$$

from which we will focus on $\boldsymbol{\omega}_{\text{int}}^{\mathbf{EU,EU'}}$, $\boldsymbol{\omega}_{fin}^{\mathbf{EU,EU'}}$ and $\boldsymbol{\omega}^{\mathbf{EU,noEU'}}$ since the first component is not considered as export-driven by definition.

Production perspective

Equations 10 and 11 yield the detailed mathematical expressions of the row sums of the $\mathbf{\Omega}$ matrices for intra-European trade ($\mathbf{\Omega}^{\mathbf{EU,EU}}$) and for extra-European trade ($\mathbf{\Omega}^{\mathbf{EU,noEU}}$). Let us denote them as $\mathbf{w}^{\mathbf{EU,EU}}$ and $\mathbf{w}^{\mathbf{EU,noEU}}$, respectively, such that:

$$\mathbf{\Omega i}=\mathbf{\Omega}^{\mathbf{EU,EU}}\mathbf{i}+\mathbf{\Omega}^{\mathbf{EU,noEU}}\mathbf{i}=\mathbf{w}^{\mathbf{EU,EU}}+\mathbf{w}^{\mathbf{EU,noEU}} \tag{9}$$

Then,

$$\mathbf{w}^{\mathbf{EU,EU}}=\begin{pmatrix}\hat{\mathbf{v}}^{1}\mathbf{L}^{11} & \hat{\mathbf{v}}^{1}\mathbf{L}^{12}\\ \hat{\mathbf{v}}^{2}\mathbf{L}^{21} & \hat{\mathbf{v}}^{2}\mathbf{L}^{22}\end{pmatrix}\begin{pmatrix}\mathbf{f}^{11}+\mathbf{f}^{12} & \mathbf{0}\\ \mathbf{0} & \mathbf{f}^{21}+\mathbf{f}^{22}\end{pmatrix}\begin{pmatrix}\mathbf{1}\\ \mathbf{1}\end{pmatrix}$$

$$=\begin{pmatrix}\hat{\mathbf{v}}^{1}\mathbf{L}^{11}\mathbf{f}^{11}+\hat{\mathbf{v}}^{1}\mathbf{L}^{11}\mathbf{f}^{12}+\hat{\mathbf{v}}^{1}\mathbf{L}^{12}\mathbf{f}^{21}+\hat{\mathbf{v}}^{1}\mathbf{L}^{12}\mathbf{f}^{22}\\ \hat{\mathbf{v}}^{2}\mathbf{L}^{21}\mathbf{f}^{11}+\hat{\mathbf{v}}^{2}\mathbf{L}^{21}\mathbf{f}^{12}+\hat{\mathbf{v}}^{2}\mathbf{L}^{22}\mathbf{f}^{21}+\hat{\mathbf{v}}^{2}\mathbf{L}^{22}\mathbf{f}^{22}\end{pmatrix} \tag{10}$$

$$\mathbf{w}^{\mathbf{EU,noEU}}=\begin{pmatrix}\hat{\mathbf{v}}^{1}\mathbf{L}^{11} & \hat{\mathbf{v}}^{1}\mathbf{L}^{12}\\ \hat{\mathbf{v}}^{2}\mathbf{L}^{21} & \hat{\mathbf{v}}^{2}\mathbf{L}^{22}\end{pmatrix}\begin{pmatrix}\mathbf{e}^{13}+\mathbf{e}^{14} & \mathbf{0}\\ \mathbf{0} & \mathbf{e}^{23}+\mathbf{e}^{24}\end{pmatrix}\begin{pmatrix}\mathbf{1}\\ \mathbf{1}\end{pmatrix}$$

$$=\begin{pmatrix}\hat{\mathbf{v}}^{1}\mathbf{L}^{11}\mathbf{e}^{13}+\hat{\mathbf{v}}^{1}\mathbf{L}^{11}\mathbf{e}^{14}+\hat{\mathbf{v}}^{1}\mathbf{L}^{12}\mathbf{e}^{23}+\hat{\mathbf{v}}^{1}\mathbf{L}^{12}\mathbf{e}^{24}\\ \hat{\mathbf{v}}^{2}\mathbf{L}^{21}\mathbf{e}^{13}+\hat{\mathbf{v}}^{2}\mathbf{L}^{21}\mathbf{e}^{14}+\hat{\mathbf{v}}^{2}\mathbf{L}^{22}\mathbf{e}^{23}+\hat{\mathbf{v}}^{2}\mathbf{L}^{22}\mathbf{e}^{24}\end{pmatrix} \tag{11}$$

The outcome of (10) can then be decomposed into three components as for (7):

a) Value added embodied in country 1 (EU country) due to its sales to the domestic market (not to be included as intra-European trade): $\hat{\mathbf{v}}^{\mathbf{1}}\mathbf{L}^{\mathbf{11}}\mathbf{f}^{\mathbf{11}}$

b) Value added embodied in country 1 (EU country) due to its intermediate exports to country 2 (EU country): $\hat{\mathbf{v}}^{\mathbf{1}}\mathbf{L}^{\mathbf{12}}\mathbf{f}^{\mathbf{21}} + \hat{\mathbf{v}}^{\mathbf{1}}\mathbf{L}^{\mathbf{12}}\mathbf{f}^{\mathbf{22}}$

c) Value added embodied in country 1 (EU country) due to its exports of final goods to country 2 (EU country): $\hat{\mathbf{v}}^{\mathbf{1}}\mathbf{L}^{\mathbf{11}}\mathbf{f}^{\mathbf{12}}$

And analogously for country 2 (EU country): $\hat{\mathbf{v}}^{\mathbf{2}}\mathbf{L}^{\mathbf{22}}\mathbf{f}^{\mathbf{22}}$, $\hat{\mathbf{v}}^{\mathbf{2}}\mathbf{L}^{\mathbf{21}}\mathbf{f}^{\mathbf{11}} + \hat{\mathbf{v}}^{\mathbf{2}}\mathbf{L}^{\mathbf{21}}\mathbf{f}^{\mathbf{12}}$ and $\hat{\mathbf{v}}^{\mathbf{2}}\mathbf{L}^{\mathbf{22}}\mathbf{f}^{\mathbf{21}}$, respectively. Therefore, we can decompose the embodied value added in EU countries (i.e. row sums of the $\mathbf{\Omega}$ matrix) into the four components: embodied value added in EU countries to satisfy domestic final use; embodied value added in EU countries due to their intermediate exports to EU countries; embodied value added in EU countries due to their exports of final goods to EU countries; embodied value added in EU countries due to their exports of final and intermediate goods to non-EU countries.

In matrix form, equations 10 and 11 can be combined in this way:

$$\mathbf{\Omega i} = \mathbf{\Omega}^{\mathbf{EU,EU}}\mathbf{i} + \mathbf{\Omega}^{\mathbf{EU,noEU}}\mathbf{i} = \mathbf{w}^{\mathbf{EU,EU}} + \mathbf{w}^{\mathbf{EU,noEU}} = \mathbf{w}_{dom}^{\mathbf{EU,EU}} + \mathbf{w}_{\text{int}}^{\mathbf{EU,EU}} + \mathbf{w}_{fin}^{\mathbf{EU,EU}} +$$

$$= \begin{pmatrix} \hat{\mathbf{v}}^{\mathbf{1}} & 0 \\ 0 & \hat{\mathbf{v}}^{2} \end{pmatrix}\begin{pmatrix} \mathbf{L}^{\mathbf{11}} & 0 \\ 0 & \mathbf{L}^{\mathbf{22}} \end{pmatrix}\begin{pmatrix} \mathbf{f}^{\mathbf{11}} \\ \mathbf{f}^{\mathbf{22}} \end{pmatrix} + \begin{pmatrix} 0 & \hat{\mathbf{v}}^{\mathbf{1}} \\ \hat{\mathbf{v}}^{2} & 0 \end{pmatrix}\begin{pmatrix} 0 & \mathbf{L}^{\mathbf{12}} \\ \mathbf{L}^{\mathbf{21}} & 0 \end{pmatrix}\begin{pmatrix} \mathbf{f}^{\mathbf{11}} + \mathbf{f}^{\mathbf{12}} \\ \mathbf{f}^{\mathbf{21}} + \mathbf{f}^{\mathbf{22}} \end{pmatrix} +$$

$$+ \begin{pmatrix} \hat{\mathbf{v}}^{\mathbf{1}} & 0 \\ 0 & \hat{\mathbf{v}}^{2} \end{pmatrix}\begin{pmatrix} \mathbf{L}^{\mathbf{11}} & 0 \\ 0 & \mathbf{L}^{\mathbf{22}} \end{pmatrix}\begin{pmatrix} \mathbf{f}^{\mathbf{12}} \\ \mathbf{f}^{\mathbf{21}} \end{pmatrix} + \mathbf{w}^{\mathbf{EU,noEU}}$$

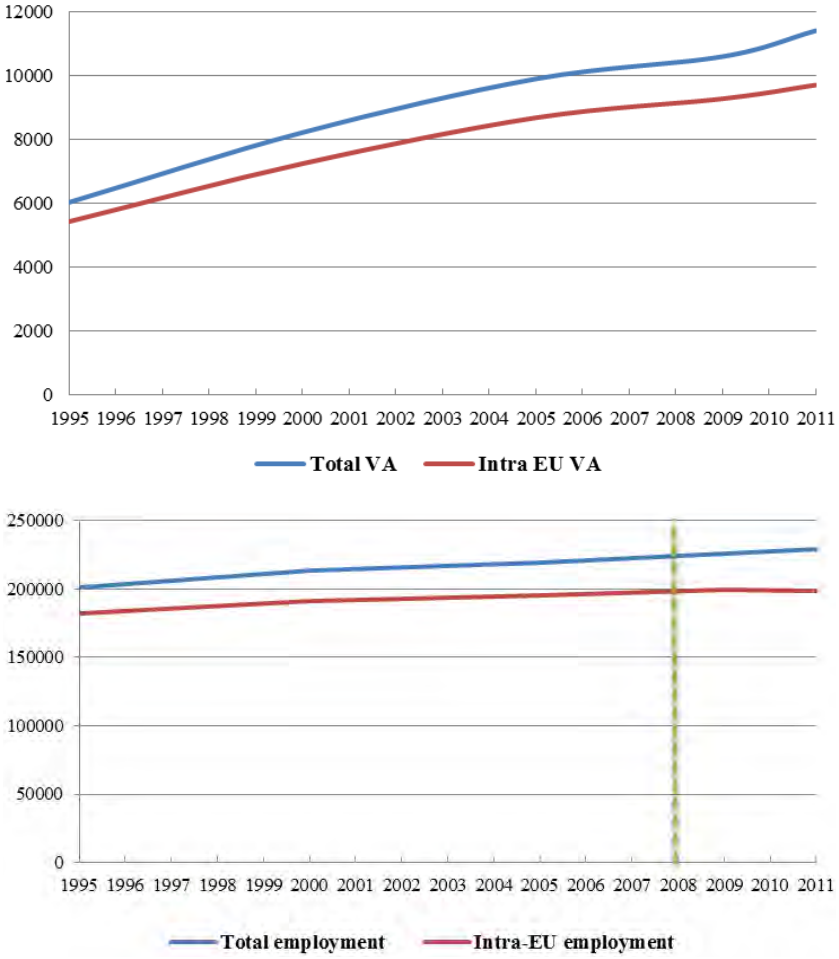
from which we will focus on the embodied value added in EU countries due to their intermediate and final exports to other EU countries ($\mathbf{w}_{\text{int}}^{\mathbf{EU,EU}}, \mathbf{w}_{fin}^{\mathbf{EU,EU}}$) and extra-EU countries ($\mathbf{w}^{\mathbf{EU,noEU}}$). In summary, our methodology allows the representation of the full income generated in Europe. A similar analysis is done for employment.

Our main source of data is WIOD, World Input-Output Database, Release 2013, which is freely available at http://www.wiod.org. It provides world input-output tables since 1995 covering 27 European countries and 13 other major countries (Australia, Brazil, Canada, China, India, Indonesia, Japan, Mexico, Russia, South Korea, Taiwan, Turkey and United States). In addition, it includes data for 35 industries, which cover all economic sectors (agriculture, mining, construction, utilities, manufacturing and services). Information on employment has been obtained from the socioeconomic accounts of WIOD, considering national employment of each country and they are expressed in thousands of jobs. The analysis is carried out for the period 1995-2011.

3. Results

In this section, we present the general results obtained from the analysis of value added and employment embodied in EU trade flows, with a particular focus on intra-EU trade.

Figure 1. Evolution of income (billion EUR) and employment (thousands of jobs) in Europe



Source: Own elaboration.

A first look at Figure 1 shows the close relationship between the evolution of value added (VA) embodied in intra-EU production (i.e. production generated in European countries that is also destined for Europe) and the general evolution of VA, mainly explained by the important weight of the domestic demand for all the EU countries. This same behavior is repeated for the magnitude of employment. The parallel evolution in both cases seems to decouple by the end of the period studied (from 2005 onwards), mainly due to the expansive

effect of extra-EU trade for EU countries and the beginning of the impact of the economic crisis on the domestic demands.

These general trends can be qualified with a closer look at the changes in intra-EU and extra-EU trade in Europe and their share in income generation. Table 1 shows these results.

As can be observed, in 1995, the EU-27 countries generated a total income of EUR 6 047.5 billion, most of which ended up in the EU (EUR 5 443 billion), with this appearing for all the countries, magnitudes and years analyzed[1]. Germany, Spain, France, Italy, Netherlands and the UK accounted for 80.9% of the total income generated in the European Union, also explaining 81.1% of all the income generated in Europe due to EU's final uses of products. The participation of this group of countries is slightly lower for the VA embodied in extra-EU trade and, particularly, for the VA embodied in intra-EU trade. For the EU as a whole, at the beginning of the period, the value added embodied in trade accounted for a 21.33% of the total, with a slightly higher share of the intra-EU trade over the extra-EU trade (EUR 685.7 billion vs EUR 604.1 billion).

From 1995 to 2011, three general features can be observed. First, for the EU as a whole, value added embodied in trade increased its share by 5 percentage points (up to 26.03% of the total income generated in Europe in 2011), showing the trade expansion of European countries and its positive effect in terms of income (rise in the value added associated to traded goods). Second, while intra-EU trade almost maintains its share in income generation (11.12% versus 11.34% in 1995), the value added incorporated into extra-EU goods goes up to 14.9% (9.99% in 1995)[2]. In other words, the results suggest that trade and particularly extra-EU trade have been driving factors of income generation in Europe. Third, the group of the six top income contributors (Germany, Spain, France, Italy, Netherlands and the United Kingdom) loses share in all the magnitudes and particularly in extra-EU exports, showing a higher dispersion in income generation among EU countries. In any case, the share of these countries in intra-EU trade is not seriously affected (reduction of 3 percentage points in 15 years). Behind these general figures, however, we can find important disparities in the behaviour of countries. Table 2 shows the share of trade components in the income generation of the EU-27 countries and the EU as a whole.

Again, three important additional features can be deduced from this table. At the aggregate level, we can confirm the increasing role of trade, the clear shift between intra-EU trade and extra-EU trade, and the predominance of the intra-EU trade of intermediate inputs explaining income embodied over the trade of final goods. The trade share for the EU-27 was 21.3% in 1995

[1] Data for the years between 1995 and 2011 are available upon request.

[2] Comparing the values of 2011 and 1995 for all the general magnitudes, and assigning an index = 100 to the change in value added, we can deduce that the intra-EU trade embodied in the EU demand had a relative change of 94% (the least dynamic growth factor), while the VA embodied in intra-EU trade relatively changed by 98% and the VA embodied in extra-EU trade changed by 149% (the most dynamic factor).

TABLE 1. EMBODIED VALUE ADDED AND ITS COMPONENTS IN THE EU-27 AND THE 6 TOP CONTRIBUTORS (CURRENT PRICES IN EUR)

	1995					2011			
	Total magnitude	VA embodied in intra-EU demand[1]	VA embodied in extra-EU[2]	VA embodied in intra-EU trade[3]		Total magnitude	VA embodied in intra-EU demand	VA embodied in extra-EU	VA embodied in intra-EU trade
DE	1671.7	1514.2	157.5	163.7	DE	2357.6	1909.3	448.3	297.7
ES	403.1	380.6	22.5	36.9	ES	989.1	903	86.1	92.4
FR	1028.5	937.9	90.5	91.3	FR	1817	1632.9	184.2	131.9
IT	743.1	669.9	73.1	71.8	IT	1421.7	1250.7	171	113.2
NL	277.2	239.2	38	61.9	NL	542.5	449.5	93	114.8
UK	766.7	673.5	93.2	72.8	UK	1584.2	1353.4	230.8	134.8
EU-27	6047.5	5443.3	604.1	685.7	EU-27	11423.7	9721.1	1702.5	1270.8
6 top contrib. (%)	80.9	81.1	78.6	72.7		76.3	77.1	71.3	69.6

Source: Own elaboration.

[1] Corresponds to: $\omega_{dom}^{EU,EU'} + \omega_{int}^{EU,EU'} + \omega_{fin}^{EU,EU'}$; the same for 2011.

[2] Corresponds to: $\omega^{EU,noEU'}$; the same for 2011.

[3] Corresponds to : $\omega_{int}^{EU,EU'} + \omega_{fin}^{EU,EU'}$; the same for 2011.

Table 2. Trade share in income generation in Europe (in italics the 6 top contributors)

	1995								2011						
		Intra-EU trade			Extra-EU trade					Intra-EU trade			Extra-EU trade		
	Total trade/ Total magnit	Interm/ Total intra trade	Final/ Total intra trade	Total Intra-EU trade/ Total trade	Interm/ Total extra trade	Final/ Total extra trade	Total Extra-EU/Total trade		Total trade/ Total magnit.	Interm/ Total intra trade	Final/ Total intra trade	Total Intra-EU trade/ Total trade	Interm/ Total extra trade	Final/ Total extra trade	Total Extra-EU/ Total trade
AT	23.4	66.4	33.7	57.5	62.2	37.8	42.5	AT	33.8	59.4	40.7	43.8	64.1	35.9	56.2
BE	38.3	57.3	42.8	71.1	64.3	35.7	28.9	BE	38.4	58.1	41.9	53.2	68.7	31.3	46.8
BG	28.9	60	40	38.5	48.0	52.0	61.5	BG	32.3	61.9	38.1	42	60.5	39.5	58
CY	16.1	25	75	40	54.9	45.1	60	CY	14.9	50	50	29.2	61.8	38.2	70.8
CZ	32.5	65.8	34.2	66.4	62.4	37.6	33.6	CZ	41.2	56.5	43.5	59	58.9	41.1	41
DE	*19.2*	*54.7*	*45.3*	*51*	*54.4*	*45.6*	*49*	DE	*31.6*	*51.8*	*48.2*	*39.9*	*58.8*	*41.2*	*60.1*
DK	27.2	40.9	59.2	52.6	52.0	48.0	47.5	DK	31.1	52.3	47.7	41.4	60.6	41.2	58.6
EE	37.5	60	40	55.6	53.6	46.4	44.4	EE	36.7	60	40	49	68.1	31.9	51
EL	6.2	40.7	59.3	50	64.5	35.5	50	EL	11.3	47.2	52.8	16.8	72.1	27.9	83.2
ES	*14.7*	*45.5*	*54.5*	*62.1*	*56.0*	*44.0*	*37.9*	*ES*	*18.1*	*48.7*	*51.3*	*51.8*	*61.8*	*38.2*	*48.2*
FI	28.6	73.7	26.3	47.7	61.9	38.1	52.3	FI	26.9	74.5	25.5	33.2	67.7	32.3	66.8
FR	*17.7*	*53*	*47*	*50.2*	57.6	42.4	*49.8*	FR	*17.4*	*52*	*48*	*41.7*	*57.9*	*42.1*	*58.3*
HU	26.8	61	39	54	55.0	45.0	46.1	HU	44.8	58.1	41.9	50.4	56.4	43.6	49.6
IE	47.6	39.7	60.3	63.2	57.6	42.4	36.8	IE	56.5	49.2	50.8	31.5	70.6	29.4	68.5
IT	*19.5*	*46.2*	*53.8*	*49.6*	*50.6*	*49.4*	*50.5*	IT	*20*	*49.1*	*50.9*	*39.8*	*49.8*	*50.2*	*60.2*
LT	29.6	60	40	46.2	58.8	41.2	53.9	LT	33.3	53.1	46.9	34.8	68.5	31.5	65.2
LU	54	76.5	23.5	68.9	75.1	24.9	31.1	LU	59.4	71.4	28.6	30.3	79.3	20.7	69.7
LV	31.3	75	25	40	66.6	33.4	60	LV	29	61.1	38.9	34	64.9	35.1	66
MT	30.4	60	40	71.4	62.4	37.6	28.6	MT	39.3	55.6	44.4	45.5	74.6	25.4	54.6
NL	*36*	*52.7*	*47.3*	*62*	*63.7*	*36.3*	*38*	NL	*38.3*	*57.6*	*42.4*	*55.3*	*67.2*	*32.8*	*44.8*
PL	19.7	57.6	42.4	66.7	52.1	47.9	33.3	PL	29.5	51.5	48.5	55	56.0	44.0	45
PT	18.2	43.3	56.7	68.2	61.6	38.4	31.8	PT	17.8	56	44	53	61.5	38.5	47
RO	18.6	50	50	49	70.1	29.9	51	RO	22.6	56.3	43.7	43.1	64.2	35.8	56.9
SE	29.5	64.3	35.8	46.3	57.7	42.3	53.7	SE	32.5	59.2	40.8	33.4	67.8	32.2	66.6
SI	30.8	50	50	60	52.8	47.2	40	SI	33.4	54.7	45.3	51.4	52.6	47.4	48.6
SK	35.7	70.6	29.4	71.7	67.0	33.0	28.3	SK	36.6	60.7	39.3	62.3	52.8	47.2	37.7
UK	*21.7*	*55.3*	*44.7*	*43.9*	*62.6*	*37.4*	*56.1*	UK	*23.1*	*62.2*	*37.8*	*36.9*	*67.5*	*32.5*	*63.1*
EU-27	21.3	53.8	46.2	53.2	57.4	42.6	46.8	EU-27	26	54.6	45.4	42.7	61.4	38.6	57.3

NB: The shares of total intra-EU plus extra-EU trade sum 100%, as well as the sum of shares of intra-EU intermediates and final goods. Source: Own elaboration.

and 26% in 2011. Focusing on extra-EU trade, the extra-EU share (of total trade) was 46.8% and 57.3% in 1995 and 2011 respectively. If we focus on the subdivision of extra-EU trade, it is remarkable the dominance of extra European trade in intermediate inputs, as in the inter-EU trade. However, in this case, in many European countries, the extra-EU trade of inputs and final products is less uneven, for instance Czech Republic, Italy, Latvia, Romania and Slovakia. Moreover, 21 out of 27 EU countries increased the trade share in this period and 26 countries also increased the share of extra-EU trade from 1995 to 2011. Notably, 16 of these 26 countries increased these shares by more than 10 percentage points, and Belgium, Greece, Ireland, Luxembourg, Malta and Portugal by more than 15 percentage points.

Focusing on the six top income contributors, all save France (from 17.74% to 17.40%) increased their trade share, and all of them increased the extra-EU share by more than 6 percentage points. The highest increment in the trade share corresponds to Germany, which went from 19.21% in 1995 to 31.64% in 2011. This is mainly due to the strong orientation towards non-EU exports, which in 1995 represented 49.03% of all its VA embodied in trade and 60.09% in 2011.

If we focus on the composition of intra-EU trade, on average this is more oriented towards intermediate inputs, 53.8% in 1995 and 54.58% in 2011. Greece, Spain, Ireland and Italy were the countries which showed the strongest orientation of intra-EU trade towards final goods in 2011, while Finland, Luxembourg, Slovakia and Sweden were the most specialized in intermediate inputs.

An interesting analysis refers to the income effects of the relationships between EU countries, which can be seen in Table 3. We present here the data for 2011; the other years analyzed are available upon request.

Table 3 provides a quantification of the income embodied in the trade flows across EU countries. Considering one of the countries, Spain, as an example, the reading of the table is as follows. Looking by row, in 2011, Spain generated EUR 92 billion of VA in the production of goods (intermediate and final goods) traded with the other EU countries. This income was mainly generated in the production of goods exported to France (EUR 21 billion), Germany (EUR 16 billion), Italy (EUR 13 billion), Portugal (EUR 11 billion) and the UK (EUR 10 billion). Looking by column, the final demand of Spain incorporates (or induces the generation of) EUR 95 billion across the other EU countries. Germany, in the production of goods imported by Spain, generates EUR 22 billion, France EUR 19 billion and Italy EUR 12 billion. Net balances between countries can be obtained by comparing different row and column sum elements in Table 3.

On the basis of the income embodied in intra-EU trade, we can obtain additional information about the patterns of export and import and the effect on income associated to intra-EU trade.

Figure 2 shows the shares of the different countries in embodied income (by rows and columns) for 1995 and 2011. We present only those percentages above the simple average of the EU-27 countries (also shown, as the standard deviation, at the bottom of each table).

Table 3. Income embodied in intra-EU trade (2011, billion EUR)

	AT	BE	BG	CY	CZ	DE	DK	EE	EL	ES	FI	FR	HU	IE	IT	LT	LU	LV	MT	NL	PL	PT	RO	SE	SI	SK	UK	EU-27 (direct)
AT	0	1.3	0.4	0	1.8	16	0.3	0	0.4	1.6	0.3	2.7	1.8	0.2	4.8	0.1	0.2	0.1	0	1	1.4	0.2	1.2	0.8	0.6	0.6	2.6	**40.1**
BE	1.2	0	0.2	0.1	0.9	13	1.7	0.1	0.9	4.5	0.9	12	0.7	0.7	5.8	0.1	1.7	0.1	0	8.9	1.6	0.8	0.5	2.1	0.2	0.2	8.7	**67.4**
BG	0.2	0.3	0	0	0.1	0.8	0	0	0.5	0.2	0	0.4	0.1	0	0.6	0	0	0	0	0.1	0.1	0	0.5	0	0	0	0.2	**4.2**
CY	0	0	0	0	0	0.1	0	0	0.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	**0.7**
CZ	2.7	1.3	0.2	0	0	11	0.3	0	0.2	1.2	0.3	2.5	1	0.2	2	0.1	0.2	0.1	0	1.2	2.2	0.2	0.6	0.6	0.2	2.6	2.5	**32.9**
DE	25	17	1.5	0.4	12	0	7.3	0.4	4.6	22	4.6	50	7.6	2.9	36	0.8	2.1	0.5	0.2	22	17	4.1	4.8	12	1.5	3.5	38	**297.7**
DK	0.3	0.6	0.1	0	0.4	5.6	0	0.1	0.3	1.2	1.3	1.8	0.2	0.3	1.3	0.2	0	0.1	0	1.6	1	0.2	0.2	4.8	0	0.1	4.9	**26.4**
EE	0	0.1	0	0	0	0.2	0.1	0	0	0	0.7	0.1	0	0	0.1	0.2	0	0.2	0	0.1	0.1	0	0	0.4	0	0	0.1	**2.5**
EL	0.1	0.1	0.3	0.4	0	0.7	0	0	0	0.2	0	0.2	0	0	0.5	0	0	0	0	0.1	0.2	0	0.2	0.1	0	0	0.4	**3.7**
ES	1.5	3.6	0.3	0.2	1.5	16	1.2	0.1	1.4	0	0.6	21	0.6	0.9	13	0.1	0.2	0.1	0.1	3.9	2.6	1.1	1.3	1.5	0.2	0.3	10	**92.4**
FI	0.3	0.6	0	0	0.2	2.9	0.5	0.3	0.1	0.9	0	1.2	0.1	0.1	0.8	0.1	0	0.1	0	0.9	0.7	0.1	0.1	2.7	0	0.1	1.7	**14.5**
FR	2.1	12	0.5	0.2	1.9	32	1.3	0.1	1.9	20	1	0	1.3	1.4	19	0.2	1.4	0.1	0.1	6.3	3.9	2.4	1.6	3.2	0.4	0.8	18	**131.9**
HU	1.5	0.4	0.3	0	0.7	5.7	0.2	0	0.2	1.7	0.1	1.5	0	0.1	1.7	0	0.1	0	0	0.5	1	0.1	1.5	0.3	0.2	0.6	1.4	**19.8**
IE	0.3	1.4	0	0	0.4	4.3	0.4	0	0.1	2.2	0.2	2.6	0.2	0	2.1	0	0.1	0	0	1.2	0.4	0.3	0.2	0.6	0	0.1	8.1	**25.4**
IT	4.6	4.3	0.8	0.4	2.3	27	1.3	0.1	3.8	13	1	23	1.6	1	0	0.3	0.3	0.2	0.4	3.3	4.8	1.9	3.2	2.1	1.3	0.8	12	**113.2**
LT	0.1	0.1	0	0	0	0.6	0.2	0.1	0	0.1	0.1	0.3	0	0	0.2	0	0	0.4	0	0.2	0.3	0	0	0.2	0	0	0.2	**3.2**
LU	0.2	1.4	0	0	0.2	1.7	0.1	0	0	0.2	0.1	1.4	0.1	0.1	0.6	0	0	0	0	0.3	0.2	0.1	0	0.1	0	0.3	**7.1**
LV	0.1	0	0	0	0	0.3	0.1	0.1	0	0	0.1	0.1	0	0	0.1	0.3	0	0	0	0.1	0.1	0	0	0.2	0	0.1	**1.8**
MT	0	0	0	0	0	0.2	0	0	0	0	0	0.1	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0.3	**1**
NL	1.8	15	0.3	0.2	1.4	28	3.2	0.1	1.6	7.9	1.8	11	1.5	1.5	11	0.3	0.6	0.1	0.1	0	2.9	1.3	0.8	3	0.2	0.5	19	**114.8**
PL	1.5	1.6	0.3	0	3.1	17	1.3	0.2	0.3	2.3	0.6	4.9	1.5	0.4	4.3	0.9	0.1	0.4	0	2.2	0	0.3	1.1	1.9	0.2	0.9	5.8	**52.5**
PT	0.2	0.5	0	0	0.1	2	0.1	0	0.1	4.8	0.1	2.4	0.1	0.2	1	0	0	0	0	0.5	0.2	0	0.1	0.3	0	0	1.4	**14.1**
RO	0.7	0.4	0.5	0	0.3	2.7	0.1	0	0.2	0.8	0.1	1.2	0.6	0.1	2.2	0	0	0	0	0.4	0.4	0.1	0	0.2	0.1	0.1	0.7	**11.9**
SE	0.7	2.2	0.1	0	0.6	6.7	4.1	0.2	0.3	1.9	3.9	3.4	0.4	0.3	2.2	0.2	0.1	0.2	0	2.4	1.5	0.4	0.2	0	0.1	0.1	4.7	**37**
SI	0.5	0.1	0.1	0	0.2	1.6	0.1	0	0.1	0.1	0	0.5	0.2	0	0.9	0	0	0	0	0.1	0.2	0	0.1	0.1	0	0.1	0.2	**5.4**
SK	1.3	0.3	0.1	0	2	3.4	0.1	0	0.1	0.7	0.1	1.1	1	0	1.1	0	0.1	0	0	0.5	1	0.1	0.3	0.3	0.1	0	0.9	**14.4**
UK	2.4	8.3	0.3	0.5	1.8	33	3.7	0.2	1.3	8.4	1.9	18	1.4	1.4	14	1.1	0.2	0.5	0.2	0.4	16	4.2	1.7	1.3	4.9	0.3	0.6	0	**134.8**
EU-27 (emb)	**49**	**72**	**6**	**3**	**32**	**##**	**27**	**2**	**19**	**95**	**20**	**163**	**22**	**25**	**122**	**4**	**8**	**3**	**2**	**73**	**48**	**25**	**20**	**42**	**6**	**12**	**141**	**1270.8**

Source: Own elaboration.

The first interesting result is the decrease from 1995 to 2011 in the standard deviation of the shares, both in columns and rows, showing higher diffusion (diversification) in the intra-EU export destination from 1995 to 2011. This change is more marked in exports (first two pictures, shares by row) than in imports.

Regarding income embodied in exports, in 1995, the final demand of Germany was a significant driver for income (above the EU-27 average) for 20 of the 26 EU countries. For 14 of them, the German market represented at least the 25% of the income generated in the intra-EU trade, with the cases of Poland, Romania and Slovenia, for which the German destination represented

FIGURE 2. INTRA-EU MAIN PATTERNS AND INCOME SHARES

Shares by row, 1995

	AT	BE	BG	CY	CZ	DE	DK	EE	EL	ES	FI	FR	HU	IE	IT	LT	LU	LV	MT	NL	PL	PT	RO	SE	SI	SK	UK	
AT		5			5	38				5		5	5		10					5							10	
BE						25				4		20			10					14							12	
BG																												
CY																												
CZ	13					38																				13		
DE	9	9					4			7		16			13					10				4			15	
DK		6				31				6	6	6			6					6				13			13	
EE																												
EL						33									33													
ES	3	3				22			3			24			14					5	11			3			11	
FI						18	9			9		9			9					9				18			18	
FR		11				26				11					16					5							14	
HU	25					25																						
IE		8				23				8		15			8					8							31	
IT	4	4				29			4	8		21								4							11	
LT																												
LU		20				20						20			20													
LV																												
MT																												
NL		16				29	3			5		11			8									3			15	
PL						50						8			8					8							8	
PT						22				22		22			11												11	
RO						50									50													
SE		9				18	14			5	5	9			5					9							14	
SI						50																						
SK					33	33																						
UK	3	7				25	3			7		16		7	11					10				4				
num	***6***	***11***	***0***	***0***	***2***	***20***	***5***	***0***	***2***	***12***	***2***	***14***	***1***	***1***	***16***	***0***	***0***	***0***	***0***	***12***	***0***	***1***	***0***	***6***	***0***	***1***	***13***	
Average	**2.5**																										6	11
Desvest	**11**																											

Shares by column, 1995

	AT	BE	BG	CY	CZ	DE	DK	EE	EL	ES	FI	FR	HU	IE	IT	LT	LU	LV	MT	NL	PL	PT	RO	SE	SI	SK	UK	num
AT					10	6							17		3													**4**
BE	4					9	6		9	5	10	11			7		25			15		7		5			7	**13**
BG																												**0**
CY																												**0**
CZ	4																									33		**2**
DE	52	29			40		33		27	25	20	29	33	10	31		25			35	40	21	33	27	33	33	30	**20**
DK						3					10													9				**3**
EE																												**0**
EL																												**0**
ES	4					6			9			10			7					4	29			5			5	**9**
FI							6																	9				**2**
FR	7	20			10	17	6		9	23	10			10	21		25			10	10	14		9			16	**16**
HU	4																			3								**1**
IE																											5	**1**
IT	11	6			10	15	6		27	14	10	16	17							6	10	7	33	5	33		10	**17**
LT																												**0**
LU																												**0**
LV																												**0**
MT																												**0**
NL	4	20				13	11		9	7	10	7			7						10	7		9			11	**13**
PL						4																						**1**
PT										5																		**1**
RO																												**0**
SE		4				3	17					10								4							4	**6**
SI																												**0**
SK					10																							**1**
UK	7	10			10	13	11		9	11	10	13		50	11					15	10	7		14				**15**
Average	**2.5**																										10	11
Desvest	**11**																											

Shares by row, 2011

	AT	BE	BG	CY	CZ	DE	DK	EE	EL	ES	FI	FR	HU	IE	IT	LT	LU	LV	MT	NL	PL	PT	RO	SE	SI	SK	UK	
AT					5	40				5		8	5		13													8
BE						19				7		18			9		3			13	3				3			13
BG						25									25													
CY																												
CZ	9	3				33				3		6	3		6					3	6			3	3		9	9
DE	8	6			4					7		17			12					7	6			4				13
DK		4				23				4	4	8			4					8	4			19				19
EE											33																	
EL						25									25													
ES		4				17						23			14					4	3	12						11
FI		7				20	7			7		7			7					7	7			20				13
FR		9				24				14					14					5	3							14
HU	10				5	30				10		5			10					5	5		5			5	5	
IE		4				16				8		12			8					4				4				32
IT	4	4				24			4	11		19									4							10
LT						33																						
LU		14				29						14			14													
LV																												
MT																												
NL		13				24				7		10			10													17
PL		4			6	33				4		10			8					4				4				12
PT						14				36		14			7													7
RO	8		8			25				8		8	8		17													8
SE		5				19	11			5	11	8			5					5	5							14
SI	20					40						20			20													
SK	7				14	21				7		7	7		7						7							7
UK		6				24	3			6		13		10	8					12	3			4				
num	***7***	***13***	***1***	***0***	***5***	***22***	***3***	***0***	***1***	***17***	***3***	***19***	***4***	***1***	***21***	***0***	***1***	***0***	***0***	***12***	***12***	***1***	***3***	***8***	***0***	***2***	***17***	
Average	**2.9**																											
Desvest	**8.3**																											

Shares by column, 2011

	AT	BE	BG	CY	CZ	DE	DK	EE	EL	ES	FI	FR	HU	IE	IT	LT	LU	LV	MT	NL	PL	PT	RO	SE	SI	SK	UK	num
AT					6	7							9		4									5		17	8	**7**
BE					3	6	4		5	5	5	7	5	4	5		25			12	4	4	5	5			6	**17**
BG																								5				**1**
CY																												**0**
CZ	6					5						5										4		5			25	**6**
DE	51	24	33		38		26		26	23	25	31	36	12	30	25	25	33		29	35	16	25	29	33	33	27	**23**
DK											5													12			4	**3**
EE											5																	**1**
EL																												**0**
ES	4	6			6	7	4		5		5	13	5	4	11					5	6	44	5				7	**16**
FI							4																	7				**2**
FR	4	17	17		6	14	4		11	20	5		5	4	16		13			8	8	8	10	7		8	13	**20**
HU	4				3																			5			8	**4**
IE																											6	**1**
IT	10	6	17		6	12	4		21	13	5	13	9	4						4	10	8	15	5	17	8	8	**20**
LT																												**0**
LU																												**0**
LV																												**0**
MT																												**0**
NL	4	21			3	12	11		11	8	10	7	9	8	9		13				6	4	5	7		8	13	**19**
PL					9	7	4				5	3	5		3	25								5	5		8	**12**
PT										5																		**1**
RO			17									5																**2**
SE					3	3	15				20										4						4	**6**
SI																												**0**
SK					6								5															**2**
UK	4	11			6	14	15		5	8	10	11	5	56	9		13			22	8	8	5	12		8		**19**
Average	**3.0**																										11	9.4
Desvest	**10**																											

Source: Own elaboration.

around 50% of the income embodied in their intra-EU trade, being especially significant. Italy, France, Spain, Netherlands, Belgium and the UK were also important drivers of income embodied for a significant number of countries. In 2011, these countries were also featured destinations, for even more countries, with slightly reduced shares (in general). The emergence of Poland as a significant destination for 12 countries is also significant. In 2011, Germany's demand drove at least 30% of the VA generated in Austria, Czech Republic, Hungary, Lithuania, Poland and Slovenia for intra-EU trade. Spanish demand crystalized 36% of the Portuguese income associated to intra-EU trade, Finnish demand 33% of the Estonian income and UK demand 32% of the Irish income. These data confirm the leading role of German final demand, particularly for eastern economies, and the importance of neighbouring countries (shorter distances), explaining trade.

Regarding the income embodied in imports, in Figure 2 we also observe an increase in the interconnections between EU countries from 1995 to 2011. The average share increase, the standard deviation decrease, and the top six income contributors (Germany, the UK, France, Italy, Spain and Netherlands) together with Belgium also appear as the main providers of inputs (generating domestic income) to the production of final goods of other countries. The increasing integration of Poland in intra-EU trade is worthy of note, appearing as relevant for the production of 12 countries in 2011 (versus only 1 in 1995), as is the intensification of the Spanish links in this period, significantly contributing to the production of 16 EU countries, compared to 9 in 1995.

As well as for income, we now present the results obtained regarding the employment embodied in exports of intermediate inputs and final products among European countries. The general evolution of employment can be seen in Figure 1. The main general data are summarized in Table 4.

From 1995 to 2011, the EU employment increased by 29 million additional jobs, which means a yearly growth rate of almost 2%, and 14.3% throughout the whole period. This positive growth is mainly explained by the long positive economic period experienced by the EU countries. Of these 29 million jobs, more than 50% can be associated to trade, and, particularly, to extra-EU trade (12.5 million jobs). As can be seen, intra-EU demand (domestic country components and intra-EU trade) supported more than 16 million jobs (2.7 million associated to intra-EU trade), while extra-EU trade supported 12.5 million jobs from 1995 to 2011. Moreover, we can see in Table 1 that while the six top income contributors represented 76.3% of the EU-27 income in 2011, 71.3% of the VA embodied in extra-EU trade and 69.6% of the VA embodied in intra-EU, these percentages fall to 66.5%, 63.3% and 57.4%, respectively, regarding employment. This unequal relationship tells us about the character of the goods traded (with a high value added per unit of employment), confirming that the trade of these countries is ruled by a certain competitive advantage, which is more intense in the extra-EU trade. Moreover, two other countries, Poland and Romania, gain relevance regarding employment, generating in 2011, 11.5% of the total EU-27 employment, 10.9% of the jobs resulting in

TABLE 4. EMBODIED EMPLOYMENT AND ITS COMPONENTS IN THE EU-27

										Employment embodied growth (%) 1995-2011				
1995 EMP	Total employment	Total intra EU[1]	Total extra EU[2]	Total intra EU trade[3]	2011 EMP	Total employment	Total intra EU[1]	Total extra EU[2]	Total intra EU trade[3]		Total employment	Total intra EU	Total extra EU	Total intra EU trade
AT	3718	3373	345	477	AT	4295	3534	761	630	AT	15.5	4.8	120.8	32.0
BE	3867	3463	404	1012	BE	4530	3763	767	886	BE	17.1	8.7	89.8	-12.4
BG	3519	2954	564	364	BG	3463	2820	644	514	BG	-1.6	-4.6	14.0	41.4
CY	296	265	32	27	CY	394	350	44	22	CY	33.2	32.4	39.2	-18.1
CZ	5148	4570	578	1155	CZ	5147	4262	886	1297	CZ	0.0	-6.7	53.1	12.3
DE	37601	34276	3325	3544	DE	41987	34927	7060	4840	DE	11.7	1.9	112.3	36.6
DK	2553	2235	318	373	DK	2739	2294	445	333	DK	7.3	2.6	39.9	-10.6
EE	633	536	98	155	EE	617	515	102	114	EE	-2.6	-3.9	4.7	-26.8
EL	4131	3978	154	170	EL	5183	4837	347	122	EL	25.5	21.6	125.9	-28.1
ES	13569	12862	707	1207	ES	18247	16650	1597	1814	ES	34.5	29.4	125.9	50.3
FI	2053	1774	279	252	FI	2493	2066	427	210	FI	21.4	16.4	53.3	-16.4
FR	22694	20691	2003	2087	FR	25566	22983	2583	1942	FR	12.7	11.1	28.9	-6.9
HU	4026	3531	495	600	HU	4022	3170	852	828	HU	-0.1	-10.2	72.0	38.0
IE	1285	1113	172	334	IE	1895	1402	494	276	IE	47.5	25.9	186.9	-17.4
IT	21841	19771	2070	2131	IT	25096	21962	3134	2160	IT	14.9	11.1	51.4	1.4
LT	1480	1239	241	207	LT	1416	1162	254	150	LT	-4.4	-6.3	5.4	-27.8
LU	216	187	29	69	LU	375	260	115	74	LU	73.8	39.3	296.5	6.9
LV	968	803	165	113	LV	855	715	140	78	LV	-11.7	-11.0	-15.2	-30.5
MT	139	124	15	27	MT	174	136	37	30	MT	25.0	10.2	148.0	10.9
NL	7155	6251	904	1439	NL	8816	7441	1375	1637	NL	23.2	19.0	52.1	13.8
PL	14735	13779	956	2035	PL	15748	13778	1970	2576	PL	6.9	0.0	106.1	26.6
PT	4531	4289	242	631	PT	5021	4609	413	529	PT	10.8	7.5	70.4	-16.2
RO	9503	8637	866	942	RO	10673	9257	1415	1058	RO	12.3	7.2	63.4	12.3
SE	4129	3547	582	493	SE	4600	3728	872	433	SE	11.4	5.1	49.8	-12.2
SI	918	794	124	201	SI	934	782	152	162	SI	1.7	-1.5	22.3	-19.4
SK	2107	1923	185	509	SK	2251	1941	310	531	SK	6.8	1.0	67.8	4.3
UK	27913	25145	2768	2212	UK	32888	28919	3970	2242	UK	17.8	15.0	43.4	1.4
EU-27	200728	182108	18621	22763	EU-27	229424	198262	31163	25488	EU-27	14.3	8.9	67.4	12.0
top 6	65.1	65.3	63.2	55.4	top 6	66.5	67.0	63.3	57.4					
PL+RO (%)	12.1	12.3	9.8	13.1	PL+RO (%)	11.5	11.6	10.9	14.3					

Source: Own elaboration. * top 6 income contributors(%);

Notes: 1 Corresponds to: $\omega_{dom}^{EU,EU'} + \omega_{int}^{EU,EU'} + \omega_{fin}^{EU,EU'}$; 2 Corresponds to: $\omega^{EU,noEU'}$; 3 Corresponds to : $\omega_{int}^{EU,EU'} + \omega_{fin}^{EU,EU'}$ ..

extra-EU exports, and up to 14.3% of the jobs associated to intra-EU trade (Table 4). In other words, these countries are acting as important employment factories in Europe. In addition, if we focus on the last part of Table 4, in total employment, they follow the six top main contributors with growth rates of 6.9% and 12.3% from 1995 to 2011, allowing a rapid increase in their income.

Note that during the analyzed period, for countries such as Bulgaria, Estonia, Hungary, Lithuania and Latvia, the total number of jobs decreased. However, for Bulgaria and Hungary, trade represented a clear source of employment, particularly the intra-EU trade in Bulgaria and the extra-EU trade in Hungary.

Given the space restrictions, we cannot show here more detailed results for employment. These are available upon request. In any case, the same analysis for employment shows the significant increase in the role of trade. The percentage of the total EU-27 employment supported by trade went from 20.6% to 24.7%, with an increase in most of the countries. In addition, there has been a significant shift from intra-EU to extra-EU markets, which have practically interchanged shares (intra-EU trade represented 55% of the total employment embodied in trade, and 45% for extra-EU, and, in 2011, intra-EU trade represented 45% of total employment embodied in trade, and 55% for extra-EU trade). Moreover, the share of intermediate inputs and final products, and the associated employment is relatively balanced and constant over time.

4. Conclusions

Globalization has changed the traditional perspective of economic growth of countries. International supply chains, involving trade among countries in the different stages of the production processes, have affected the generation and distribution of income and employment worldwide. Recent literature supports the concept of a new globalization based on the consolidation of macro-regions with different specialization patterns. In this context, we wonder if there has been a certain phenomenon of "*Europeanization*" as opposed to "globalization" and if, in this process, some EU countries have been more globally competitive in final goods while other EU countries have acted as input suppliers to the former.

To address these questions, we have analyzed the role that trade, and particularly intra-EU trade, has played as a driver of income and employment in the EU countries. On the basis of a multiregional input-output model focused on the EU production structure, we quantify the employment and value added embodied in trade by importing and destination countries for the period 1995-2011, a relevant period in the recent past of the EU.

Our results suggest that trade in European countries represents a very relevant proportion in the generation of income and employment in the European Union as a whole. The results strongly support the importance of intra-EU trade as well as the irruption of extra-EU trade as a central driver of employment and income in the EU.

When comparing the distribution of total trade between European countries, the study shows a certain trend towards the trade of intermediate inputs, which means that European countries trade more in the intermediate steps of the production chain than in the last step with final products. This is the case of countries like Austria, Czech Republic, Finland, Luxembourg and Slovakia.

For all the indicators and years analyzed in this study, we can conclude that there is a higher homogeneity in embodied variables but there is a higher dispersion in direct variables. This would suggest the existence of important similarities in consumption patterns, leading to a similar distribution of embodied values. Our results also provide evidence of two different specialization patterns among European countries. On the one hand, eastern countries have experienced an important increase in income and employment linked to intra-EU trade in the period analyzed, revealing their dynamism since their incorporation into the European Union. On the other hand, although the countries of central Europe have also experienced an increase in intra-EU trade, these countries show a clear shift towards extra-EU trade, not forgetting the great relevance of the domestic component.

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