Multiregional Input-Output Analysis of the Social impacts of EU structural FUNDS 2007-2013

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Abstract (English)

Jean Monnet famous quote "We are not forming coalitions of states, we are uniting men" encapsulated ones of the deepest meanings of the ideal vision of Europe: the social commitment. European leaders throughout the years are proudly waved the social Flag as one of its constitutive and also differentiating elements compared with other visions of development. Its importance is stressed in the Treaty on European Union when states that "The Union shall establish… a highly competitive social market economy, aiming at full employment and social progress..." Furthermore, "It shall combat social exclusion and discrimination, and shall promote social justice and protection, equality between women and men, solidarity between generations and protection of the rights of the child" (art 3.3. TUE). European commitments with the social agenda transcends its own boundaries and "In its relations with the wider world, the Union shall uphold and promote its values and interests and contribute to the protection of its citizens. It shall contribute to… eradication of poverty and the protection of human rights, in particular the rights of the child..," (art 3.5. TUE).

The European Union structural Funds ("The Funds") had played a major role in the economic and social cohesion among European countries. In that sense, it could be interesting to analyse if these Funds also meet the high standards of the European social values.

This paper will, first, try to analyse the impact of spatial distribution of the Funds 2007-2013 and the leakage effects to others territories. Secondly, and relying on the Satellite Economic Accounts of the World Input Output Database, it would be addressed the social (wages and skill level) consequences of these expenditures, inside Europe as well as outside.

The methodological approach will be a multiregional input-output (MRIO) model. This model will allow us to research into the trade relations of target regions in order to set the losses or gains of multiplier effects from the economic as well as social perspective due to the increasing trade globalization. Main data come from WIOD database and the European Union Budget office.

Keywords: Social Policy, Multi-Regional Input-Output Analysis, Evaluation, European Policy.

Topic: 31 Input-Output-based Policy Analysis

1. Introduction

Jean Monnet famous quote "We are not forming coalitions of states, we are uniting men" encapsulated ones of the deepest meanings of the ideal vision of Europe: the social commitment. European leaders throughout the years are proudly waved the social Flag as one of its constitutive and also differentiating elements compared with other visions of development. Its importance is stressed in the Treaty on European Union (TEU) when states that "The Union shall establish… a highly competitive social market economy, aiming at full employment and social progress…" Furthermore, "It shall combat social exclusion and discrimination, and shall promote social justice and protection, equality between women and men, solidarity between generations and protection of the rights of the child" (art 3.3. TEU). European commitments with the social agenda transcends its own boundaries and "In its relations with the wider world, the Union shall uphold and promote its values and interests and contribute to the protection of its citizens. It shall contribute to… eradication of poverty and the protection of human rights, in particular the rights of the child..," (art 3.5. TEU). In order to achieve those social, as well as economic and territorial, commitments the European Union have set throughout the years several financial instruments to fund targeted projects through grants, loans and guarantees. The more relevant ones are the European Regional Development Fund (ERDF), the European Social Fund (ESF) and the Cohesion Fund (CF). Recently, and as a consequence of the 2003 Common Agricultural Policy (CAP) major reform, new funds have been added to target rural and fisheries areas: the European Agricultural Fund for Rural Development (EAFRD) and the European Maritime and Fisheries Fund (EMFF). All five funds together are known as the European Structural and Investment Funds (ESI).

Social concerns have been present in European integration since the very beginning in the 50's; nevertheless two major steps concerning social issues were accomplished in the 80's. The first one was the adoption of the Single European Act (SEA) which established new economic and social objectives, increasing the structural expenditure designed to enhance cohesion among the country members. The financial ambitions of the SEA proved necessary to reform the financial system implemented to date; which lead to the second major step. The interinstitutional agreement under the presidency of Jacques Delors which set the first multiannual financial framework (MFF); this new financial approach pursued two main

objectives: to guarantee the financing of the community budget and to end with the annual budgetary squabbles. These "financial perspectives" set the political priorities –reflected in each one of the headings in which the expenditure is divided- as well as the maximum amount and the composition of the foreseeable community expenditure. As the European Commission Highlights "The MFF is not the budget of the EU for seven years. It provides a framework for financial programming and budgetary discipline by ensuring that EU spending is predictable and stays within the agreed limits. It also allows the EU to carry out common policies over a period that is long enough to make them effective. This long term vision is important for potential beneficiaries of EU funds, co-financing authorities as well as national treasuries."[1] The first MMF was known as "Package Delors I"; Five more have been implemented since then. The following table summarizes some relevant data of each one.

Table 1. Commitment appropriations of European Multiaanual Financial Frameworks (Million EUR)

Multiannual Financial Framework	Years	Structural Actions		Common Agricultural Policy		Total
Package Delors I	1988-1992	61,780	22%	154,852	56%	**275,611.00**
Package Delors II	1993-1999	204,791	34%	282,167	47%	**601,428.00**
Agenda 2000	2000-2006	261,097	35%	333,595	44%	**752,166.00**
MFF 2007-13	2007-2013	348,865	36%	330,085	34%	**975,777.00**
MFF 2014-20	2014-2020	366,791	34%	312,735	29%	**1,082,555.00**

Source. Own Elaboration from (European Commission, 2000; European Union, 2014).
Millions eur at current prices, adjusted at the last year of the period.

As reflected in Table 1, the bulk of the commitments (more than 70% until the last MFF) are assigned to economics and social cohesion (structural actions) and Agriculture (CAP). It is worth to remark that, while the first one have kept its endowments, as a share of total, over the years (around 35%), the share allocated to Agriculture have been severely declining (from 56% to 29%). Although, from a political point of view EU is focusing its socio-economic development efforts in cohesion, while Agriculture policy is evolving to a more environmental approach,[2] practically the whole budget has direct and indirect social

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[1] http://ec.europa.eu/budget/mff/introduction/index_en.cfm
[2] Briefly, the own labelling of the headings confirms this changing in the strategic guidelines. Structural actions were grouped under the headings "Cohesion for growth and employment" in the MFF 2007-13 and "Economic, social and territorial cohesion" in the MFF 2014-20; Agricultural policy were grouped under the headings

impacts. Therefore, it would be most interesting to analyse if the outcomes of the whole expenditure, not only the "Cohesion-for-growth-and-employment" Funds, meet the high standards of the above mentioned European social values. Specifically, this paper will focus on the last ended period where the EU MFF nearly amount 1 billion Euros.

According to European Commission's sixth report on economic, social and territorial cohesion "Until the crisis in 2008, disparities between regional economies in the EU were shrinking"; specifically in the case of labour "while regional disparities in both employment and unemployment rates narrowed between 2000 and 2007, they have widened significantly since 2008. In 2013, therefore, disparities in both were wider than in 2000". Nevertheless, the European Commission's conclude that the "Cohesion Policy in the 2007–2013 period made a substantial contribution to growth and jobs" (European Commission, 2014b). The European Policies Research Centre, after an exhaustive literature review, also confirms that "Cohesion policy has yielded positive results and contributed to the aims outlined in the Treaty" (Polverari et al., 2014). The EC official conclusions are also confirmed by academic works, although the effects are not uniform depending on the particular circumstances of the countries. The institutional quality in place and the national policies condition the outcomes and the final effectiveness (Ederveen et al., 2006; Katsaitis and Doulos, 2009; Rodriguez-Pose and Garcilazo, 2013). In short, EU Fund have proved its effectiveness concerning economic growth and total employment; nevertheless it remains to be explored some qualitative characteristics of that employment. This paper is a first attempt to address some of these characteristics like factor compensation or skilled profiles.

The research will be accomplished through a multiregional input-output (MRIO) model. This methodology has proved to be useful in analyzing selected impacts of public policies. One specific implementation of the MRIO model is used in the Triple Bottom Line (TBL) analysis which assess the economic, social and environmental outcomes of reviewed policies (Foran et al., 2005; Kucukvar et al., 2014; Wood and Garnett, 2010). This approach has already been used by certain authors in a previous paper to assess a wide variety of impacts of the European Agriculture Fund for Rural Development (EFARD). Specifically, the MRIO model proposed allowed to research the intra-EU and non-intra-EU trade relations of target regions

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"Preservation and management of natural resources" in the MFF 2007-13 and "Sustainable growth: natural resources" in the MFF 2014-20.

to determine the losses or gains of impact effects from a TBL (economic, social and environmental) perspective because of increasing trade globalization (Monsalve et al., 2014). The present research widens the political scope (from Rural Development to the whole MFF) and focus mainly on the social dimension considering that the social aspects have received less attention than the economic or environmental ones. Specifically, it will be evaluated the effects on Labour compensations (Wages), Capital Compensations (Benefits), and High, Medium and Low skilled employment (Working hours). Main data to accomplished the analysis came from WIOT Database and its Socio-Economic Accounts (Timmer et al., 2015).[3] Other social relevant indicators could and should be included in future research and they are not in the present study owed to the lack of data. However, the distinction between wages and benefits and between skill level and region where the employment and income are created can be considered a good proxy for the potential social impacts of the Funds (Simas et al., 2014).

The paper is organized as follows: section 2 describes the methodological approach and data sources; section 3 shows the main results; and section 4 provides conclusions and a discussion.

2. Methodology and data

2.1. Multiregional input-output model

In the standard Multiregional input-output (MRIO) model framework, regions and countries are included with their own technology, and trade is divided into intermediate trade, with specific industry destinations, and final trade.

The basic input-output equation is as follows (Miller and Blair, 2009):

$$x^r = A^{rr}x^r + y^{rr} + \sum_{s \neq r} A^{rs}x^s + \sum_{s \neq r} y^{rs} \tag{1}$$

where x is the output of the region indicated in the superscript, A^{rr} is the domestic matrix of coefficients of production (intraregional matrix), A^{rs} is the trade between industries from

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region r to region s (intermediate exports of region r or intermediate imports of region s); both are calculated as

$$A^{ij} = Z^{ij}(\hat{x}^j)^{-1} \tag{2}$$

where y^{rs} is the final trade between industries in region r to final agents in region s (final exports of region r or final imports of region s). In matrix form, including m regions, expression (1) becomes:

$$
\begin{pmatrix} x^1 \\ x^2 \\ x^3 \\ \vdots \\ x^m \end{pmatrix} =
\begin{pmatrix}
A^{11} & A^{12} & A^{13} & \cdots & A^{1m} \\
A^{21} & A^{22} & A^{23} & \cdots & A^{2m} \\
A^{31} & A^{32} & A^{33} & \cdots & A^{3m} \\
\vdots & \vdots & \vdots & \ddots & \vdots \\
A^{m1} & A^{m2} & A^{m3} & \cdots & A^{mm}
\end{pmatrix}
\begin{pmatrix} x^1 \\ x^2 \\ x^3 \\ \vdots \\ x^m \end{pmatrix} +
\begin{pmatrix}
\sum_r y^{1r} \\
\sum_r y^{2r} \\
\sum_r y^{3r} \\
\vdots \\
\sum_r y^{mr}
\end{pmatrix} \tag{3}
$$

This can also be expressed in compact form by (4):

$$x = Ax + y \tag{4}$$

Additionally, solving through the Leontief Inverse $L= (I-A)^{-1}$:

$$x = (I-A)^{-1}y \tag{5}$$

Expression (5) can be easily extended (Miller and Blair, 2009) to represent other impacts as factor contents such as valued added (Johnson and Noguera (2012), Koopman et al. (2014)); labor (Simas et al. (2014b)); or environmental impacts. Environmental impacts are many and varied: greenhouse gases (GHG), emissions (Peters and Hertwich (2008), Skelton et al. (2011)), water uses (Cazcarro et al. (2013), Chen and Chen (2013)), materials (Schoer et al., 2013) or multiple categories (Steen-Olsen et al., 2012). These wide flexibility of the input output impact analysis makes it suitable for assessing the sustainability from the Triple Bottom Line (TBL) perspective. In that cases, the social aspect is usually misrepresented and constitutes the focus of this paper. The social impacts we are going to assess are recorded in Table 1.

For the sake of simplicity, we will consider a general impact factor, f, which will be every social impact included in table 1. Therefore, the extended MRIO model to represent the impact factor f follows expression (6):

$$F = \hat{f}(I - A)^{-1}\hat{y} \tag{6}$$

where the symbol ^ denotes that the variable is expressed as a diagonal matrix. Utilizing these diagonal matrices both for the impact factors and for the final demand enables multipliers (the Leontief Inverse times each impact factor) and results in matrix form, which provides more information without needing more data ((Cadarso et al., 2012; Skelton et al., 2011), Meng et al. (2014)).

Table 2. Summary of the social indicators.

Indicator	Description	Unit
Output	Total production by sector	Million euro
Wages	Labour compensation	Million euro
Benefits	Capital compensation	Million euro
High skilled employment	Hours worked by high-skilled persons engaged	Million hour
Medium skilled employment	Hours worked by medium-skilled persons engaged	Million hour
Low skilled employment	Hours worked by low-skilled persons engaged	Million hour

Note: Data originate from WIOD.
Source: Own elaboration.

For instance, regarding the wages in an MRIO context, to determine the total wages generated by the Funds (W), we will use expression (7):

$$W = \hat{w}(I - A)^{-1}\hat{y}^F = P\hat{y}^F \tag{7}$$

where $\hat{w}$ is the diagonalized vector of wages per unit of output of each sector n in each region r (wages coefficients). The product $\hat{w}(I - A)^{-1}$ provides the wages multiplier matrix (P), and $\hat{y}^F$ is the diagonal matrix of the final demand generated by the Funds expenditure.

From expression (7), the sub-matrix P[rs] in wages multiplier P shows total wages that occurs in country r when adding a unit of final demand of country s. Summing W matrix by rows results in the total wages (domestic) per production country ($W^r = \sum_S W^{rs}$). Summing all elements along every column, we have 'vertical integration by countries' or wages generated all over the world linked to one country's final demand ($w^S = \sum_r W^{rs}$).

The same equation (7) could be rewritten to assess the rest of impacts of table 1 by changing the factor content, w by the corresponding impact factor expressed in terms of coefficients (impact factor by unit of output of each sector n in each region r).

One further consideration should be noted. The sub-matrix P^{rs} of multiplier P shows total impact that occur in country r when attending a unit of final demand for countries. Examining the F matrix in expression (6) along the row shows the distribution of the impact that occurs in one sector and country caused by all sectors and countries. Summing F matrix by rows results in a total impact (domestic) from the production country ($f^r = \sum_S F^{rs}$) or country's producer impact (PI). These PI results by rows are consistent with data by country and sector provided by statistics (WIOD database in our case). Conversely, examining the F matrix down a column yields impacts from all over the world and across sectors required for the production of a particular final demand in a country. Summing along columns, as we have previously stated, we have 'vertical integration by countries' that provides impacts generated all over the world linked to one country's final demand ($fv^s = \sum_r F^{rs}$). This measure put the focus on consumption and provides the factor footprint, and it quantifies total, direct and indirect factor generated linked to the demand of final goods by the country's agents (households' consumption, investment and public administration consumption).

2.2. Data and data preparation

As it was previously said in the introduction, World Input-Output Database (WIOD) 2007-2011 provides the initial data to develop our extended multiregional input-output model. This study's analysis was conducted using the wider disaggregation allowed by this database: 41 countries/regions and 35 sectors. Once the model was solved at that disaggregation level, we have proceed to a double aggregation in order to facilitate the analysis of the results. The first aggregation encompasses 6 regions: EU, NAFTA, China, East Asia, BRIIAT, and Rest of the World. This aggregation level has allowed us to address the social effects of the EU MFF as a single unit and evaluate the spillover effects of EU to the remaining regions. The second aggregation encompasses 32 regions: 27 EU countries[4] and the 5 remaining regions. These

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[4] EU: Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Spain, Slovakia, Slovenia, Sweden, United Kingdom. Croatia has been excluded given its recent entry (2013). NAFTA: Canada, Mexico and USA;

aggregations are the most appropriate to address the intra-EU effects; that is, how much of the social impacts associated with the EU budget of a specific country remains in the same country and how much leaks to the other EU countries. This approach allows us to analyze country by country not only the direct MFF effects but also the "imported" benefits from other countries' MFF expenditures.

Data for the elaboration of final demand vectors came from European Commission's official financial report 2013 (European Union, 2014) and datasets downloadable from the related website.[5] Data are disaggregated by year (2007-2013), by member state and by headings. Table 3 collects the total aggregated amount of EU MFF expenditure, excluding earmarked assignments (2.5%) and other non-EU beneficiaries (7%).

The allocation of the MFF into the 35-sector-final-demand vector has been determined taking into account the compulsive monitoring reports and other evaluation documents. Data availability has conditioned the Member State differentiation in the elaboration of the vectors. Specifically the reports on Cohesion Policy (Subheading "Cohesion for growth and employment" in Table 3) (European Commission, 2015) and Common Agricultural Policy (Subheading "Market related expenditure and direct aids" in Table 3) (European Commission, 2014a) offered detailed information at country level which allowed to elaborate different final demand vectors for each EU country. These two headings nearly amount the 67% or the total budget. The rest of the budget has been allocated considering the same sectorial distribution for all Member States. Table 4 shows the shares which have been used to compute the final demand vectors. It should be noted that the shares shown of headings 1.2.2. (Cohesion Policy) and 2.0.1 (Common Agricultural Policy) are just a mean of the EU_27 and because due to data availability it was possible to differentiate the final demand vectors for each country for those headings.

Table 3. Allocation of EU expenditure by Member State and by Heading 2007-2013 (EUR million)

		EU-27	BE	BG	CZ	DK	DE	EE	IE	EL	ES	FR	IT	CY	LV	LT	LU	HU	MT	NL	AT	PL	PT	RO	SI	SK	FI	SE	UK
1	SUSTAINABLE GROWTH	353,210.9	8,819.0	3,736.6	15,878.2	1,939.5	35,213.0	3,329.3	2,098.7	26,363.1	41,772.6	22,776.9	29,541.2	583.5	3,954.7	7,142.4	994.4	17,389.3	536.8	6,007.3	3,298.6	54,653.8	23,990.6	7,680.6	3,203.4	7,545.3	3,041.4	3,580.1	18,117.7
1.1	Competitiveness for growth and employment	62,873.7	6,332.5	425.6	495.9	1,316.6	9,888.9	159.5	1,028.7	1,471.5	5,411.4	8,672.0	5,638.2	128.8	171.9	817.5	801.2	712.6	62.4	3,684.0	1,656.7	1,156.0	1,027.8	363.3	319.2	407.3	1,239.0	1,903.8	7,558.0
1.1.1	Seventh Research framework programme (incl.compl.of sixth Research FP)	38,939.0	3,927.5	74.9	209.1	825.9	6,439.8	63.9	513.9	929.3	3,801.4	5,163.4	3,724.7	74.0	32.2	45.4	196.5	247.1	18.9	2,803.0	979.4	375.6	383.3	114.7	140.6	51.8	722.2	1,341.9	5,723.8
1.1.2	Decommissioning (Direct research)	162.4	5.8	0.0	5.1	0.0	39.8	0.0	0.0	0.0	15.4	13.3	66.2	0.0	0.0	0.0	0.2	0.0	0.0	6.6	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	9.9
1.1.3	Ten	3,952.5	378.8	3.5	54.2	84.8	676.2	9.7	28.5	37.1	327.0	602.6	392.4	4.6	16.8	37.3	92.1	35.3	1.8	163.2	329.6	37.3	54.1	1.9	21.3	13.1	128.4	262.1	158.7
1.1.4	Galileo	2,509.1	16.0	0.2	6.3	0.2	850.3	0.0	0.2	0.0	9.3	1,264.3	179.6	0.0	0.0	0.0	19.1	0.0	0.0	3.1	0.1	0.2	0.4	0.0	0.0	0.0	0.2	0.1	159.6
1.1.5	Marco Polo	133.9	16.0	2.4	0.0	0.1	19.8	0.0	0.3	0.4	5.9	16.6	27.0	1.7	1.4	0.0	1.3	2.7	0.0	16.4	9.6	1.9	1.6	0.0	1.4	0.0	0.3	3.5	3.4
1.1.6	Lifelong Learning	7,463.0	382.6	108.9	155.0	129.8	943.4	52.1	96.1	204.7	686.2	857.9	833.7	31.4	68.3	101.2	26.6	166.3	15.8	294.3	166.3	553.3	201.7	209.0	70.3	89.3	150.3	173.2	690.7
1.1.7	Competitiveness and innovation framework programme (CIP)	1,528.3	231.9	7.8	13.4	31.2	212.0	6.5	18.0	52.4	132.4	118.8	165.5	5.1	5.3	4.2	50.8	16.8	2.2	113.3	65.3	22.8	30.6	12.6	12.6	4.2	24.2	32.8	133.2
1.1.8	Social policy agenda	984.5	384.1	7.7	8.0	11.4	89.5	2.4	7.2	12.0	25.4	67.5	52.0	3.8	1.9	5.5	97.6	12.3	3.4	46.3	26.7	10.4	10.0	3.8	9.9	4.7	6.2	10.7	63.6
1.1.9	Customs 2013 and Fiscalis 2013	269.8	150.9	2.4	3.3	3.3	5.2	2.5	2.2	6.3	2.7	3.2	3.5	2.1	2.5	2.5	40.4	3.5	2.0	3.5	2.7	3.3	3.4	2.5	2.5	2.3	3.6	4.4	3.0
1.1.10	Nuclear decommissioning	1,025.8	0.0	210.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	585.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	229.7	0.0	0.0		
1.1.11	European Global Adjustment Funds	424.2	20.1	0.0	0.3	57.3	42.5	0.0	63.3	2.9	43.8	40.3	54.2	0.0	0.0	2.9	0.1	0.0	0.7	25.5	28.0	1.2	8.6	2.9	2.2	0.0	7.4	19.6	0.3
1.1.12	Energy projects to aid economic recovery	1,574.0	92.1	1.3	32.0	101.2	240.8	15.0	110.0	6.0	204.3	116.2	47.9	0.0	0.0	30.8	2.7	55.8	13.8	64.9	15.9	134.0	52.9	9.2	37.0	2.7	15.0	24.3	107.5
1.1.DAG	Decentralised agencies	1,553.7	127.2	0.0	0.0	0.0	145.3	0.0	139.5	167.6	94.9	135.9	0.0	0.0	7.5	25.0	0.0	0.0	0.1	0.0	0.0	264.6	0.0	13.2	0.0	156.6	0.0	276.0
1.1.OTH	Other actions and programmes	2,353.5	599.5	5.6	9.2	71.2	184.4	7.8	49.7	52.8	62.7	271.9	91.5	6.0	5.1	5.9	220.7	187.8	3.8	143.7	33.0	16.1	16.5	6.6	8.3	9.6	24.5	31.0	228.3
1.2	Cohesion for growth and employment	290,337.2	2,486.5	3,311.0	15,382.3	622.9	25,324.1	3,169.5	1,070.0	24,891.7	36,361.1	14,105.0	23,903.0	454.6	3,782.8	6,324.9	193.1	16,676.7	474.4	2,323.3	1,641.9	53,497.8	22,962.8	7,317.2	2,884.2	7,138.0	1,802.4	1,676.4	10,559.6
1.2.1	Structural funds	237,732.0	2,459.0	2,336.4	10,275.9	620.0	25,294.6	2,001.5	1,025.4	20,907.0	29,734.7	14,100.7	23,900.7	305.2	2,502.0	4,117.2	166.5	11,509.5	309.3	2,320.4	1,640.2	36,806.2	19,338.1	4,924.7	2,180.1	4,924.2	1,802.1	1,675.1	10,555.4
1.2.2	Cohesion Fund	52,577.2	25.3	974.5	5,106.4	2.1	25.1	1,167.9	44.6	3,984.7	6,625.6	2.1	1.5	149.5	1,280.8	2,207.6	19.7	5,163.7	165.0	1.6	0.2	16,691.1	3,624.6	2,392.3	704.0	2,213.6	0.0	0.3	3.7
1.2.DAG	Decentralised agencies	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1.2.OTH	Other actions and programmes	28.0	2.2	0.2	0.1	0.8	4.4	0.1	0.1	0.1	0.8	2.2	0.7	0.0	0.0	0.2	6.9	3.6	0.0	1.3	1.5	0.5	0.1	0.2	0.2	0.3	0.3	0.9	0.5
2	PRESERVATION AND MANAGEMENT OF NATURAL RESOURCES	384,168.0	4,906.4	3,495.7	6,843.2	7,834.9	47,406.7	1,228.4	10,689.5	21,240.3	48,422.7	68,490.2	40,001.8	464.8	1,888.0	3,482.6	366.8	9,220.9	98.4	7,248.3	8,871.6	26,689.9	9,381.0	9,971.7	1,394.9	3,758.9	6,048.4	6,926.3	27,793.1
2.0.1	Market related expenditure and direct aids	298,413.1	4,118.6	1,987.1	4,155.2	6,972.5	39,151.5	478.0	8,158.4	17,456.2	40,727.0	61,766.8	32,152.4	290.5	693.6	1,803.1	250.4	6,178.9	25.7	6,634.6	5,218.9	14,950.2	5,276.6	4,796.7	561.4	1,820.2	3,897.0	5,099.2	23,792.1
2.0.2	Rural development	80,035.1	485.7	1,469.0	2,655.8	400.6	8,000.8	683.1	2,443.6	3,488.0	6,426.5	6,395.0	7,157.2	147.3	1,072.2	1,628.0	94.3	2,982.6	61.3	479.8	3,604.5	11,224.1	3,861.6	5,076.6	806.8	1,917.5	2,053.4	1,675.2	3,744.6
2.0.3	European fisheries fund	3,499.9	59.0	30.4	21.6	130.3	108.3	57.9	54.6	236.8	986.0	196.2	367.3	17.3	112.3	44.4	2.2	28.6	6.1	41.1	5.1	477.0	210.6	87.7	14.8	9.6	37.1	58.4	97.0
2.0.4	Fisheries market	473.1	35.6	0.7	0.0	43.2	21.6	3.3	22.6	10.3	73.4	40.9	62.4	2.6	1.2	1.5	5.7	0.0	2.5	21.4	0.0	4.1	13.0	1.2	0.8	0.0	8.5	37.8	58.5
2.0.5	Life+	1,366.9	193.7	8.6	10.4	40.9	123.1	4.8	10.4	47.3	166.4	83.6	243.6	7.0	8.5	5.6	13.2	25.8	2.8	62.8	42.2	34.5	18.4	9.1	11.1	11.6	37.3	51.7	92.5
2.0.DAG	Decentralised agencies	308.6	7.8	0.0	0.0	246.1	0.0	0.0	0.0	0.0	41.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	12.7	0.0	0.0
2.0.OTH	Other actions and programmes	71.3	5.9	0.0	0.2	1.3	1.5	1.2	0.0	1.7	1.5	7.8	18.9	0.0	0.0	0.0	1.0	5.1	0.0	8.6	0.8	0.0	0.7	0.5	0.0	0.0	2.4	3.9	8.4
3	CITIZENSHIP, FREEDOM, SECURITY AND JUSTICE	11,006.6	980.0	87.2	111.7	87.4	759.5	70.9	91.8	366.2	528.3	1,106.3	2,275.8	64.2	64.8	170.0	85.1	198.6	115.9	764.1	274.0	853.9	224.6	173.5	120.8	94.8	123.4	507.5	663.8
3.1	Freedom, security and justice	4,617.4	405.8	36.2	32.3	12.8	243.9	41.3	24.2	206.2	334.1	375.5	383.2	31.5	30.1	125.5	15.8	69.8	88.5	632.1	199.0	577.8	140.7	49.6	41.6	28.0	67.1	96.9	287.2
3.1.1	Solidarity and management of migration flows	2,331.6	96.9	25.5	26.1	6.2	191.5	25.6	16.2	194.7	290.2	219.5	293.0	28.7	21.9	116.1	10.1	55.8	70.3	75.4	57.3	74.3	35.5	37.0	33.9	23.3	60.1	82.5	164.1
3.1.2	Security and safeguarding liberties	269.9	29.2	4.8	2.8	2.4	23.0	2.0	5.1	5.2	17.9	8.7	45.7	1.1	3.7	5.4	1.9	5.6	1.3	34.6	4.7	4.5	5.0	5.5	4.3	3.1	3.0	8.4	31.1
3.1.3	Fundamental rights and justice	316.8	93.2	5.7	3.3	3.7	23.9	2.4	2.2	4.9	17.2	15.1	37.9	1.6	4.5	4.0	1.9	7.0	0.8	14.6	11.0	4.3	3.2	6.8	3.0	1.3	3.7	2.1	37.6
3.1.DAG	Decentralised agencies	1,301.6	6.0	0.0	0.0	0.0	0.0	10.7	0.0	0.1	0.0	2.8	0.0	0.0	0.0	0.0	0.7	0.0	15.7	505.3	123.1	493.6	96.6	0.0	0.0	0.0	0.0	0.2	46.6
3.1.OTH	Other actions and programmes	397.5	180.5	0.2	0.1	0.5	5.4	0.6	0.6	1.3	8.8	129.5	6.5	0.0	0.0	1.3	1.3	0.4	2.3	3.0	1.0	0.4	0.3	0.3	0.4	0.9	3.7	7.8
3.2	Citizenship	6,389.6	574.2	51.0	79.4	74.5	515.6	29.5	67.6	160.1	194.2	730.8	1,892.7	32.7	34.7	44.5	69.3	128.8	27.4	131.9	75.0	276.1	83.9	123.8	79.3	66.7	55.7	410.6	376.6
3.2.1	Public health and consumer protection programme	474.3	120.0	2.7	3.1	13.5	35.1	2.3	5.7	8.3	17.3	43.5	28.6	2.6	2.1	2.9	44.5	9.7	1.2	36.8	9.4	4.4	4.0	3.1	6.0	1.9	10.8	9.5	44.9
3.2.2	Culture 2007-2013	313.1	40.3	2.3	6.6	4.8	30.9	2.7	2.0	4.7	15.1	48.0	27.3	0.9	2.5	2.8	2.0	7.0	0.2	17.8	21.8	3.7	7.4	3.7	11.8	3.1	4.9	7.0	31.1
3.2.3	Youth in action	827.3	53.8	13.6	16.7	17.1	99.3	10.0	16.2	19.7	59.1	84.4	64.1	5.3	10.1	12.0	10.0	23.6	6.5	29.0	18.8	59.4	23.1	34.0	16.4	15.5	18.6	22.7	67.4
3.2.4	Media 2007	690.1	81.3	3.8	10.7	23.1	103.0	2.4	9.5	10.2	45.9	188.0	47.4	1.0	2.5	2.6	5.1	5.8	0.2	27.7	12.0	18.9	7.1	3.0	2.3	2.0	9.8	22.0	42.4
3.2.5	Europe for Citizens	167.1	26.2	1.8	3.0	1.0	22.8	0.3	1.0	2.1	4.6	32.7	18.3	0.8	1.6	1.5	0.1	14.4	0.5	1.7	3.9	8.9	0.5	3.5	1.6	3.8	0.8	1.3	7.6
3.2.6	Civil protection Financial instrument	74.1	2.3	0.5	0.1	7.8	11.2	0.8	0.0	5.7	3.1	2.9	15.6	0.6	0.2	0.0	1.1	1.0	0.3	6.2	1.8	0.2	1.0	5.0	0.0	0.7	7.5	2.7
3.2.7	Communication actions	574.2	174.0	4.4	5.2	5.1	35.8	3.4	9.7	9.1	19.6	159.2	28.4	2.3	6.8	5.3	6.2	10.4	3.2	10.7	5.4	11.6	9.2	6.9	5.6	4.6	7.9	9.8	14.4
3.2.8	European Solidarity Fund	2,109.7	0.0	0.0	16.0	0.0	166.9	0.0	13.0	99.1	21.1	163.1	1,198.9	7.6	0.0	0.0	0.0	37.5	0.0	0.0	0.2	105.6	31.3	36.8	29.8	20.4	0.0	162.4
3.2.DAG	Decentralised agencies	788.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	458.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	330.4	0.0
3.2.OTH	Other actions and programmes	371.0	76.3	21.9	18.0	2.1	10.5	7.6	10.4	1.3	8.3	9.0	5.8	11.5	9.0	17.3	0.2	19.4	15.4	2.2	1.6	63.4	0.3	32.6	5.4	15.3	2.2	3.6
4	THE EU AS A GLOBAL PARTNER	4,498.5	0.0	912.5	30.3	0.0	0.0	17.9	0.0	0.0	0.0	0.0	0.0	7.7	26.1	69.7	0.0	116.3	1.7	0.0	0.0	457.4	0.0	2,640.4	31.6	49.3	0.0	0.0	0.0
4.0.1	Instrument for Preaccession (IPA)	4,496.2	0.0	912.5	30.3	0.0	0.0	17.9	0.0	0.0	0.0	0.0	0.0	7.7	26.1	69.7	0.0	116.3	1.7	0.0	0.0	457.4	0.0	2,640.4	31.6	49.3	0.0	0.0	0.0
	Other actions and programmes	2.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	ADMINISTRATION	48,942.7	29,830.6	90.7	114.5	346.9	1,271.0	55.2	298.9	260.5	579.2	2,274.5	1,769.7	52.2	59.5	72.4	8,904.2	141.6	57.9	611.5	163.6	201.6	194.7	134.2	60.2	71.6	162.8	191.1	963.2
6	COMPENSATIONS	935.4	0.0	257.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	602.5	0.0	0.0	0.0	0.0
	TOTAL EXPENDITURE	802,762.5	44,536.0	8,580.6	22,977.9	10,208.6	84,650.3	4,701.8	13,178.9	48,230.2	91,302.8	94,648.0	73,588.5	1,172.4	5,993.1	10,937.0	10,350.4	27,066.8	810.7	14,631.1	12,607.8	82,856.6	33,790.8	21,202.8	4,811.0	11,519.8	9,376.0	11,205.0	47,537.8

Table 4. Allocation of EU Expenditure in Final Demand Vectors (share of total)

Sector / Budget Line		1.1.1	1.1.2	1.1.3	1.1.4	1.1.5	1.1.6	1.1.7	1.1.8	1.1.9	1.1.10	1.1.11	1.1.12	1.1.DAG	1.1.OTH	1.2.1	1.2.2	1.2.DAG	1.2.OTH	2.0.1	2.0.2	2.0.3	2.0.4	2.0.5	2.0.DAG	2.0.OTH	3.1.1	3.1.2	3.1.3	3.1.DAG	3.1.OTH	3.2.1	3.2.2	3.2.3	3.2.4	3.2.5	3.2.6	3.2.7	3.2.8	3.2.DAG	3.2.OTH	4.0.1	5	6
Agriculture, Hunting, Forestry and Fishing	c1																			0.1	0.0	0.2				0.1																		0.0
Mining and Quarrying	c2																																											
Food, Beverages and Tobacco	c3																																											
Textiles and Textile Products	c4																																											
Leather, Leather and Footwear	c5																																											
Wood and Products of Wood and Cork	c6																																											
Pulp, Paper, Paper, Printing and Publishing	c7													0.0	0.0		0.0		0.0			0.0	0.0			0.0					0.0									1.0		0.1	0.0	
Coke, Refined Petroleum and Nuclear Fuel	c8																																											
Chemicals and Chemical Products	c9																																											
Rubber and Plastics	c10																																											
Other Non-Metallic Mineral	c11																																											
Basic Metals and Fabricated Metal	c12																																											
Machinery, Nec	c13			1.0				0.1				0.1					0.1						0.1					0.0															0.0	
Electrical and Optical Equipment	c14		0.0		0.2		0.1				0.0	0.1	0.1		0.1		0.0					0.0	0.1			0.0																	0.0	
Transport Equipment	c15		0.3								0.0						0.0	0.0				0.0	0.1			0.0																	0.0	
Manufacturing, Nec; Recycling	c16													0.1			0.0												0.2			0.0	0.0		
Electricity, Gas and Water Supply	c17													0.0								0.0																					0.0	
Construction	c18		0.5					0.8			0.1	0.4	0.4			0.4		0.2	0.2			0.1	0.2			0.1											0.5		0.1	0.1
Sale, Maintenance and Repair of Motor Vehicles and Motorcycles; Retail Sale of Fuel	c19																																											
Wholesale Trade and Commission Trade, Except of Motor Vehicles and Motorcycles	c20																																											
Retail Trade, Except of Motor Vehicles and Motorcycles; Repair of Household Goods	c21																																											
Hotels and Restaurants	c22													0.0	0.0		0.0		0.0			0.0																			0.0	
Inland Transport	c23				0.4							0.0																													0.0	
Water Transport	c24				0.4							0.0																													0.0	
Air Transport	c25																																											
Other Supporting and Auxiliary Transport Activities; Activities of Travel Agencies	c26																																											
Post and Telecommunications	c27																																											
Financial Intermediation	c28			0.1							0.0				0.0			0.0				0.0													0.0	1.0
Real Estate Activities	c29												0.0	0.0		0.0		0.0		0.4		0.1																	0.0	
Renting of M&Eq and Other Business Activities	c30	0.2	1.0	0.1			0.5			0.4	0.1	0.2		0.2	0.2		0.2		0.1	0.2			0.1	0.1		0.2		0.1				0.1		0.1		0.0	0.1
Public Admin and Defence; Compulsory Social Security	c31			0.2	0.3	1.0			0.5	0.2	0.0	0.0		0.5	0.0			0.0	1.0	0.2		0.5	0.2	0.1	1.0	0.2	0.5	0.4			0.7	0.2	0.5	0.1	0.2	1.0
Education	c32			0.3		0.3			0.3	0.1	0.2	0.2			0.2			0.2		0.2		0.1	0.2			0.2	0.2			0.1	0.1
Health and Social Work	c33			0.3			0.2			0.0	0.0	0.0		0.0				0.2		0.0	0.2	0.3		0.1	0.5						0.1	0.1
Other Community, Social and Personal Services	c34			0.3						0.0	0.1	0.1		0.1				0.1		0.0	0.1	0.3		0.1	0.3	1.0	1.0	0.8			0.4	0.1
Private Households with Employed Persons	c35																																											
Incomes		0.8		0.2	0.8			0.4	0.4		0.2	0.2	0.0	0.0	0.5	0.0	0.9	0.5	0.3		0.5	0.3			0.5			1.0			0.5	0.1	0.1

It is worthwhile to note that a huge quantity of public funds should be considered as direct transfers to targeted groups and people. The specific share of the budget is shown in the final row "income". This quantity has been assigned to sectors according to the distribution of the "Final-consumption-expenditure-by-households" column in WIOD, assuming that the receivers of these transfers have the same consumption pattern as the average consumer in each country. In accordance with the same column information, we have divided the aggregate final demand into 41 regions (consequently distinguishing domestic and imported EU MFF demand from 40 regions).

Finally, the model is solved at current prices annually to cover the MFF period and then deflated and aggregated for presentation purposes.

3. Results

The EU Funds we focus on in this paper amount 802.5 thousand Million euros and they are able to generate 1,621.7 thousand Million euros of total output globally (Figure 1). This implies a good level of efficiency, more when we noticed that also near of 84% of that output is produced inside the EU. However, when we look at the countries, those who benefit most are not the less developed ones or those with the lower income per capita in the UE, but the opposite: The Netherlands, Germany and Sweden and, on the contrary, those less benefited by the increase in total output are Lithuania and Greece. The different degree of development and the different participation of countries in the intra and extra-UE global production chains divert to some extent the objectives of the Funds, making that their impact in terms of output goes in favor of the more developed ones. As a result, Figure 1 shows how some European countries increase their share in the output impact in relation to their share in the Funds received. Regarding the impact overseas, it is remarkable the output generated in China, which shows the eighth position, but all the outside impacts are remarkable even considering that they are not single countries, since they do not receive any amount directly and the resulting impact comes from indirect effects completely (Baldwin, 2012; Dietzenbacher et al., 2012).

Figure 1. EU-Funds destination and Output generated by region (Million Euros)
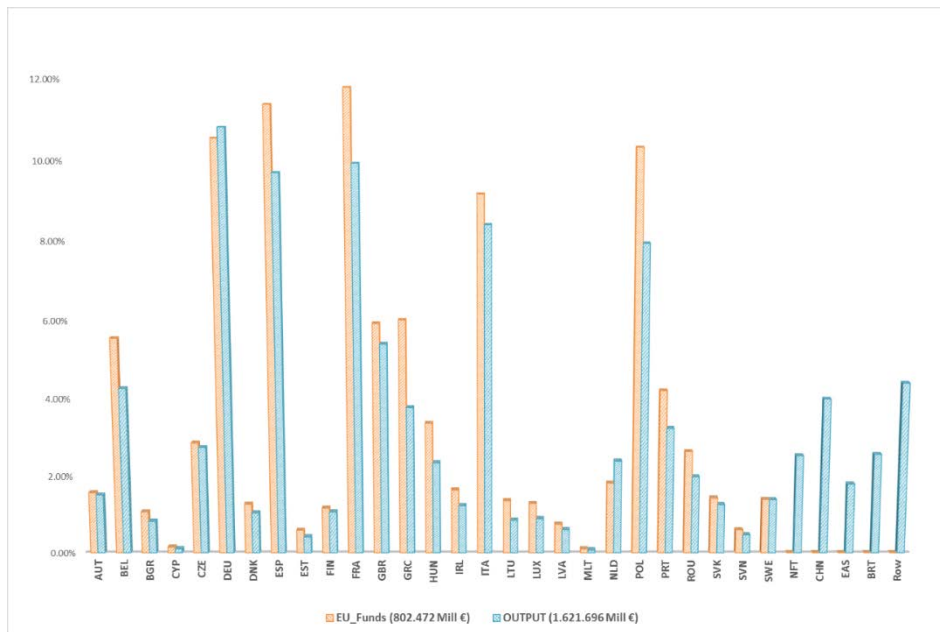
Although the output impact is a good measure for the level of activity linked to the EU Funds, it is probably a rough measure for assess how a country benefits on the behalf of the Funds. The assessment of the income generated by them in every country is a better indicator. This is what is showed by Figure 2 distinguishing by factor of production, labor compensation, on the one side, and capital compensation, on the other hand. In aggregate terms, the impact of the Funds on employment and capital compensation shows a proportion closer to 60-40%, respectively. At country level, Germany, France, Spain, Italy and Poland show, inside the EU, the highest shares in both impacts. However, the countries show different patterns of linkage effects to capital or labor compensation. Countries like Belgium, Germany, Italy, Portugal, United Kingdom or Greece show higher relative linkage effects on labor compensation than in capital compensation owed to the Funds, while in countries like Slovakia, Poland or Spain the effects are in the other way round, higher regarding capital compensation. This can be the result of the kind of measure funded and the sectors involved, but also it is an indicator that points to countries with lower salaries in comparison to the levels of capital compensation, that can be the case of the last countries cited. This is also the case of all the countries and regions considered outside the EU. For them the differences are particularly marked, being the strong difference for Row. This is remarkable, since it implies that the EU-Funds expenditure trigger much higher increases in benefits than in salaries in regions like China, Row or BRIIAT. Most of those emerging

countries are labor intensive, however the low salaries paid and the intensification of developed countries multinationals firms in those emerging regions are behind these results. This is the case treated under the Theory of the Leontief Paradox (Duchin, 2004) which is also spotted within the EU with case of high and low income per capita countries. In addition, the results of Figure 2, and also those of Figure 3, are in line with the findings by (Alsamawi et al., 2014a) that point out how the imports from developing countries show higher embodiment of working hours while the exports of developed countries show higher embodiment of wages and, as a result, the trade pattern resulting from the Funds would be the same as the general one and concerns about a fairer trading would arise.

Figure 2. EU-Funds Income generation by region (Percentage of Million Euros generated)
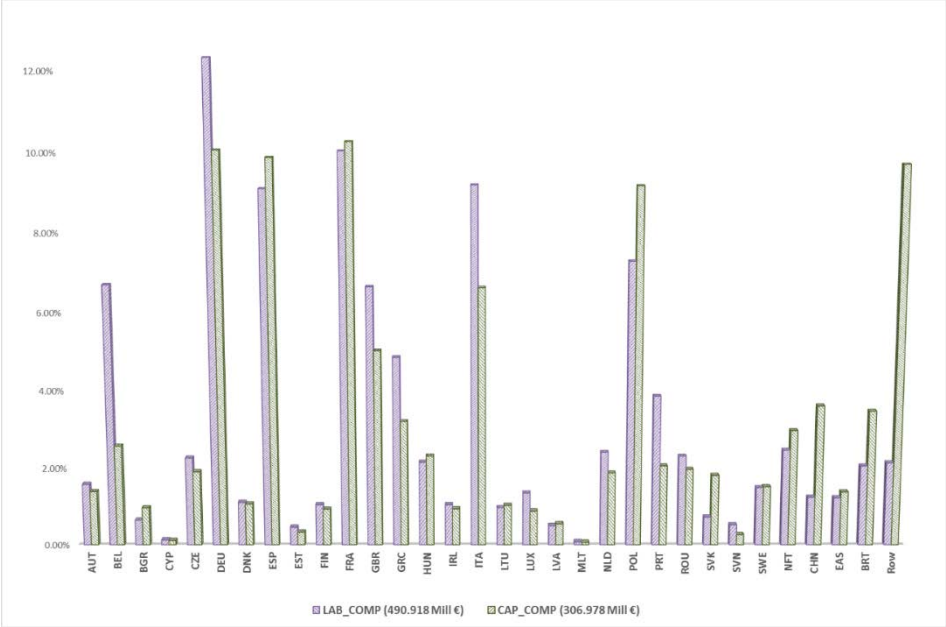
Source. Own Elaboration

Figure 3 show the impact in terms of Employment generated by the EU-Funds worldwide. This figure also shows the differentiations between the three different skill qualifications. The 70% of total employment is generated within Europe while the remaining 30% is generated overseas. The importance of overseas employments is motivated by the employment related to trade which represents about 20% of total world employment (Arto et al., 2014). European trade relationships with emerging countries like China, India is a fact currently. However, results show that employment leakage as overseas labour presents some different patterns compared to the EU employment. The specialization of emerging countries in Low and Medium skilled employment is noteworthy (Simas et al., 2014a).

Within the EU, Poland is the country with a higher employment generation, followed by far by countries like Spain, Germany, Italy and Romania (Figure 3). The case of both European Eastern countries is noteworthy. Both countries show a great employment generation capacity which is forced by the employment intensive economic structures they present, which is mainly generated for Medium and Low-skilled works. The case of Romania is even more relevant because it is not main Funds receiver. Outsourcing processes of Central rich economies, like Germany or Austria to those countries are behind these results (Bruno et al., 2012). The case of the remaining great employment generators, like Spain, Germany or Italy, is motivated by the big amount of Funds they received. The employment skill pattern is slightly different to the case of Eastern countries. Countries like Germany, Italy, France or for example Great Britain, generate high and medium skill employments more intensively than Low skill ones. The economic development of these economies is behind this result. It is not the case of Spain which show a big amount of High and Medium skill employment 56% but the remaining is Low skill employment. One more time the characteristics of the Spanish economic structure force these results.

In aggregate terms, within the EU the 71% of total employment is generated for High and Medium skill qualifications (Figure 3). This pattern is different for the employment generated overseas where only the 50% of total employment is generated in these two highest skilled employments. China and BRIIAT are the regions where the highest employment impact is generated worldwide. The importance of trade relationships with the EU and these emerging and developing economies is a fact currently. Both big regions are employment intensive and generate more than 26% of total employment generated by the EU-Funds, only followed by Poland. Nevertheless the professional qualifications of the employments generated are mainly Low (Alsamawi et al., 2014a). In the case of China, the 52% of total employment generated is Low skill and 29% is Medium skill. Only the 19% of total employment is generated for High skill qualifications. The pattern in BRIIAT countries is similar, more than 79% of the employment is generated for Low and Medium skilled labour. Results are very different to the EU figures and economic benefits of the employment generation is questioned. The outsourcing processes of developed countries to those emerging and developing economies are drive to labour intensive industries. In this case the EU is contribution to the unequal labour footprint observed in (Alsamawi et al., 2014b). The

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search of comparative advantages in terms of low labour costs are behind these results. A big amount EU-Funds produces could compromise the ideas of the Fair Trade Beyond 2015 Campaign, where a just, equitable and sustainable world is desired (Alsamawi et al., 2014a).

Figure 3. EU-Funds Employment generation by region and by labour skills (Million hours).
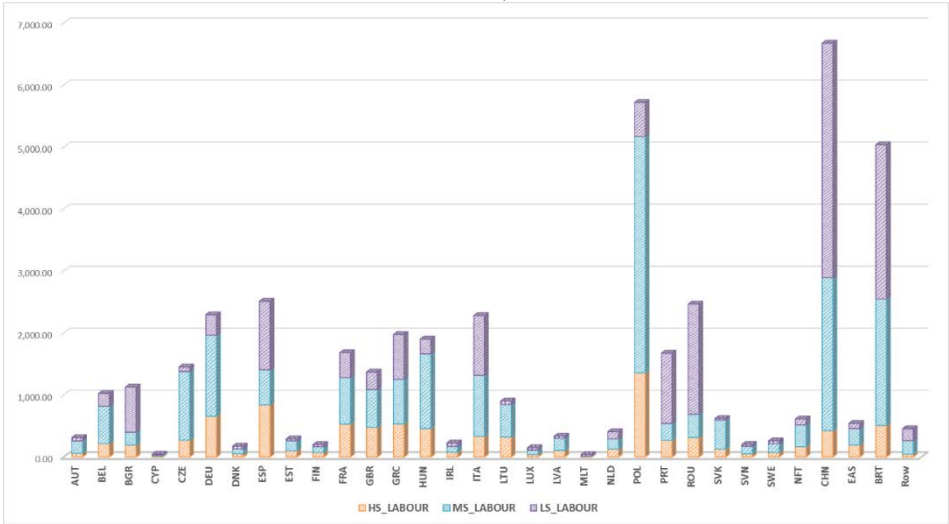
Source. Own Elaboration

Figure 4 shows, by skill qualification, the countries relationships in the employment leakage among regions. The tool CIRCOS-Graphs has been used to develop the employment flows figure (Krzywinski et al., 2009). In both cases, High-Medium and Low skill qualifications, the EU is the region where the greatest amount of employment is generated (EUR in the left side of both graphs) because of the EU-Funds expenditures.

In the case of High-Medium skill figures, it is possible to identify how the richest countries in the EU, like Germany, France, Great Britain, Italy or Spain, are those countries showing a highest High and Medium skill employment leakage to emerging economies like China or BRIIAT. The economic capabilities of these countries, that accounts for the highest numbers of multinational firms, allow a growing presence of their production chains in emerging countries which has been increasingly enforcement by the quality improvements of, e.g. Chinese, institutions in the last years (Feenstra et al., 2013). The case of Poland is also remarkably. Not being as rich as the other regions, presents a big High and Medium skill employment leak to China and BRIIAT. Poland is acting as "low salary factories" within the EU (Bruno et al., 2012) but as one of the links of the production chain between China and rest of Europe, so this trade relationships with China has similarities with the richest

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countries in the EU as Poland inward and outward multinationals presence is growing (VCC-IBRKK, 2012).

The case of Low skill employment shows how emerging countries accounts for a greater share of the employment generated. One more time the most of the Low skill labor generation is produced in Europe, however a different pattern is observed. European countries with lower GDP per capita accounts for the most of the Low skill employment generated, it is the case of countries like Portugal, Poland, Greece or Ireland. Low skill employment generated overseas is generated in China and BRIIAT which specialized in the production and export of labor intensive goods (Jakob and Marschinski, 2012). This result, and the rest of results presented in this paper, shows the existence of the Leontief's Paradox. Europe developed economies like Germany, France or Great Britain, are generating intensively High and Medium skill employments, while emerging regions, like China, is generating in Low skill employment. Moreover, due to the low level of salaries paid in China and the presence of a big number of European multinationals in China, the generation of income of mainly produced in capital intensive goods which confirms the existence of the Leontief Paradox (Guan and Hubacek, 2007).

Figure 4. Employment Leakages by origin country High-Medium and Low Skill Labour (Million hours).

Source. Own Elaboration

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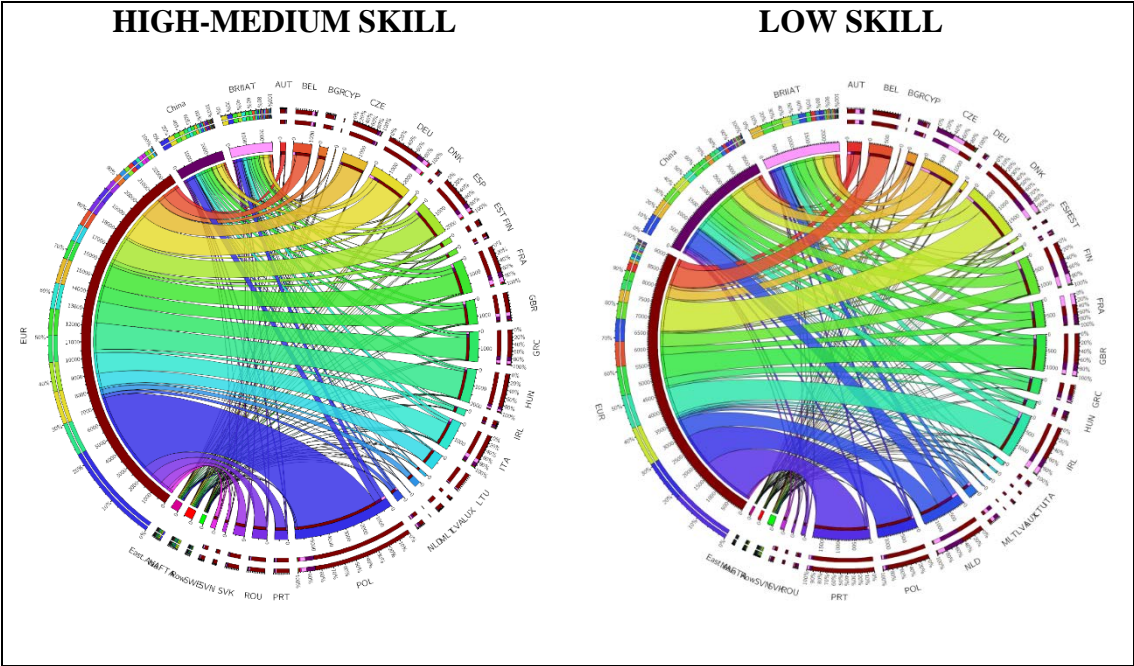
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