ISSN: 2951-6641 (paper) 2951-8156 (online)
https://doi.org/10.54790/rccs.28

ARTICLES/ARTÍCULOS

New Indicators on Integration of Global Value Chains in Employment and the Economy of Andalusia[1]

Nuevos indicadores de integración de las cadenas de valor globales en el empleo y la economía andaluza

José Manuel Rueda-Cantuche
European Commission Joint Research Centre and University Pablo de Olavide, Seville
josem.RCANTUCHE@ec.europa.eu

Juan Manuel Valderas-Jaramillo
Regional Administration of Andalusia and University of Seville, Seville
valderas@us.es

Received/Recibido: 12/6/2022
Accepted/Aceptado: 12/9/2022

ABSTRACT:

This study proposes two new indicators for monitoring the integration of Andalusia in global value chains based on the OECD methodology, the Eurostat Inter-country Input-Output Tables (FIGARO) and the Input-Output Tables for Andalusia published by the Institute of Statistics and Cartography of Andalusia (IECA). The results clearly indicate that, in terms of both employment and value added in Andalusian exports, the region of Andalusia benefits most from trade with the European Union, with the exception of trade with the rest of Spain, Greece and Malta. In Andalusia, R&D exports and agricultural products retain the highest proportion of value added, while energy products retain the least.

KEYWORDS: Multi-regional Input-Output (MRIO) model; Global chain values; Extended Input-Output tables; Economy of Andalusia; FIGARO inter-country tables

HOW TO QUOTE: Rueda Cantuche, José Manuel and Valderas-Jaramillo, Juan Manuel (2023). Nuevos indicadores de integración de las cadenas de valor globales en el empleo y la economía andaluza. *Revista Centra de Ciencias Sociales*, 2(1), 11-43. https://doi.org/10.54790/rccs.28

La versión original en castellano puede leerse en https://doi.org/10.54790/rccs.28

RESUMEN

Este trabajo propone dos nuevos indicadores para monitorizar la integración de Andalucía en las cadenas de valor globales basadas en la metodología de la OCDE: las tablas input-output multipaís de Eurostat (FIGARO) y las tablas input-output de Andalucía publicadas por el IECA. Los resultados indican claramente que, tanto en términos de empleo como de valor añadido incorporado en las exportaciones andaluzas, es el comercio con los países de la Unión Europea el que más beneficia a la región andaluza, a excepción del comercio con el resto de España, Grecia y Malta. Las exportaciones de I+D y de productos agrarios son las que mayor proporción de valor añadido retienen en Andalucía, siendo los productos energéticos los que menos.

PALABRAS CLAVE: modelos input-output multirregionales (MRIO); cadenas de valor globales; tablas input-output extendidas; economía andaluza; tablas multipaís FIGARO.

1. Globalisation and Value Chains: 2021—2022 Industry CRECE Plan

Production processes in recent decades have been characterised by increasing globalisation and greater interdependence on a global scale for both economic and technological reasons (Baldwin, 2019; Ponte, Gereffi and Raj-Reichert, 2019). This greater interconnection of production processes globally has integrated markets, companies and products in such a way that virtually all outputs require increasingly more intermediate inputs from abroad. As a result, the volume and complexity of the exchanges of goods and services increases on a global scale.

When integrating various economies, it is necessary to know the extent to which each territory is related, integrated or participates in the different value chains or, in other words, the degree of participation in generating value added during the production process and the impacts of production activity in social and territorial terms.

The classic indicators based on gross imports and exports are insufficient for this purpose since they do not include net inputs in terms of value added or employment, nor do they account for more than the direct effect without singling out the indirect effects on other upstream supplying industries in Andalusia.

As will become clear in the second and third sections of this study, the Input-Output analysis and proliferation of multi-regional tables (Tukker and Dietzenbacher, 2013; European Commission, 2019) are vital for analysing these key elements and making decisions related to economic policy that enable improvements in productivity and the derived profits retained in the region, as well as in the production process.

In this line, the Regional Government of Andalusia published the 2021—2022 Industry CRECE Plan of Action[2] for a new industrial policy in Andalusia in August 2021. This Plan describes a series of actions focused on industrial policy, whereby

the aim is for companies in Andalusia to emerge stronger from the health crisis as a result of COVID-19 and for the existing industrial value chains to be strengthened and expanded. For this reason, greater impact is sought in social and territorial cohesion by increasing industrial productivity and generating value added that has an impact on the territory, as well as improving other aspects that are more linked to the adaptation of industrial employment, the use of natural resources and knowledge in Andalusia, and the development of the region's industrial goods and services markets.

This Plan establishes a monitoring process that uses a set of short-term and structural indicators. The former measure the evolution of the industrial sector in the short term, in addition to other aspects related to the development and implementation of action plans. In contrast, the structural indicators aim to reflect the mid- and long-term evolution of the productive structure of the economy of Andalusia. These include indicators of growth of the value chain that are "aimed at measuring the evolution of each of the value chains of industrial goods and services developed in Andalusia in relation to their economic contribution, employment impact and territorial distribution" (Regional Government of Andalusia, 2021). These indicators must be based on the latest data that are available on an Andalusian, Spanish and European level. Likewise, the structural indicators proposed in the Plan aim to overachieve the 2030 convergence objective in relation to the Spanish national average, as well as growth in industrial value chains.

In this sense, the Plan identified thirty-two value chains of industrial products and goods produced in Andalusia. Thus, one of the most interesting aspects of this Plan will be the analysis of how the value chains developed in Andalusia respond to the so-called industrial ecosystems that are based on the recommendations of the EC Communication "A new Industrial Strategy for Europe", published on 10 March 2020 and updated on 5 May 2021, in which the European Union suggests analysing these industrial ecosystems thoroughly, together with the key players, such as academic and research institutions, suppliers, SMEs and big companies.

> "These ecosystems encompass all those parties that operate in a value chain: from the smallest start-ups to the biggest companies, from the academic world to researchers, and from service providers to suppliers" (Regional Government of Andalusia, 2021).

This Plan also expresses the need to know the situation of these value chains and detect their problems, requirements and future challenges, taking into account various aspects, such as the geographical context (regional, national or international) and the social, economic and environmental impacts. It therefore advocates a specific data collection system for both quantitative and qualitative information, including variables such as: number of companies; number of employees and their contribution to industrial gross value added (GVA) per product unit; level of internationalisation in exports; and technology level. In qualitative terms, the Plan proposes measuring the degree of development, degree of dependence and development in R&D, as well as human capital requirements.

The Plan also proposes the detailed study of the various stages or links in global value chains,

> "from the extraction and/or supply of raw materials, the transformation of the raw materials involved, the necessary development of R&D and product concept, the materials for manufacture or transformation, components, assembly, manufacture or transformation, distribution and commercialisation, application or use, operation and maintenance services, to management at the end of the useful life".

For this purpose, the main actors currently involved in each link in the chain would first be identified and, in doing so, the available resources of human capital, business fabric, natural resources and raw materials, available industrial land, advanced engineering services, innovation and knowledge, domestic/foreign market, and so on, would also be determined. Subsequently, a comparative analysis with other Spanish and/or European regions that may be taken as reference would identify the main limitations of the value chains. Finally, the growth requirements of the corresponding value chains would be evaluated, with a view to increasing the possibilities of integration in global value chains (Spanish, European and/or international).

Having introduced the Industry CRECE Plan by the Regional Government of Andalusia, the following section will propose a series of indicators for monitoring regional value chains and, in doing so, will be able to complement the set of structural indicators proposed in that Plan. For this purpose, section three will explain the data and methodology required for calculation before a commentary is provided on the results obtained for Andalusia in section four. The last section of the study will then end with some final conclusions and future recommendations.

2. Indicators for Global Value Chains

2.1. Measuring Bilateral Trade in terms of Value Added

The Industry CRECE Plan recognises that

> "industry is a key sector of activity for the region to achieve balanced and sustainable economic growth, as its contribution to the economy does not just come down to wealth and the employment created by the sector itself, but rather has an important carry-over effect in the entire value chain of the economy" (Regional Government of Andalusia, 2021).

However, the list of indicators proposed by this Plan lacks indicators that capture said spill-over effects in those sectors that participate in the value chains and that appropriately evaluate the integration of Andalusian sectors in global value chains. Thus, this article proposes two new indicators based on the recommendations by the OECD for value chain indicators[3] with an innovative methodology that combines the Eurostat Inter-country Input-Output Tables

(FIGARO database) with specific information about Regional Accounts and trade statistics provided by the Institute of Statistics and Cartography of Andalusia (IECA).

Generally speaking, as a region or country produces and exports industrial goods that are to be used as inputs for other production processes in other geographical areas, value is added to the average cost of the materials and services at origin. Ad infinitum, in practice this implies that the total value of the exports of a product consumed by households, the government or companies is comprised of an accumulation of contributions of value added by each company/sector involved in any link in the value chain. In this sense, knowing how much value added is retained in Andalusia (or in the different links in the chain in Andalusia) for every million euros exported, for example, of extra virgin olive oil (first indicator), is of significant importance. These figures may even vary depending on the product destination, whether that be China, another country in the European Union (EU) or the rest of Spain. Of course, the type of product should also be taken into account; in the case of electricity, for example, the contribution by Andalusia is expected to be one of the lowest given the high import level of energy products key for its production.

Following the same reasoning, it would also be relevant to know how much employment is linked to Andalusian exports, taking into account not only the employment that is directly involved in the export sector, but also in other Andalusian upstream supplying industries. This information can be estimated by product type and country of destination, thus distinguishing those products in which Andalusia would be positioned in a link that may have a high or low employment intensity in relation to other regions and countries. This would be a very useful second indicator when designing an industrial strategy specialising in value chains of high employment intensity.

As Grossman and Rossi-Hansberg (2008) highlighted, the use of export and import statistics as an indicator of the economic growth capacity of an economy is now restricted to those times in which trade flows mainly comprised final goods. In other words, most of the value added accrued in the exports of that goods remained in the country itself or the exporting region given that the links of the production processes were not as globalised then as they are now. Thus, every time an intermediate product is exported and imported in each link in a value chain, there is value-added trade between countries or regions.

Exports are, therefore, no longer a suitable indicator for understanding the consequences of trade in a world with global value chains where countries are increasingly integrated. For this reason, knowing both the origin of the value added of the exported products and their final destination (Johnson and Noguera, 2012) is essential. In other words, from the perspective of an exporting country, the volume of exports is less important than the value added that is associated with such exports.

2.2. Methodology

The Spanish National Accounts and trade statistics do not provide the necessary detailed data to construct the new proposed indicators as they only report data on bilateral flows of goods and services without distinguishing the origin and/or destination.

However, the most relevant development of global Inter-country Input-Output Tables (Tukker y Dietzenbacher, 2013) has paved the way for extensive literature that proposes various methods for breaking down a country's exports into the various contributions made by other sectors and countries that contributed throughout all the links in the value chain of a determined product (Arto et al., 2015; Dietzenbacher et al., 2013; Foster-McGregor & Stehrer, 2013; Johnson & Noguera, 2012; Koopman et al., 2014; Los et al., 2016; A. J. Nagengast & Stehrer, 2014, 2016; Timmer et al., 2014).

This study will follow the methodology proposed by Arto et al. (2019) using the global Eurostat Inter-country Input-Output Tables (FIGARO) and specific data on trade flows in Andalusia with the rest of Spain, the European Union and the rest of the world, as well as the main macro-economic aggregates of the Annual Regional Accounts of Andalusia and the Input-Output Tables for Andalusia in the year 2016. The reason for choosing this year is that there are sufficient basic data in all the geographical areas. In any case, the intention of this study is to show the ability of these new indicators to explain the degree of Andalusia's integration in the global value chains. It could be extrapolated to any other period or time series if considered appropriate by the IECA.

Arto et al. (2019) establishes the formulas to calculate the breakdown of the exports according to whether they have content from Andalusia (domestic) or from outside this region (foreign). More information about the mathematical equations that underpins the methodology may be found in this article.

In brief, this study will distinguish the domestic content (value added and employment) of the Andalusian exports, distinguishing the countries of destination and sectors that participate in the links in the respective value chains. As an example, these indicators will enable details to be measured such as the generated value added in the farming sector associated with exports by the Andalusian agri-foodstuffs industry which exports its products to the United States.

Likewise, this study will include the economic impact beyond Andalusia associated with these agri-foodstuff exports, but via imports of products from other countries, such as fertilisers from Germany, for example. This indicator shows the degree of dependence or level of vertical integration in the value chain of Andalusian exports.

The approach by Arto et al. (2019) presents a comparative advantage in relation to other breakdown methods in that it is possible to disaggregate, in great detail, the content into production factors (value added and employment) of the exports and

respond to very specific questions such as, for example, how many jobs in Mexican heavy machinery plants are later used in Chinese factories to produce metal tools, which will then be exported to Russia to subsequently produce coal which is exported to the Basque Country. There, the Basque electricity sector will use it to produce electricity, which will be used by the Andalusian chemical sector to produce fertilisers that are eventually used in the production of Andalusian extra virgin olive oil, before it is finally exported and consumed by households in the United States. Effectively, the consumption of extra virgin olive oil by American households has accumulated value added from Mexico (heavy machinery), China (tools), Russia (coal), rest of Spain (electricity) and Andalusia (fertilisers and extra virgin olive oil).

Annex I includes further information about how this extension of the FIGARO tables has been done to include the self-governing region of Andalusia.

3. Data

The Eurostat FIGARO database for the year 2016 and Input-Output Table for Andalusia published by the IECA for the year 2016 (IECA, 2020) were the starting points for producing the Inter-country Input-Output Table with Andalusia separated from the rest of Spain.

The Input-Output Table for Andalusia is a product-by-product table, in which the production processes of the economic activities of an economy are typically described, including the trade transactions of goods and services, both made in Andalusia and from the rest of Spain and the rest of the world. There is a disaggregation of 81 products. In addition, the final demand includes the consumption expenditure of households, consumption expenditure of the government and non-profit institutions, investment and exports with the rest of Spain and the rest of the world. On the other hand, the value added is divided into various concepts such as wages and salaries, other net taxes on products and the gross operating surplus and mixed income. The IECA also publishes data related to employment.

The global FIGARO Inter-country Input-Output Tables are also product-by-product for the year 2016, distinguishing between 45 countries; that is, the 27 EU Member States, plus the 18 most relevant trade partners for the EU (see Annex 2) and one area that contains the rest of the world (aggregated). The methodology for producing these tables can be found in European Commission (2019). There is a disaggregation of products in the classification A*64, with similar components to the Input-Output Table for Andalusia both for final demand (excluding exports by definition) and for value added.

To integrate the Input-Output Table for Andalusia in the FIGARO tables, the dimensions of both tables first needed to be standardised, particularly in terms of products, components of final demand and vale added. The main peculiarity in this

regard is that the combination of the 81 products in the table for Andalusia and the 64 products in the FIGARO table produce a table with a maximum disaggregation of 61 products, which is presented in Annex 3. In terms of components of final demand and value added, the data from the Input-Output Table for Andalusia has been adjusted to the existing dimensions of the FIGARO tables.

Following standardisation, the Input-Output Table for Andalusia was integrated in the 2016 FIGARO tables by estimating the necessary components from all the data available in the Input-Output Framework for Andalusia in 2016 (mainly the origin of the imports and the destination of the regional exports). The missing elements were estimated using aggregates for Andalusia that are broken down according to the available data in the 2016 FIGARO tables (data on the rest of Spain and the rest of the world). Finally, these results needed to be adapted to adjust the part of the table that corresponds to the rest of Spain, observing quality and valuation criteria that ensure plausible values as a result of this process, as well as the correct valuation of the flows and the ensuing estimation of unavailable values. Thus, the elements corresponding to Spain in the FIGARO tables were broken down into two new geographical areas: Andalusia and the rest of Spain (RE), which, together with the remaining countries, make up the extended Inter-country Input-Output Table that enables the estimation of the results that will be commented on in the next section.

It should be emphasised that the process of integrating Andalusia in the FIGARO tables scrupulously respects the official data available provided by the IECA. In other words, there was no loss of data as such, with the exception of the standardisation in terms of products that reduced the available data on 81 products for Andalusia, to 61 products. The resulting values of this aggregation, however, are fully consistent with the official statistics for Andalusia. Undoubtedly, the disaggregation of the public values of the official Andalusian statistics and their integration in the 2016 FIGARO tables are based on hypotheses that, as stated, make the most efficient use possible of the existing data both in 2016 FIGARO and in the Input-Output Framework for Andalusia. Furthermore, there was no loss of data here, but rather an extension of a model and an extension of the data based on that hypothesis that, again, respects the baseline data for Andalusia. Undoubtedly, the availability of more detailed data would enable these hypotheses to be relaxed to a certain extent and would enable the model to be extended in a more realistic way using the additional data available.

https://doi.org/10.54790/rccs.28

4. Results

4.1. General Aspects

In Andalusia, unlike in the EU and in the rest of Spain, the strength of the industrial sector does not exceed 10% of its gross domestic product according to the 2021–2022 Industry CRECE Plan (Regional Government of Andalusia, 2021). Even more serious is the decreasing evolution in the last decade. In this sense, the strength of Andalusia in economic and/or industrial activities continues to be proportionally less than what it should be in terms of population and geographical extension.

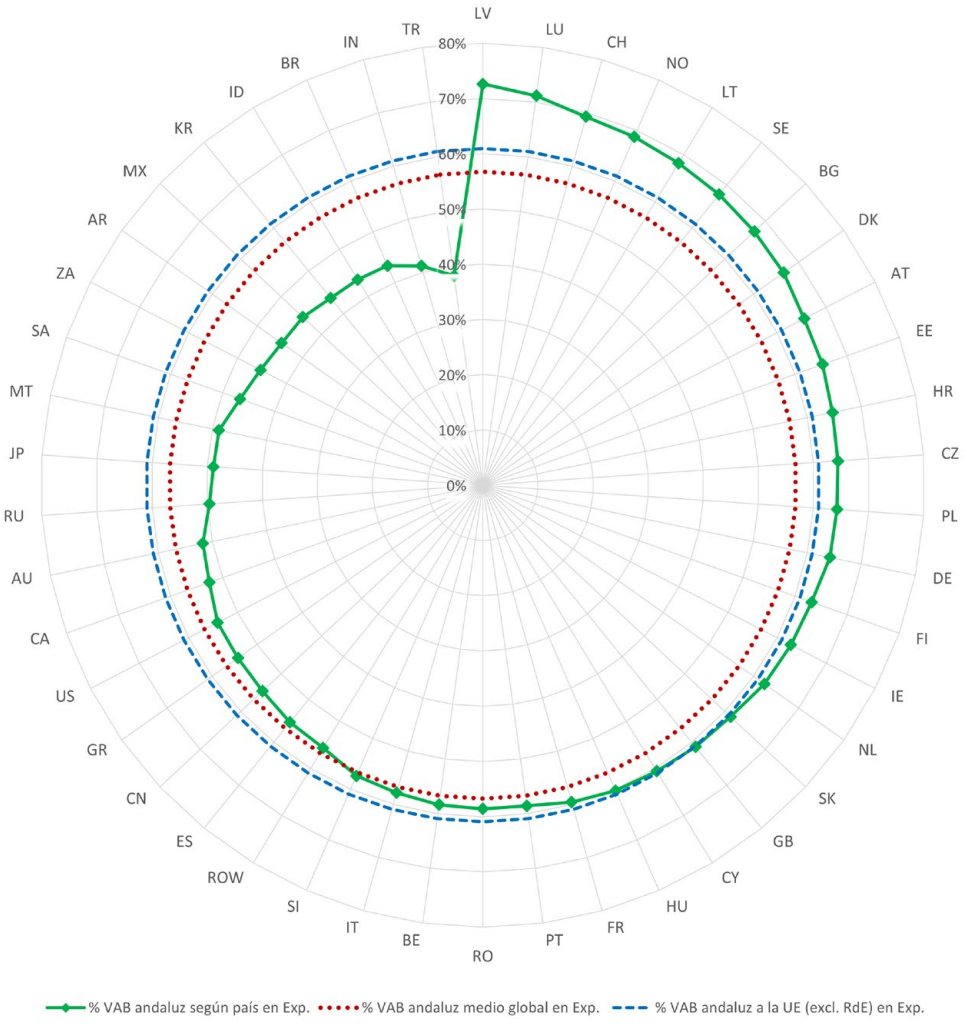
According to this Plan, the strongest sectors in terms of value added in the manufacturing industry are the metal and chemical industries, which in turn have special relevance at a national level in terms of employment. In recent years, the agri-foodstuffs industry, non-metallic mineral products and the aerospace industry notably increased their participation in the GDP of Andalusia.

4.2. Value Added and Employment in Andalusian Exports

From the results obtained, it can be deduced that Andalusian trade with the European Union (EU) is that which fundamentally retains a greater percentage of value added in relation to the total export volume. It should be highlighted that current values are being worked with at all times. The percentage of value added of exports to the EU that remains in the economy of Andalusia, excluding exports to the rest of Spain, is 60.9% (dashed line in Figure 1). These percentage decreases to 57.6% (dotted line in Figure 1) if all the Andalusian exports to the rest of the EU (that is, including the rest of Spain) are included. Lastly, if we consider the total of the Andalusian exports, that is, to the rest of Spain, EU and the rest of the world, the percentage of value added that remains in the economy of Andalusia decreases to 56.7% (see Table 1 of Annex 4). Likewise, for the total economy of Andalusia, 19.5% of its value added is linked to its exports.

Figure 1

% of Andalusian value added in exports

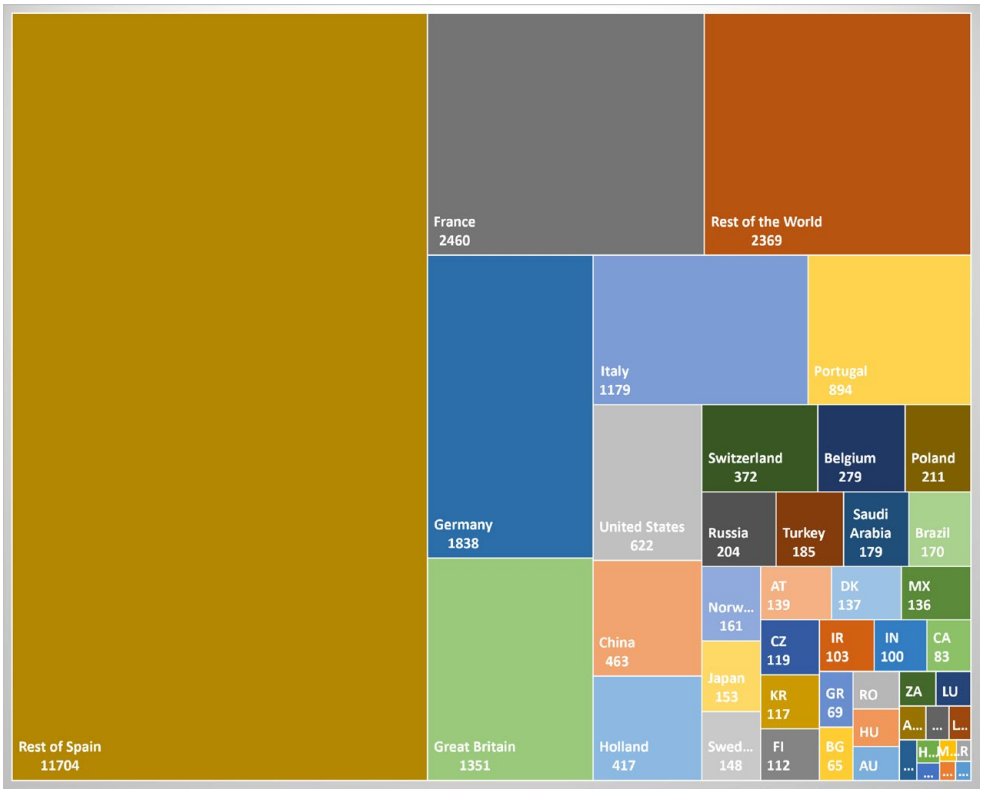


Source: Own research.

 https://doi.org/10.54790/rccs.28

Figure 2

Andalusian value added in exports by country of destination (millions of euros)



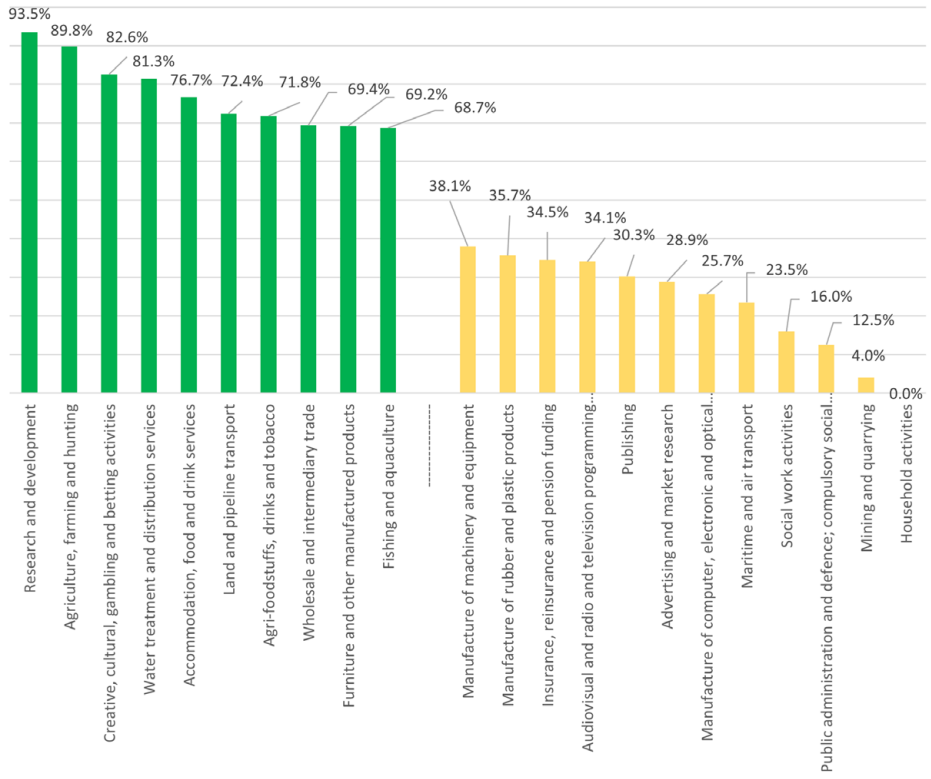
Source: Own research.

Figure 1 (continuous line with markers) shows how Andalusian exports to Latvia and Luxembourg are those that retain a higher proportion of Andalusian value added, with more than 70%, followed by Lithuania, Sweden, Bulgaria and Denmark, with more than two-thirds in all cases. Similarly, although the proportion of retained Andalusian value added is greater for these countries, it is important to highlight that these countries are not the main destinations of Andalusian exports, as seen in Figure 2. The percentage of retained Andalusian value added in exports to the rest of Spain is only 55.3%, while in Italy it would be 57.8%; in France, 59.6%, in Poland, 64.3%; and in Germany, 64.2%. Broadly speaking, the percentage of retained value added by Andalusian exports exceeds the overall average value of the Andalusian exports, with the exception of Malta, Greece and the rest of Spain, which have a lower percentage. Finally, as regards those countries that do not belong to the EU, Switzerland (69.3%), Norway (68.7%) and the Great Britain (61.0%) are the countries with which Andalusia retains a higher percentage of value added in its exports.

Figure 3 shows the results by product, irrespective of the country of destination. For the sake of greater clarity, given the significant number of products, only the 10 best and 10 worst categories are shown. Table 2 of Annex 4 includes the complete table with all the values used to produce Figure 3. The main finding is that R&D activities retain the highest proportion of Andalusian value added in their exports (more than 90%), followed by agriculture, farming and hunting. Cultural and entertainment activities and water collection and distribution also stand out with more than 80%, followed by agri-foodstuffs, drinks and tobacco, restaurant and accommodation services, and land transport, with more than 70%. Within industrial activities, the exports with a greater proportion of Andalusian value added that stand out are as follows: agri-foodstuffs, drinks and tobacco (71.8%); manufacture of furniture and other manufacturing industries (69.2%); and manufacture of other non-metallic mineral products such as glass, stone and ceramic (66.6%).

Figure 3

Andalusian value added in the exports by products



Source: Own research.

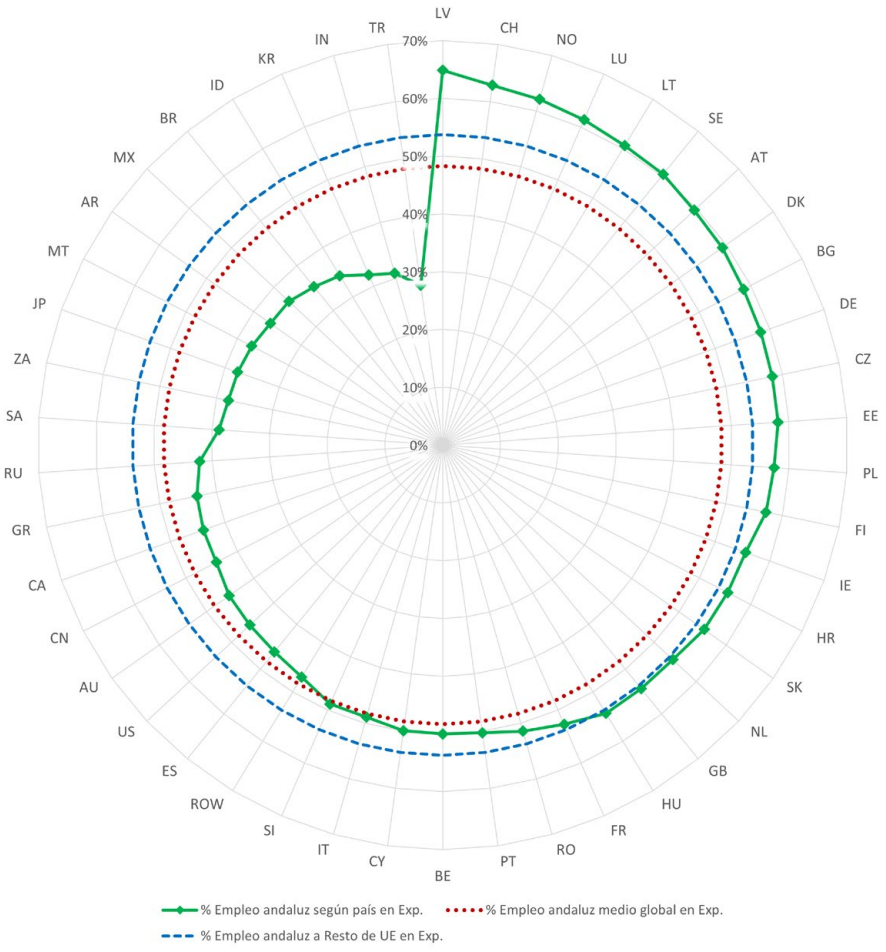
 https://doi.org/10.54790/rccs.28

In contrast, mining activities (including natural gas) have the lowest component of Andalusian value added in exports (4.0%), while others, such as maritime transport (23.5%) and in industry, the manufacture of computer and electronic products (25.7%), the manufacture of rubber and plastic products (35.7%) and the manufacture of other machinery and equipment (38.1%), can also be highlighted.

In terms of employment, 20% of the total Andalusian employment is occupied in activities that are directly or indirectly linked to Andalusian exports. The guidelines for countries of destination are similar to value added as seen in Figure 4. Of all the employment required for Andalusian exports to the EU (excluding exports to the rest of Spain), only 53.7% are jobs located in Andalusia (dashed line in Figure 4). When

Figure 4

% of Andalusian employment supported by exports



Source: Own research.

including the total Andalusian exports, that is, to the rest of Spain, EU and the rest of the world (dotted line in Figure 4), the percentage falls below 50%, to 48.3%. The values that provide the basis for Figure 4 are found in Table 3, Annex 4.

Once again, trade with the EU implies a higher percentage of jobs located in Andalusia, with trade with Latvia, Luxembourg, Lithuania and Sweden standing out with more than 60% (continuous line with markers in Figure 4). Also of relevance, although with lower percentages, are the results of the main destinations for Andalusian exports, such as Germany (58.4%), Poland (57.4%), France (52.7%), Italy (48.9%) and the rest of Spain (46.2%).

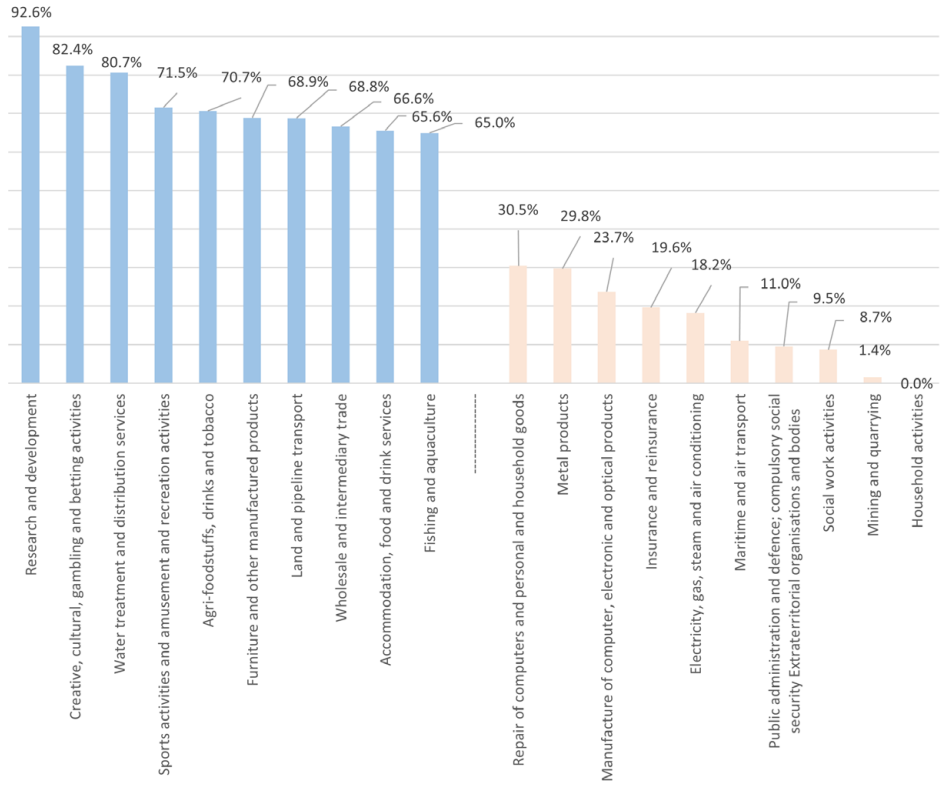
Finally, Figure 5 shows the aggregated results of employment by product for all the destinations, representing the 10 products with the most employment located in Andalusia and the 10 with the least. As occurs with the value added, R&D export activities use a higher proportion of Andalusian employment in their value chain, with nearly 93%. This is followed by cultural and entertainment activities and water collection and distribution, with more than 80%. Next, with more than 70%, is agri-foodstuffs, drinks and tobacco, as well as sports and recreation activities. Within the industry as a whole, the exports with a greater proportion of Andalusian employment that stand out in the value chain are as follows: agri-foodstuffs, drinks and tobacco (70.7%); manufacture of furniture and other manufacturing industries (68.9%); and manufacture of other non-metallic mineral products such as glass, stone and ceramic (62.0%). The comparison of both indicators is interesting for agriculture, farming and hunting where, in terms of employment, the percentage of Andalusian jobs is only 63.6% while the percentage of Andalusian value added is nearly 90%.

Again, mining activities are those that have a lower component of Andalusian employment in exports (1.4%). Here, we can also highlight maritime transport (11.0%) and in industry, the manufacture of computer and electronic products (23.7%), metal products (29.8%) and the textile industry (34.6%).

 https://doi.org/10.54790/rccs.28

Figure 5

Andalusian employment supported by exports by products



Source: Own research.

5. Conclusions

The availability of an Inter-country Input-Output table extended to a specific region such as Andalusia is crucial for monitoring and analysing value chains and, in a strategic manner, for making decisions that enable Andalusia to benefit from its participation in these value chains through economic policy measures such as those described in the 2021–2022 Industry CRECE Plan.

The spread of Inter-country Input-Output Tables on a global scale, supported by different international organisms such as the OECD (ICIO-OECD) and the European Commission (Eurostat-FIGARO), are a unique opportunity to develop indicators that monitor regional value chains, as is the case of the methodology proposed in this study for Andalusia.

Likewise, the advantages of having a global Inter-country Input-Output Table extended to a region are not limited to the economic and social aspect, but also include the environmental dimension, enabling the impacts of economic activity to be studied in terms of emissions, water impact of production and/or ecological footprints in general.

This study proposes a methodology for producing an extended Inter-county Input-Output Table with Andalusia on a regular basis and, therefore, will enable value chains to be monitored with the indicators proposed in this article, which could be integrated in the set of structural indicators from the 2021–2022 Industry CRECE Plan. Furthermore, the data that the IECA would have to draw up the Input-Output Framework for Andalusia would be a great additional added value that was not available to the authors of this study. For example:

- The exports by product and their distribution by countries of destination.
- The matrix of imports at the same level of disaggregation of products and countries of origin, as well as any kind of data that distinguish between imports for intermediate or final use.
- A range of statistical information for estimating the flows with the rest of Spain (freight transport surveys, etc.).

For example, we have seen that Andalusian trade with the European Union (EU) is that which fundamentally retains a higher percentage of value added in relation to the total volume of exports, reaching 60.9% excluding the rest of Spain. Likewise, for the total economy of Andalusia, 19.5% of its value added is linked to its exports, with the sectors of R&D activity and agriculture, farming and hunting retaining the highest value added in relation to the exported volume. In contrast, mining activities (including natural gas) are those that have a lower component of Andalusian value added in exports, followed by maritime transport.

In terms of employment, 20% of the total Andalusian employment is occupied in activities that are directly or indirectly associated with Andalusian exports. In contrast, of all the employment required for Andalusian exports to the EU (excluding the rest of Spain), only 53.7% are Andalusian jobs.

Finally, the number of indicators of value chains could be increased, including the analysis of value added and employment linked to the final demand of imported products. Ultimately, the value of importing a product by a resident in Andalusia would comprise the sum of the values added generated in Andalusia and in the rest of the world. It would also be interesting to know the proportion that remains in this region. Likewise, the analysis of these indicators over time can also offer interesting conclusions about the evolution of the integration of Andalusia in global value chains. However, this study has only focused on the analysis of value chains from the perspective of exports and leaves these other proposals for future analysis and researchers.

6. Notes

1 The views expressed are purely those of the author and may not in any circumstances be regarded as stating an official position of the European Commission.

2 https://www.juntadeandalucia.es/organismos/transparencia/planificacion-evaluacion-estadistica/planes/detalle/225561.html

3 See https://oe.cd/tiva

7. References

Arto, I., Dietzenbacher, E. and Rueda-Cantuche, J. M. (2019). *Measuring bilateral trade in value added terms*. Luxemburgo: Oficina de Publicaciones de la Unión Europea. https://publications.jrc.ec.europa.eu/repository/handle/JRC116694

Arto, I., Rueda-Cantuche, J. M., Amores, A. F., Dietzenbacher, E., Sousa, N., Montinari, L. and Markandya, M. (2015). *EU exports to the World: Effects on employment and income.* Luxemburgo: Oficina de Publicaciones de la Unión Europea. https://publications.jrc.ec.europa.eu/repository/handle/JRC93237

Baldwin, R. (2019). *The Great Convergence: Information technology and the New Globalization.* The Belknap Press of Harvard University Press. https://www.hup.harvard.edu/catalog.php?isbn=9780674237841

Comisión Europea, Eurostat (2019). *EU inter-country supply, use and input-output tables — Full international and global accounts for research in input-output analysis (FIGARO)*: Edición 2019. I. Rémond-Tiedrez and J. M. Rueda-Cantuche (Eds.), Luxemburgo: Oficina de Publicaciones de la Unión Europea. https://ec.europa.eu/eurostat/web/products-statistical-working-papers/-/KS-TC-19-002

Dietzenbacher, E., Los, B., Stehrer, R., Timmer, M. and De Vries, G. (2013). The construction of world input-output tables in the WIOD project. *Economic Systems Research, 25*(1), 71-98. https://doi.org/10.1080/09535314.2012.761180

EUSTAT (2021). *Análisis de cadenas de valor de la economía vasca*. editores: I. Arto, M. V. Román, J. M. Rueda-Cantuche and M. Tomás (Eds.). Informe del Centro Vasco para el Cambio Climático (BC3). Bilbao: Euskal Estatistica Erabundea/Instituto Vasco de Estadistica-Eustat (versión no publicada).

Foster-McGregor, N. and Stehrer, R. (2013). Value Added Content of Trade: A Comprehensive Approach. *Economics Letters, 120*(2), 354-357. https://doi.org/10.1016/j.econlet.2013.05.003

Grossman, G. M. and Rossi-Hansberg, E. (2008). Trading Tasks: A Simple Theory of Offshoring. *American Economic Review, 98*(5), 1978-1997. https://doi.org/10.1257/aer.98.5.1978

Johnson, R. C. and Noguera, G. (2012). Accounting for intermediates: Production sharing and trade in value added. *Journal of International Economics, 86*(2), 224-236. https://doi.org/10.1016/j.jinteco.2011.10.003

Junta de Andalucía (2020). *Marco Input-Output de Andalucia 2016*. Sevilla: Instituto de Estadística y Cartografía de Andalucía de la Junta de Andalucía. https://www.juntadeandalucia.es/institutodeestadisticaycartografia/mioan/metodologia/mioan16met.pdf

Junta de Andalucía (2021). *Plan de acción CRECE Industria 2021-2022 para una nueva política industrial en Andalucía*. Sevilla: Consejería de Transformación Económica, Industria, Conocimiento y Universidades. Junta de Andalucía. https://www.juntadeandalucia.es/sites/default/files/2022-06/Plan%20de%20acci%C3%B3n%20CRECE%20Industria%202021%20-%202022%20en%20Andaluc%C3%ADa_03agosto2021.pdf

Koopman, R., Wang, Z. and Wei, S.-J. (2014). Tracing value-added and double counting in gross exports. *The American Economic Review, 104*(2), 459-494. https://doi.org/10.1257/aer.104.2.459

Los, B., Timmer, M. P. and de Vries, G. J. (2016). Tracing Value-Added and Double Counting in Gross Exports: Comment. *American Economic Review, 106*(7), 1958-1966. https://doi.org/10.1257/aer.20140883

Nagengast, A. J. and Stehrer, R. (2014). Collateral Imbalances in Intra-European Trade? Accounting for the Differences between Gross and Value Added Trade Balances (SSRN Scholarly Paper ID 2796991). *Social Science Research Network*. https://papers.ssrn.com/abstract=2796991

Nagengast, A. J. and Stehrer, R. (2016). Accounting for the Differences Between Gross and Value Added Trade Balances. *The World Economy*, *39*(9), 1276-1306. https://doi.org/10.1111/twec.12401

Ponte, S., Gereffi, G. and Raj-Reichert, G. (Eds.) (2019). *Handbook on Global Value Chains*, Cheltenham, UK: E. Elgar Publications. https://www.e-elgar.com/shop/gbp/handbook-on-global-value-chains-9781788113762.html

Timmer, M. P., Erumban, A. A., Los, B., Stehrer, R. and de Vries, G. J. (2014). Slicing up global value chains. *The Journal of Economic Perspectives*, *28*(2), 99-118. https://doi.org/10.1257/jep.28.2.99

Tukker, A. and Dietzenbacher, E. (2013). Global multiregional input-output frameworks: An introduction and outlook. *Economic Systems Research*, *25*(1), 1-19. https://doi.org/10.1080/09535314.2012.761179

Valderas-Jaramillo, J. M. and Rueda-Cantuche, J. M. (2021). The multidimensional nD-GRAS method: applications for the projection of multiregional input-output frameworks and valuation matrices, *Papers in Regional Science*, 100, 1599-1624. https://publications.jrc.ec.europa.eu/repository/handle/JRC125772

Annex 1. Methodology for producing the extended FIGARO tables with Andalusia

The extended FIGARO Inter-country Input-Output Tables with Andalusia and the rest of Spain have been produced using a process similar to EUROSTAT (2021). Figure 1 shows the structure of the FIGARO Inter-country Input-Output Table for the 61 products common to the Eurostat and IECA classifications for Andalusia, both based on the Spanish National Classification of Economic Activities (CNAE, Rev. 2).

Figure 1

Schema of the FIGARO Inter-country Input-Output Tables

		Intermediate Consumption										Final demand										
		Country 1				Spain				…	Country n					Country 1				Spain				…	Country n					
		Prod C01	Prod C02	…	Prod C61	Prod C01	Prod C02	…	Prod C61	…	Prod C01	Prod C02	…	Prod C61		Households	Government	…	Investment	Households	Government	…	Investment	…	Households	Government	…	Investment	Total production
Country 1	Prod C01	$S_{dom}{}^{1}$				$S^{1,ES}$				…	$S^{1,n}$					$Y_{dom}{}^{1}$				$Y^{1,ES}$				…	$Y^{1,n}$				q^{1}
	Prod C02									…																			
	…									…																			
	Prod C61									…																			
Spain	Prod C01	$S^{ES,1}$				$S_{dom}{}^{ES}$				…	$S^{ES,n}$					$Y^{ES,1}$				$Y_{dom}{}^{ES}$				…	$Y^{ES,n}$				q^{ES}
	Prod C02									…																			
	…									…																			
	Prod C61									…																			
…	…	…	…	…	…	…	…	…	…	…	…	…	…	…	…	…	…	…	…	…	…	…	…	…	…	…	…	…	…	…
Country n	Prod C01	$S^{n,1}$				$S^{n,ES}$				…	$S_{dom}{}^{n}$					$Y^{n,1}$				$Y^{n,ES}$				…	$Y_{dom}{}^{n}$				q^{n}
	Prod C02									…																			
	…									…																			
	Prod C61									…																			
Taxes net of subsidies on products		$t_u{}^{1}$				$t_u{}^{ES}$				…	$t_u{}^{n}$					$t_y{}^{1}$				$t_y{}^{ES}$				…	$t_y{}^{n}$				
Components of Value Added		E^{1}				E^{ES}				…	E^{n}													…					
Gross Value Added										…														…					
Total production		q^{1},				q^{ES},				…	q^{n},													…					

In Figure 1, the sub-matrices named as S correspond to the intermediate product demand, that is, those products that are used to produce other products. The blocks on the main diagonal correspond to the i-th country's intermediate consumption of products produced in the country itself, $\mathbf{S}_{dom}{}^{i}$ while those elements outside of the main diagonal, $\mathbf{S}^{i,j}$ represent the products consumed by the j-th country which are imported from the i-th country. That is, they represent the exports of the i-th country that are imported by the j-th country for their intermediate consumption. Likewise, in the block of final demand we have $\mathbf{Y}_{dom}{}^{i}$ e $\mathbf{Y}^{i,j}$ representing the final domestic consumptions of the i-th country, and the products produced in the i-th country that are consumed by the final users in the j-th country.

By extending the FIGARO Inter-country Input-Output Table with Andalusia, the objective of this study is, essentially, to break down the rows and columns

https://doi.org/10.54790/rccs.28

corresponding to Spain, both in the part of intermediate demand, and final demand and value added, such that the elements in Spain are divided into two new regions that correspond to Andalusia and the rest of Spain, using all the data available as efficiently as possible.

Graphically, the format of the extended FIGARO Inter-country Input-Output Table would be as follows:

Figure 2

Schema of the extended FIGARO Inter-country Input-Output Tables

		Intermediate Consumption												Final demand												
		Country 1				Rest of Spain				Andalusia				Country n				Country 1				Rest of Spain				Andalusia				Country n				
		Prod C01	Prod C02	…	Prod C61	Prod C01	Prod C02	…	Prod C61	Prod C01	Prod C02	…	Prod C61	Prod C01	Prod C02	…	Prod C61	Households	Governmen	…	Investment	Households	Governmen	…	Investment	Households	Governmen	…	Investment	Households	Governmen	…	Investment	Total production
Country 1	Prod C01	S_{dom}^{1}				$S^{1,RE}$				$S^{1,AN}$				$S^{1,n}$				Y_{dom}^{1}				$Y^{1,RE}$				$Y^{1,AN}$				$Y^{1,n}$				q^{1}
	Prod C02																																	
	…																																	
	Prod C61																																	
Rest of Spain	Prod C01	$S^{RE,1}$				S_{dom}^{RE}				$S^{RE,AN}$				$S^{RE,n}$				$Y^{RE,1}$				Y_{dom}^{RE}				$Y^{RE,AN}$				$Y^{RE,n}$				q^{RE}
	Prod C02																																	
	…																																	
	Prod C61																																	
Andalusia	Prod C01	$S^{AN,1}$				$S^{AN,RE}$				S_{dom}^{AN}				$S^{AN,n}$				$Y^{AN,1}$				$Y^{AN,RE}$				Y_{dom}^{AN}				$Y^{AN,n}$				q^{AN}
	Prod C02																																	
	…																																	
	Prod C61																																	
…	…	…	…	…	…	…	…	…	…	…	…	…	…	…	…	…	…	…	…	…	…	…	…	…	…	…	…	…	…	…	…	…	…	…
Country n	Prod C01	$S^{n,1}$				$S^{n,RE}$				$S^{n,AN}$				S_{dom}^{n}				$Y^{n,1}$				$Y^{n,RE}$				$Y^{n,AN}$				Y_{dom}^{n}				q^{n}
	Prod C02																																	
	…																																	
	Prod C61																																	
Taxes net of subsidies on products		t_u^{1}				t_u^{RE}				t_u^{AN}				t_u^{n}				t_y^{1}				t_y^{RE}				t_y^{AN}				t_y^{n}				
Components of Value Added		E^{1}				E^{RE}				E^{AN}				E^{n}																				
Gross Value Added																																		
Total production		$q^{1\prime}$				$q^{RE\prime}$				$q^{AN\prime}$				$q^{n\prime}$																				

This division, as is to be expected, maintains the values of Spain as a whole. That is, there are the following relationships between the blocks of the extended and original Input-Output Tables:

1. $\mathbf{S}^{ES,i} = \mathbf{S}^{RE,i} + \mathbf{S}^{AN,i}$; $\mathbf{Y}^{ES,i} = \mathbf{Y}^{RE,i} + \mathbf{Y}^{AN,i}$ for the rest of countries i;
2. $\mathbf{S}^{j,ES} = \mathbf{S}^{j,RE} + \mathbf{S}^{j,AN}$; $\mathbf{Y}^{j,ES} = \mathbf{Y}^{j,RE} + \mathbf{Y}^{j,AN}$ for the rest of countries j;
3. $t_u^{ES} = t_u^{RE} + t_u^{AN}$; $t_y^{ES} = t_y^{RE} + t_y^{A}$; $\boldsymbol{E}^{ES} = \boldsymbol{E}^{RE} + \boldsymbol{E}^{AN}$ y $\boldsymbol{q}^{ES} = \boldsymbol{q}^{RE} + \boldsymbol{q}^{AN}$;
4. $S_{dom}^{ES} = S_{dom}^{RE} + S_{dom}^{AN} + \mathbf{S}^{RE,AN} + \mathbf{S}^{AN,RE}$ and

$\boldsymbol{Y}_{dom}^{ES} = \boldsymbol{Y}_{dom}^{RE} + \boldsymbol{Y}_{dom}^{AN} + \mathbf{Y}^{RE,AN} + \mathbf{Y}^{AN,RE}$.

The rest of the blocks of the FIGARO tables that do not include Spain remain unchanged in the extended Inter-country Input-Output Table. Therefore, all the blocks that include Andalusia and the rest of Spain in the previous table (coloured in different shades of grey) would be needed to make an estimate with the information available from the Input-Output Framework of Andalusia.

Firstly, the blocks $\boldsymbol{S}_{dom}^{AN}$ and $\boldsymbol{Y}_{dom}^{AN}$ are obtained directly from the intermediate and final consumptions of the Input-Output Table for Andalusia as they correspond to the consumption of goods and services produced in this region. Likewise, $\boldsymbol{t}_{u}^{AN}$, $\boldsymbol{t}^{AN}$, $\boldsymbol{E}^{AN}$ and $\boldsymbol{q}^{AN}$ are obtained directly from the same source. Once these are obtained, $\boldsymbol{t}_{u}^{yRE}$, $\boldsymbol{t}^{RE}$, $\boldsymbol{E}^{RE}$ y $\boldsymbol{q}^{RE}$ are obtained from the difference of their Spanish counterparts, making use of the equations described in the third point above.

Subsequently, $\mathbf{S}^{RE,AN}$ and $\mathbf{Y}^{RE,AN}$ are obtained from the table of imports with the rest of Spain by products in the Input-Output Table of Andalusia.

To obtain the blocks corresponding to imports from the rest of the world, the table corresponding to the Input-Output Table for Andalusia is used. It would have been very significant to obtain this data by product, disaggregated by country of origin, which reflected a geographical distribution of the Andalusian imports closer to reality. Given this data is not publicly available, this data has been broken down proportionally to the structure of Spanish imports coming from the rest of the world given in the FIGARO tables. Consequently, if *p* represents the product and *g*, the homogeneous branch of the product-by-product Input-Output Table or, alternatively, the component corresponding to the final demand,

$$\boldsymbol{S}_{p,g}^{j,AN} = MRM_{p,g}^{AN} \times \frac{\boldsymbol{S}_{p,g}^{j,ES}}{\sum_j \boldsymbol{S}_{p,g}^{j,ES}} \text{ y } \boldsymbol{Y}_{p,g}^{j,AN} = MRM_{p,g}^{AN} \times \frac{\boldsymbol{Y}_{p,g}^{j,ES}}{\sum_j \boldsymbol{Y}_{p,g}^{j,ES}}$$

for all *p*, *g* and for every country *j* from the rest of the world, where $MRM_{And}^{p,g}$ represents the value of the import of the rest of the world in the Input-Output Table for Andalusia.

As regards Andalusian exports to the rest of Spain, $\mathbf{Y}^{AN,RE}$, said information is found in the final demand block of the Use Table for the Input-Output Framework of Andalusia, in the column "exports to the rest of Spain". However, that column does not say whether the exports are destined for intermediate or final consumption, nor the sectors that purchase the goods or services. In light of the lack of available data, we have once again opted for a proportional allocation. In this instance, we have opted for Spanish national domestic consumption values to perform this allocation and therefore,

$$\boldsymbol{Y}_{p,g}^{AN,RE} = XRE_{p}^{AN} \times \frac{\boldsymbol{Y}_{dom,p,g}^{ES}}{\sum_g (\boldsymbol{S}_{dom,p,g}^{ES} + \boldsymbol{Y}_{dom,p,g}^{ES})},$$

https://doi.org/10.54790/rccs.28

where XRE_p^{AN} are the exports of the product p to the rest of Spain available in the Input-Output Framework for Andalusia. Likewise, the exports corresponding to the intermediate part are calculated according to the same criteria,

$$\mathbf{S}_{p,g}^{AN,RE} = XRE_p^{AN} \times \frac{\mathbf{S}_{dom,p,g}^{ES}}{\sum_g (\mathbf{S}_{dom,p,g}^{ES} + \mathbf{Y}_{dom,p,g}^{ES})}.$$

The blocks corresponding to the Andalusian exports to the rest of the world, both intermediate and final, $\mathbf{S}^{AN,i}$ y $\mathbf{Y}^{AN,i}$, have been produced in the same way as the exports to the rest of Spain. In the block of final demand of the Use Table of the Input-Output Framework for Andalusia, the data is shown in the column of Andalusian exports to the rest of the world. Once again, that column does not give either the country of destination nor its use as an intermediate or final consumption, neither the foreign sector that purchases the goods or services. In this case, we have performed a proportional allocation using the structures of the Spanish exports to the rest of the world provided by the FIGARO tables. Such that,

$$\mathbf{Y}_{p,g}^{AN,i} = XRM_p^{AN} \times \frac{\mathbf{Y}_{p,g}^{ES,i}}{\sum_g (\mathbf{S}_{p,g}^{ES,i} + \mathbf{Y}_{p,g}^{ES,i})} \text{ , y } \mathbf{S}_{p,g}^{AN,i} = XRM_p^{AN} \times \frac{\mathbf{S}_{p,g}^{ES,i}}{\sum_g (\mathbf{S}_{p,g}^{ES,i} + \mathbf{Y}_{p,g}^{ES,i})},$$

where XRM_p^{AN} are the exports of the product p to the rest of the world available in the Input-Output Framework of Andalusia.

The values corresponding to the rest of Spain in the blocks $\mathbf{S}^{RE,i}$, $\mathbf{Y}^{RE,i}$, $\mathbf{S}^{j,RE}$, $\mathbf{Y}^{j,RE}$, $\mathbf{S}_{dom}^{RE}$ y $\mathbf{Y}_{dom}^{RE}$ have been obtained, respectively, from the difference between the total values for Spain available in the FIGARO Inter-country Input-Output Table and the estimated values for Andalusia, from the equations in the previous points 1), 2) and 4).

Lastly, a similar approach was followed to obtain the employment values. The Input-Output Table of the Input-Output Framework for Andalusia provides the employment for each homogeneous branch, whereby employment in the rest of Spain is obtained from the difference of the available Spanish totals in the publication of the FIGARO Inter-country Input-Output Table.

On making these estimations, the coherence of the values obtained was checked at all times. In general, the Input-Output Table for Andalusia is very coherent with respect to that for Spain, particularly for the large quantities such as gross value added and employment. At the level of coefficients, some inconsistencies were detected, resulting from the different methodologies used to produce the different tables. There is no doubt that said inconsistencies would be reduced on using more baseline data about the origin and the destination of the trade flows of Andalusia with the rest of Spain and the world.

Producing this extended Inter-country Input-Output Table is a great added value if done on a regular basis, especially if done at the same time as producing the Input-Output Framework for Andalusia and its relationships with the rest of Spain. In this study, we have opted for taking the values of the Input-Output Framework for Andalusia as given, even in those instances in which the resulting regional value is higher than the total for Spain. This has led us to assume that in these cases, the rest of Spain does not import anything more from any other country. To correct the imbalance that this causes in the table, the choice was made to allocate the difference — especially when this is not very significant — to the changes in stocks in each row and the taxes less subsidies on products in each column. If this results in significant differences, these discrepancies would be distributed throughout the extended tables using an automatic balancing method as described in European Commission (2019) or with a multi-dimensional balancing method according to the restrictions that are to be established according to the available data (Valderas-Jaramillo and Rueda-Cantuche, 2021).

https://doi.org/10.54790/rccs.28

Annex 2. Geographical areas and country codes used

	ISO-2 Code	Country name		ISO-2 Code	Country name
EU member countries	AT	Austria	Most relevant countries for the EU as trading partners	GB	Great Britain
	BE	Belgium		US	United States of America
	BG	Bulgaria		CA	Canada
	CY	Cyprus		CN	China
	CZ	Czechia		CH	Switzerland
	DE	Germany		IN	India
	DK	Denmark		JP	Japan
	EE	Estonia		KR	Republic of Korea
	ES	Spain		MX	Mexico
	FI	Finland		NO	Norway
	FR	France		RU	Russian Federation
	GR	Greece		TR	Turkey
	HR	Croatia		AR	Argentina
	HU	Hungary		AU	Australia
	IE	Ireland		BR	Brazil
	IT	Italy		ID	Indonesia
	LT	Lithuania		SA	Saudi Arabia
	LU	Luxembourg		ZA	South Africa
	LV	Latvia			
	MT	Malta			
	NL	Netherlands			
	PL	Poland			
	PT	Portugal		Code	Geographic area
	RO	Romania		RoS	Rest of Spain
	SE	Sweden	Others	And	Andalusia
	SI	Slovenia		ROW	Rest of the World
	SK	Slovakia			

Annex 3. Grouping of products used and correspondence with CPA

#	CPAs that groups	Literal	#	CPAs that groups	Literal
1	CPA_01	Agriculture, livestock and hunting	32	CPA_52	Storage and activities related to transport
2	CPA_02	Forestry and logging	33	CPA_53	Postal and courier activities
3	CPA_03	Fishing and aquaculture	34	CPA_55-56	Accommodation, food and beverage services
4	CPA_05-09	Extractive industries	35	CPA_58	Edition
5	CPA_10-12	Agro-food industry, beverages and tobacco	36	CPA_59-60	Cinematographic, video and television program activities, sound recording and music editing; radio and television programming and broadcasting activities
6	CPA_13-15	Textile industry, garment manufacturing, leather and footwear industry	37	CPA_61	Telecommunications
7	CPA_16	Wood and cork industry	38	CPA_62-63	Programming, consulting and other computer-related activities; Information services
8	CPA_17	Paper industry	39	CPA_64	Financial services, except insurance and pension funds
9	CPA_18	Graphic arts and reproduction of recorded media	40	CPA_65	Insurance, reinsurance and pension funds, except compulsory Social Security
10	CPA_19-20	Coking plants, refining and chemical products	41	CPA_66	Activities auxiliary to financial services and insurance
11	CPA_21	Manufacture of pharmaceutical products	42	CPA_68	Real estate activities
12	CPA_22	Manufacture of rubber and plastic products	43	CPA_69-70	Legal and accounting activities; headquarters activities; business management consulting activities
13	CPA_23	Other non-metallic mineral products	44	CPA_71	Architectural and engineering technical services; technical tests and analyzes
14	CPA_24	Metallurgy products	45	CPA_72	Investigation and development
15	CPA_25	Manufacture of metal products, except machinery and equipment	46	CPA_73	Advertising and market studies
16	CPA_26	Manufacture of computer, electronic and optical products	47	CPA_74-75	Other professional, scientific and technical and veterinary activities
17	CPA_27	Manufacture of electrical material and equipment	48	CPA_77	Rental activities
18	CPA_28	Manufacture of machinery and equipment	49	CPA_78	Activities related to employment
19	CPA_29	Manufacture of motor vehicles, trailers and semi-trailers	50	CPA_79	Activities of travel agencies, tour operators, reservation services and activities related to them
20	CPA_30	Other transport material	51	CPA_80-82	Other business services
21	CPA_31-32	Furniture and other manufactured products	52	CPA_84_U	Public administration and defense; compulsory social security. Extraterritorial organizations

https://doi.org/10.54790/rccs.28

#	CPAs that groups	Literal	#	CPAs that groups	Literal
22	CPA_33	Repair and installation of machinery and equipment	53	CPA_85	Education
23	CPA_35	Electric power, gas, steam and air conditioning	54	CPA_86	Health activities
24	CPA_36	Natural water; water treatment and distribution services	55	CPA_87-88	Social service activities
25	CPA_37-39	Wastewater collection and treatment; collection, treatment and disposal of waste; valorization; decontamination activities and other waste management services	56	CPA_90-92	Creative, artistic and entertainment activities; Libraries, archives, museums and other cultural activities; gambling and betting activities
26	CPA_41-43	Building	57	CPA_93	Sports, recreational and entertainment activities
27	CPA_45	Sale and repair of motor vehicles and motorcycles	58	CPA_94	Associative activities
28	CPA_46	Wholesale trade and intermediaries of trade, except motor vehicles and motorcycles	59	CPA_95	Repair of computers, personal effects and household items
29	CPA_47	Retail trade, except motor vehicles and motorcycles	60	CPA_96	Other personal services
30	CPA_49	Land and pipeline transport	61	CPA_97-98	Activities of households as employers of domestic personnel or as producers of goods and services for their own use
31	CPA_50-51	Maritime and inland waterway transport. Air Transport			

Annex 4. Data tables

Table 1

Andalusian value added in exports according to country and % of exports

Geographic area	DVA (10^6 €)	% DVA on exports
Germany	1,837.9	64.2
Saudi Arabia	178.9	46.6
Argentina	33.0	44.6
Australia	57.7	51.8
Austria	139.1	65.5
Belgium	279.4	58.4
Brazil	169.9	43.3
Bulgaria	65.5	67.3
Canada	83.2	52.6
Czechia	119.2	64.5
China	463.2	54.6
Cyprus	11.3	60.6
Croatia	19.4	64.7
Denmark	137.0	66.7
Slovakia	28.9	61.4
Slovenia	10.8	57.4
United States of America	622.2	54.1
Estonia	14.5	65.3
Finland	111.5	63.2
France	2,460.1	59.6
Great Britain	1,350.9	61.0
Greece	68.7	54.2
Netherlands	417.1	62.4
Hungary	63.8	60.3
India	99.8	41.2
Indonesia	26.2	43.6
Ireland	103.3	62.8
Italy	1,178.9	57.8
Japan	152.7	48.9
Latvia	11.2	72.6
Lithuania	27.2	68.2
Luxembourg	44.5	71.1
Malta	13.4	48.8
Mexico	136.2	44.6
Norway	160.8	68.7
Poland	211.1	64.3
Portugal	894.4	58.6
Republic of Korea	116.7	43.7
Rest of Spain	11,704.1	55.3
Rest of the World	2,369.2	55.7
Romania	64.4	58.6

https://doi.org/10.54790/rccs.28

Geographic area	DVA (10^6 €)	% DVA on exports
Russian Federation	203.7	49.6
Southof Africa	46.2	45.3
Sweden	148.4	67.8
Switzerland	371.6	69.3
Turkey	184.6	38.3
EU	20,185.2	57.6
EU without rest of Spain	8,481.2	60.9
Global	27,011.8	56.7

Table 2

Andalusian value added in the exports according to product and % of exports

CPA	DVA (10^6 €)	% DVA on exports	CPA	DVA (10^6 €)	% DVA on exports
CPA_01	7,238.3	89.8	CPA_52	904.3	61.5
CPA_02	83.2	57.4	CPA_53	55.1	47.0
CPA_03	69.1	68.7	CPA_55-56	284.9	76.7
CPA_05-09	252.2	4.0	CPA_58	19.3	30.3
CPA_10-12	1,746.9	71.8	CPA_59-60	19.9	34.1
CPA_13-15	362.0	64.8	CPA_61	179.3	49.4
CPA_16	97.9	54.6	CPA_62-63	196.7	52.7
CPA_17	111.6	38.3	CPA_64	436.1	48.3
CPA_18	49.1	52.6	CPA_65	44.1	34.5
CPA_19-20	1,221.9	50.5	CPA_66	80.8	42.5
CPA_21	42.3	52.5	CPA_68	795.9	66.5
CPA_22	203.6	35.7	CPA_69-70	630.0	56.1
CPA_23	314.4	66.6	CPA_71	259.9	60.1
CPA_24	790.6	56.2	CPA_72	203.1	93.5
CPA_25	425.8	48.8	CPA_73	135.8	28.9
CPA_26	88.0	25.7	CPA_74-75	163.8	60.1
CPA_27	210.6	49.3	CPA_77	210.1	39.1
CPA_28	197.7	38.1	CPA_78	160.7	47.6
CPA_29	95.0	40.0	CPA_79	27.3	67.8
CPA_30	459.6	55.2	CPA_80-82	612.4	59.2
CPA_31-32	134.6	69.2	CPA_84_U	8.2	12.5
CPA_33	311.0	65.2	CPA_85	78.1	42.9
CPA_35	816.9	61.3	CPA_86	67.0	61.1
CPA_36	195.2	81.3	CPA_87-88	0.6	16.0
CPA_37-39	540.9	55.5	CPA_90-92	73.2	82.6
CPA_41-43	363.5	66.9	CPA_93	62.2	65.7
CPA_45	79.8	40.8	CPA_94	93.1	68.2
CPA_46	2,302.2	69.4	CPA_95	27.0	39.8
CPA_47	863.5	63.7	CPA_96	31.6	56.2
CPA_49	1,447.9	72.4	CPA_97-98	0.0	0.0
CPA_50-51	36.2	23.5			

https://doi.org/10.54790/rccs.28

Table 3

Employment supported in Andalusia by exports according to destination and % of total employment supported

Country	Employment supported in Andalusia (10^3 people)	% Employment over total employment supported by exports
Germany	44.1	58.4
Saudi Arabia	3.7	38.8
Argentina	0.7	36.5
Australia	1.3	45.2
Austria	3.4	59.5
Belgium	6.3	50.0
Brazil	3.5	35.3
Bulgary	1.2	58.6
Canada	1.8	43.9
Czechia	2.9	58.2
China	9.7	44.1
Cyprus	0.3	49.9
Croatia	0.5	55.5
Denmark	3.2	59.2
Slovakia	0.7	55.3
Slovenia	0.3	48.9
United States of America	13.6	45.7
Estonia	0.4	58.1
Finland	2.6	57.1
France	57.3	52.7
Great Britain	31.5	54.4
Greece	1.5	43.4
Netherlands	9.8	54.4
Hungary	1.5	54.3
India	1.9	30.9
Indonesia	0.5	34.3
Ireland	2.2	55.6
Italy	26.9	48.9
Japan	3.3	37.6
Latvia	0.3	64.8
Lithuania	0.7	60.6
Luxembourg	0.8	61.3
Malta	0.3	37.2
Mexico	2.9	36.4
Norway	3.9	62.1
Poland	5.0	57.4
Portugal	20.5	50.3
Republic of Korea	2.3	32.1
Rest of Spain	257.9	46.2
Rest of the World	51.2	47.0
Romania	1.5	51.4
Russian Federation	4.5	42.1

Country	Employment supported in Andalusia (10^3 people)	% Employment over total employment supported by exports
South Africa	1.0	37.9
Sweden	3.6	60.4
Switzerland	9.1	62.9
Turkey	3.4	27.9
EU	486.9	49.4
EU without resto of Spain	229.0	53.7
Global	605.3	48.3

https://doi.org/10.54790/rccs.28

Table 4

Employment supported in Andalusia by exports and % of total employment supported

CPA	Employment supported in Andalusia (10^3 people)	% Employment over total employment supported by exports	CPA	Employment supported in Andalusia (10^3 people)	% Employment over total employment supported by exports
CPA_01	197.4	63.6	CPA_52	13.1	62.9
CPA_02	3.8	48.8	CPA_53	2.9	56.5
CPA_03	3.7	65.0	CPA_55-56	7.0	65.6
CPA_05-09	3.3	1.4	CPA_58	0.5	40.7
CPA_10-12	35.7	70.7	CPA_59-60	0.5	46.8
CPA_13-15	7.5	34.6	CPA_61	1.2	45.6
CPA_16	2.9	51.1	CPA_62-63	5.1	63.9
CPA_17	2.1	43.3	CPA_64	4.1	42.0
CPA_18	1.8	61.2	CPA_65	0.3	19.6
CPA_19-20	7.8	40.9	CPA_66	1.4	46.4
CPA_21	0.3	47.4	CPA_68	1.0	50.4
CPA_22	4.4	36.3	CPA_69-70	15.4	59.8
CPA_23	6.8	62.0	CPA_71	6.4	61.6
CPA_24	4.5	29.8	CPA_72	3.8	92.6
CPA_25	11.9	50.2	CPA_73	4.5	41.0
CPA_26	2.0	23.7	CPA_74-75	4.9	59.0
CPA_27	4.0	43.0	CPA_77	3.3	46.2
CPA_28	5.2	45.2	CPA_78	9.1	59.1
CPA_29	3.3	60.1	CPA_79	0.5	55.8
CPA_30	7.6	56.9	CPA_80-82	31.0	61.9
CPA_31-32	5.3	68.9	CPA_84_U	0.2	9.5
CPA_33	6.0	57.8	CPA_85	1.9	35.0
CPA_35	1.3	18.2	CPA_86	1.2	40.4
CPA_36	3.4	80.7	CPA_87-88	0.0	8.7
CPA_37-39	10.8	61.9	CPA_90-92	1.5	82.4
CPA_41-43	6.8	56.1	CPA_93	1.8	71.5
CPA_45	2.3	36.8	CPA_94	2.8	63.6
CPA_46	54.8	66.6	CPA_95	1.1	30.5
CPA_47	35.2	62.7	CPA_96	1.1	36.7
CPA_49	35.5	68.8	CPA_97-98	0.0	0.0
CPA_50-51	0.4	11.0	Total	605.3	48.3