ESPON

EUROPEAN UNION

Co-financed by the European Regional Development Fund

Inspire Policy Making with Territorial Evidence

WORKING PAPER//

Unveiling the interregional trade flows between Spain, France and Portugal

ESPON Applied Research project on Interregional Relations in Europe

September 2021

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This document is an interim report.

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The final version of the report will be published as soon as approved.

Introduction

There is no official data on region-to-region trade flows between different countries within the European Union (EU). Due to this limitation, several important questions regarding the dynamics of EU integration remain unanswered, both for researchers and policymakers. The recent withdrawal of the United Kingdom from the EU, for example, has highlighted this deficit. As a result, researchers were unable to study the asymmetric impacts of BREXIT on regional economies. Similarly, the COVID19 pandemic, and the way in which countries and regions moved to quickly restrict cross-border movements on public health grounds, further demonstrates how important it is to understand trade flows and how they are impacted when exposed to sudden shocks.

Measuring the level of integration of different economies belonging to a trade union or a monetary area is not a trivial issue. In academia, the concept of border effect, offers an interesting starting point for the discussion, since it allows to compare how much more intense is the trade flows (usually of goods alone) that every country (or region) have with itself than with any other country (region) belonging to the same country (or group of countries in the trade area). The first estimates of such border effect was conducted by McCallum in 1995 using trade data between and within Canada and the United States (USA). Then, several other authors have tried to replicate such analysis with the idea of measuring how strong and persistent is the administrative border as an impediment to trade interaction between any pair of countries and their regions.

In contrast to the USA and China, the estimation of international border effects for trade flows in Europe is limited to country-to-country or region-to-country data, and only possible for those countries where interregional trade datasets are collected and available. This is just an example on how relevant the knowledge of the interregional flows of goods is within Europe. The same, or even more critical comments can be said about flows of services, people, capital or knowledge.

The aim of the ESPON IRIE project (Interregional Relations in Europe) is to address this deficit through generating new data and evidence about interregional economic and social relations across the EU. Related to the trade of goods, the project aims to generate standardised estimates of the intra- and interregional trade flows (Euros and Tonnes), disaggregated by products and transport modes, covering the entire EU27 plus Iceland, Liechtenstein, Norway, Switzerland, and the UK.

As an interim complement to this pan-European analysis, this Working Paper examines the interregional-international trade of Spain with France and Portugal with level of fine grain detail that has never been applied before. The analysis centres on actual trade flows by road, with a focus on cross-border flows and the main gateways used for trade, and offers an important benchmark to evaluate the trade integration of these three countries at the sub-national level.

The borders of the Iberian Peninsula are of particular interest, because of their geographic specificities. For example, the Pyrenees act as a natural barrier for the economic interaction along the Spanish-French border. Consequently, the two main gateways (Biriatou/Irun and Le Perthus/La Jonquera) are located a considerable distance from each other (more than 600km) at either end of the Pyrenees. The Spanish-Portuguese border, on the other hand, is longer and more porous, with a larger number of crossing points and border regions. However, within Portugal, population and the economic activity is much more heavily concentrated around Lisbon and Oporto on its eastern seaboard, which considerably influences the spatial pattern of trade flows.

This Working Paper also includes an analysis of the national and regional border effects within Spain which helps to illustrate the difference between the level of regional integration of trade within a country, as compared to the two neighbouring countries i.e. the 'Home Bias' effect. A further analysis provided is a prediction of the optimal trade routes by road, adding an additional layer to standard international trade analyses. This can help our understanding of the actual use of transport infrastructure, as well as providing a more realistic analysis of regional accessibility and the consequences for the transit regions in respect of, for example, positive spillovers (transport services) and negative (GHG emissions) externalities.

The results presented in this Working Paper are very powerful and new, identifying different patterns of trade between these three countries, and unveiling geographical and economic drivers which explain the intensity and direction of the bilateral flows. Indeed, this Working Paper aims to provide a foretaste of the contribution that the ESPON IRIE project is expected to make for all of Europe, once that equivalent data is available for all countries and regions. As always, however, the analysis provided is partial and will be subject to refinement within the context of the IRIE project, as well as through further research and academic papers.

Note: This is an abridged and non-technical summary version of a longer case study, and primarily aimed at policymakers. A complete version of this Working Paper, including a complete account of methods, modelling and literature review, can be downloaded from https://www.espon.eu/programme/projects/espon-2020/applied-research/interregional-relations-europe

Measuring Flows

The methodology applied in this Working Paper includes four dimensions, as follows:

(i) Estimation and use of a new database containing intra- and interregional flows between Spain, Portugal and France, using aggregate and sector specific flows from 2004 to 2018 at the NUTS 3 scale.

(ii) Generating corresponding visualisations and descriptive analyses of the main flows and the development of different econometric specifications, using a gravity equation, to identify the role of different geographic and economic variables explaining the intensity of these flows.

(iii) Application of different explanatory variables related to the geographical (first nature) and economic (second nature) drivers of the flows, with a specific focus on the locational advantages of the border regions.

(iv) Using GIS network analysis, computing the optimal origin-destination routes for every pair of NUTS 3 regions in each of the three countries so as to estimate the most likely gateway used to cross the Spanish borders with France and Portugal, and the optimal road routes.

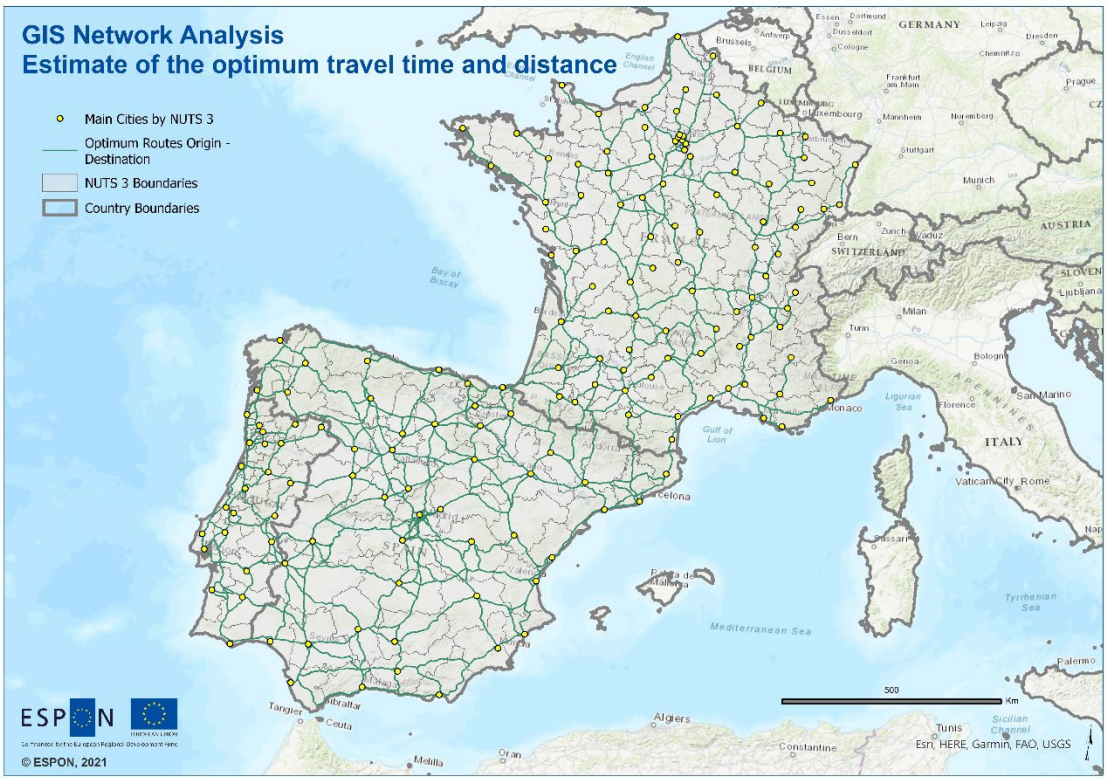
The core dataset used corresponds to the C-intereg project (www.c-intereg.es), which provides long series data on interregional flows in Spain and with the EU at the NUTS 3 level. This spatial scale is the most homogeneous within Europe and better represents the economy of cities, the main nodes for knowledge-based economies. This unique dataset serves as a good exemplar for other EU countries, both in the generation of data and its continual updating for policy research. The dataset combines interregional freight flows by road together with international customs data, covering the period from 2004-2018, and with a wide sectoral disaggregation.

Using GIS network analysis, each interregional flow was allocated an optimal route considering the actual available road transport infrastructure (see **Figure 1**). The intra-national flows within Spain, and their equivalent inter-national flows to France and Portugal at the NUTS 3 level were then modelled using different specifications of a gravity equation. The results show that, although the flows typically perform following a classical gravity equation, new insights can be obtained thanks to the use of NUTS 3 scale data. The detailed consideration of two very different borders, and the manipulation of variables related to accessibility, contiguity, and geography, also helped to exploit the spatial heterogeneity of the data to unveil new findings.

By computing the optimal route for trade flows, the analysis connects the phenomenon of trade and freight to find core nodes in the transport network, offering a more realistic view of the real accessibility of each region. Applying this method, the main bilateral flows can be identified and visualised.

Some flows are predictable, given the typical variables in the gravity equation that connects larger regions (e.g. capital cities) and those located at a reasonable distance from each other (e.g. contiguous and border regions). But, in addition, the analysis identifies singular bilateral flows, such as, for example, those connecting Valladolid with some specific French regions where the interrelation is specifically linked to the automotive sector. This illustrates how bilateral firm-specific flows also have a critical role in understanding the trade flows of entire regions.

Figure 1: Road Network used for the GIS Network Analysis.

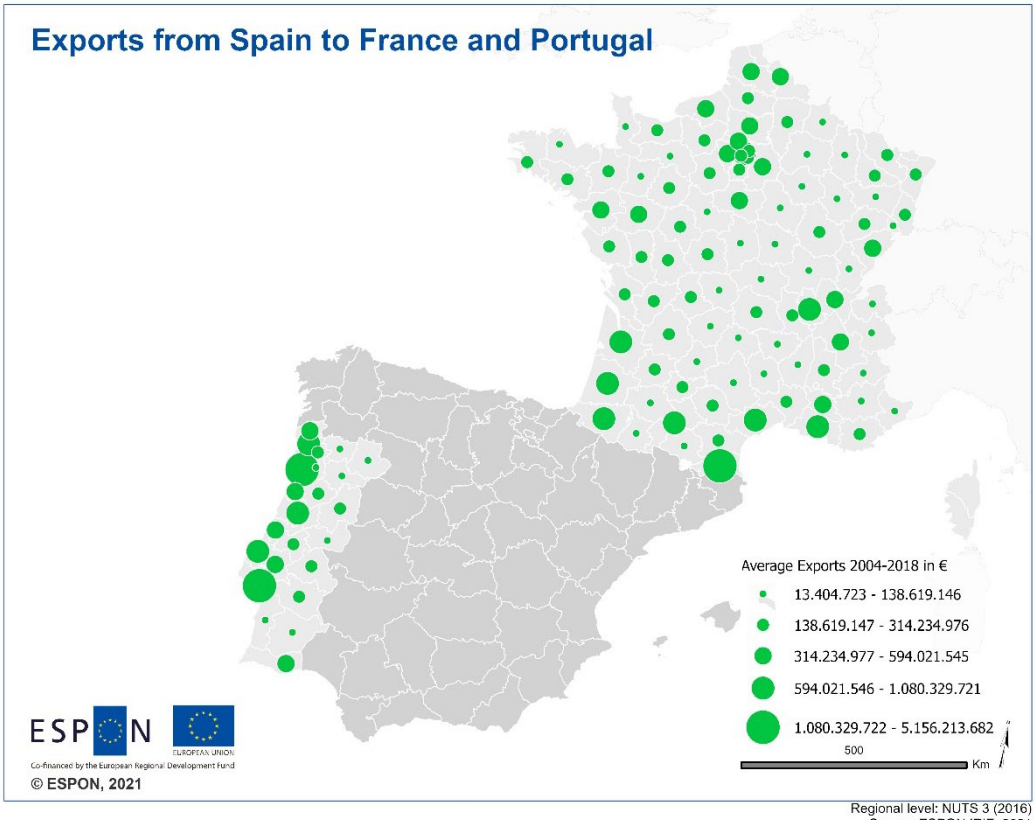


Regional level: NUTS 3 (2016)
Source: ESPON IRIE, 2021
Origin of data: CEPREDE - C-Intereg, 2021
UMS RIATE for administrative boundaries

Analysing Trade Flows

Figure 2 shows the primary destination of the Spanish exports to France and Portugal. A high level of heterogeneity of destinations is evident but with clear patterns of concentration in certain locations. In France, higher levels of concentration can be observed in the regions located close to the two main border gateways, particularly focussed on Marseille and Toulouse. In addition, high levels of concentration can also be found in the Loire-Atlantique and Nord regions in the west of the country; Paris; and Rhône and Isère in the eastern part of the country, focussed on Lyon. For Portugal, on the other hand, it is noteworthy that flows concentrate along the coast and not in the border regions, with the only exception being the regions that are also coastal. This geographical pattern reflects the spatial configuration of the Portuguese economy with higher concentrations of inflows evident in the large metropolitan areas of Lisbon and Oporto, and in the northern corridor close to the Spanish region of Galicia.

Figure 2: Main destinations of the Spanish exports to France and Portugal. NUTS 3 level. Average flows for the period 2004-2018. In Euros.



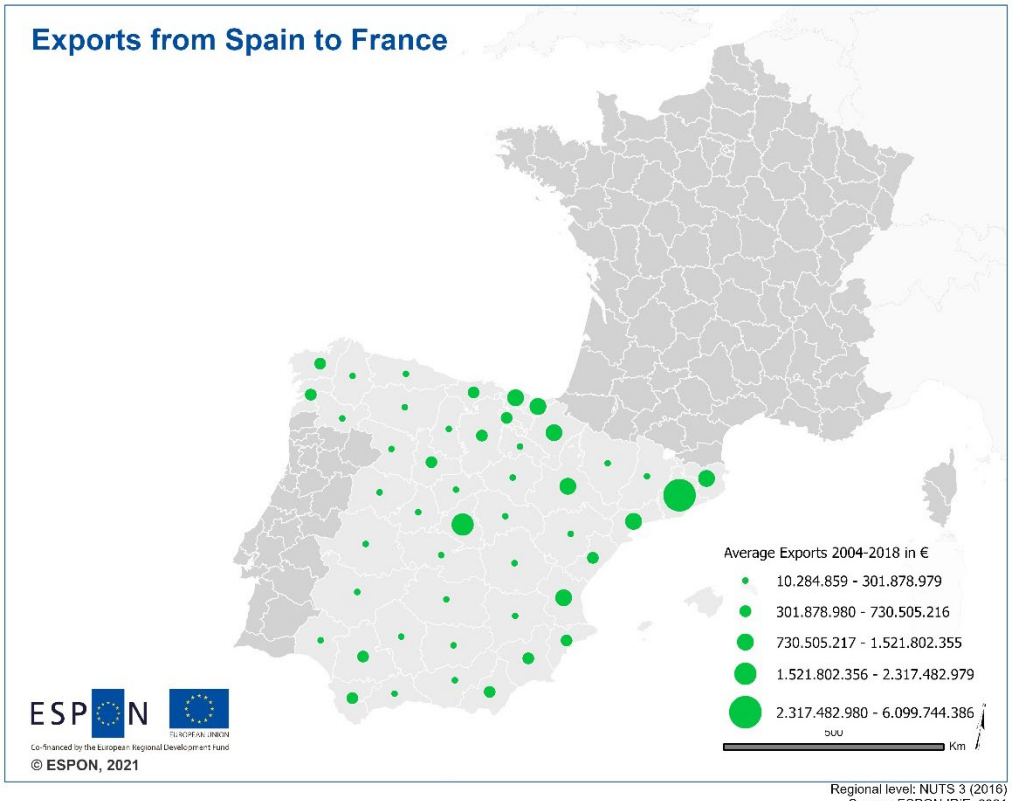
Regional level: NUTS 3 (2016)
Source: ESPON IRiE, 2021
Origin of data: CEPREDE - C-intereg, 2021
UMS RIATE for administrative boundaries

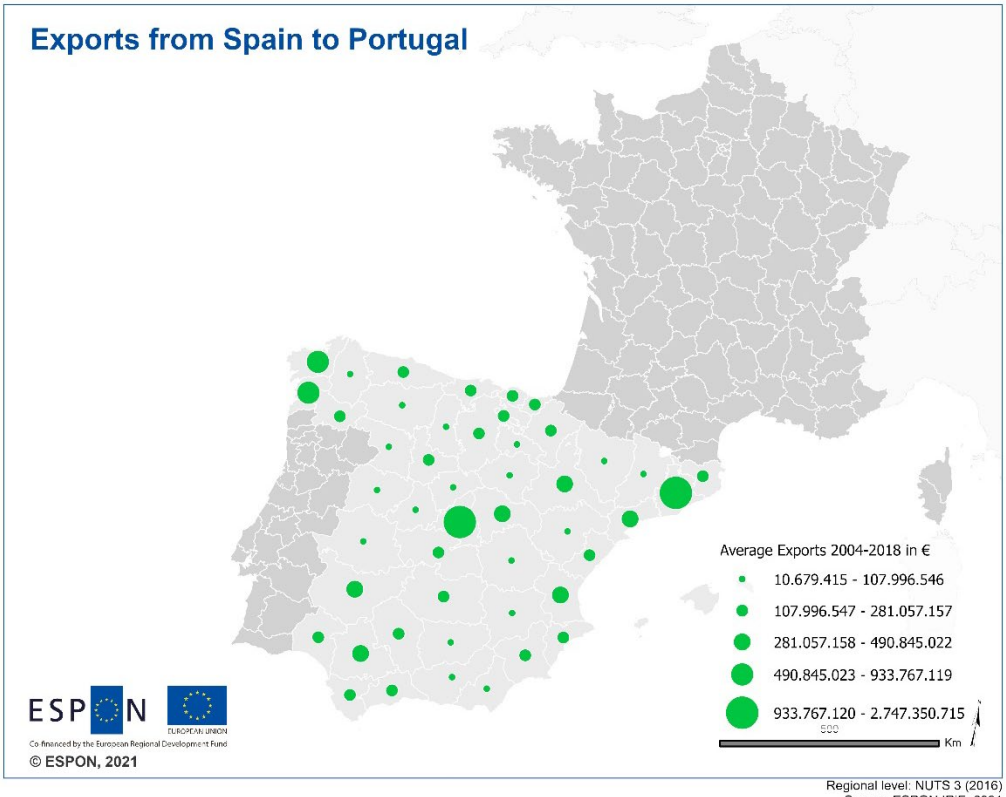
Figure 3 (First Map) shows the reverse situation and the regional origins in the Spanish exports to France and Portugal. For France, the primary origins are in Spanish border regions (Gipuzkoa, Navarre, and Girona). The concentration is even higher in Barcelona, Vizcaya (Bilbao) and Madrid, but also in Álava (Vitoria), Navarre, Zaragoza and Valencia.

This spatial pattern suggests the presence of two main drivers of trade i.e. one related to the geographical advantages of the regions located close to main border gateways and the other related to regional specific factors, such as Madrid, as the national capital, international ports (Valencia) and the presence of important clusters around, for example, the automobile and the food industry sectors.

The second map shows that the spatial concentration of exports from Spain to Portugal is much less pronounced. Just one Spanish border province (Pontevedra) and its neighbour, La Coruña, both in Galicia, comprise a strong regional concentration of Spanish exports to Portugal. The remainder are mostly located a considerable distanced from the border and concentrated around Seville in the south, Valencia in the east, and more interestingly, in all the provinces along the transport corridor that connects Madrid with Barcelona. This latter spatial pattern might also suggest a set of very specific factors which would require a more in-depth analysis.

Figure 3: Main origins of the Spanish exports to France and Portugal. NUTS3-to-NUTS3 disaggregation. Average flows for the period 2004-2018. In Euros.

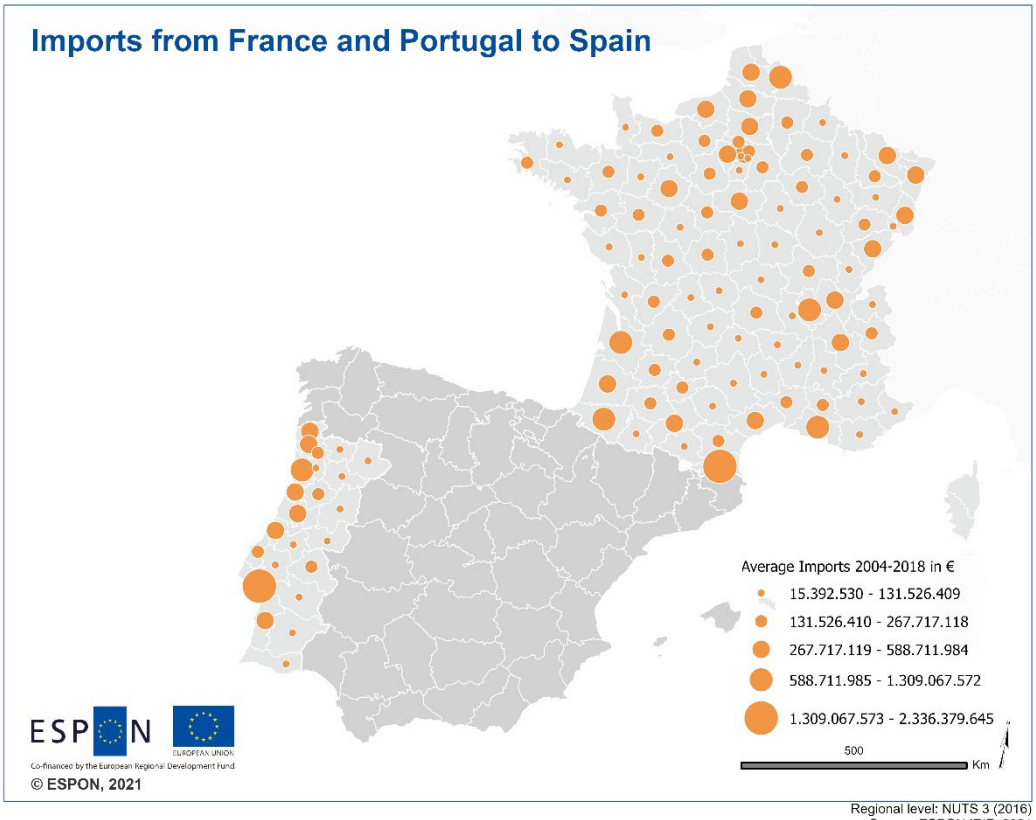




Regional level: NUTS 3 (2016)
Source: ESPON IRiE, 2021
Origin of data: CEPREDE - C-intereg, 2021
UMS RIATE for administrative boundaries

Figure 4 shows the origin of imports from France and Portugal to Spain. Starting with France, the regional concentration of exports is primarily located close to the French border, skewed towards the western gateway of Biriatou/Irun, which clearly demonstrates a high level of cross-border integration. In relation to Portugal, the main origins of exports are again concentrated in the coastal Portuguese regions. However, a pattern of concentration is also evident in the northern part of Portugal, including in landlocked border regions, such as Terras de Trás-os-Montes, Douro, Visea Dao-Lafoes.

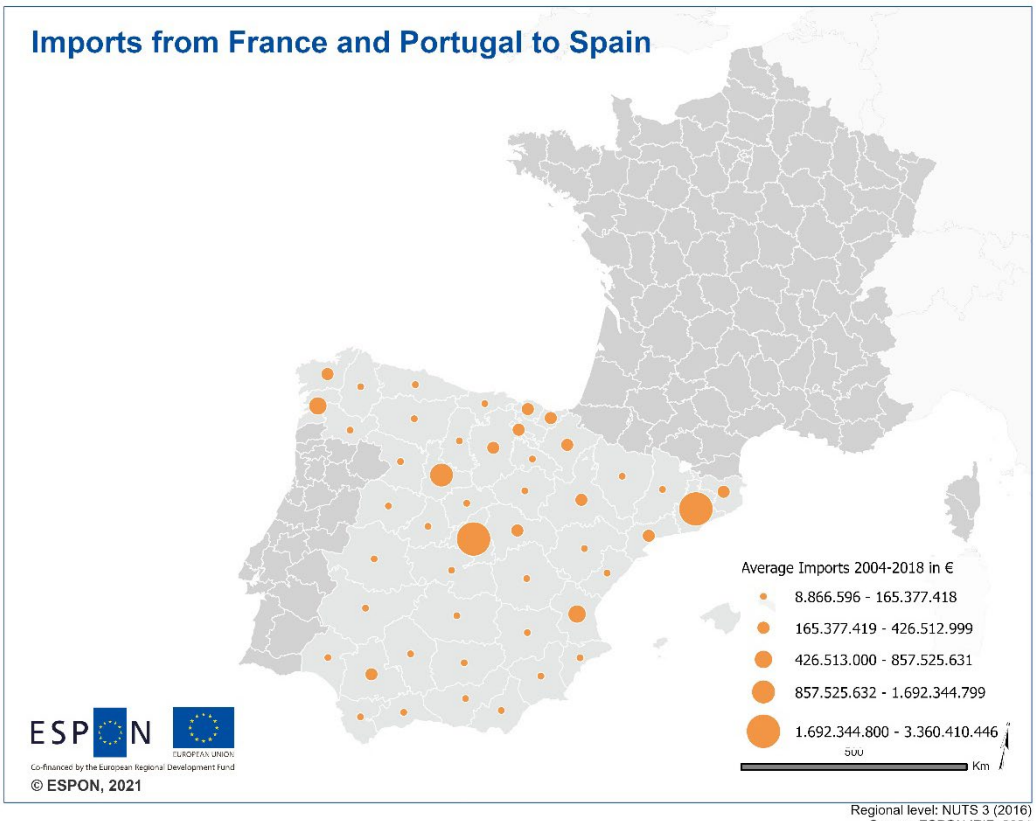
Figure 4: Main origins of the Spanish imports from France and Portugal. NUTS 3 level. Average flows for the period 2004-2018. In Euros.



Regional level: NUTS 3 (2016)
Source: ESPON IRiE, 2021
Origin of data: CEPREDE - C-intereg, 2021
UMS RIATE for administrative boundaries

Figure 5 shows the reverse situation and the main Spanish regional destinations in respect of French and Portuguese exports. It is interesting to compare this map with the maps in Figure 3 above. Although Spanish exports are heavily concentrated in the border regions adjacent to the two main gateways, imports arriving to the north-west border regions (Basque Country, Navarre or Aragon) is less evident. This might suggest that the French exporting regions close to the Atlantic corridor are not supplying the closest regions in the north of Spain.

Figure 5: Main destinations of the Spanish imports from France or Portugal. NUTS3 level. Average flows for the period 2004-2018. In Euros.



Regional level: NUTS 3 (2016)
Source: ESPON IRIE, 2021
Origin of data: CEPREDE - C-intereg, 2021
UMS RIATE for administrative boundaries

Developing this analysis further, the Sankey diagram presented in **Figure 6** shows the trading relationships between the 50 main Spanish regions exporting to French and Portuguese regions. It is interesting to note that, and perhaps not surprisingly, the largest flows connect Madrid and Barcelona with Lisbon. However, the diagram also illustrates how the geographical advantages of border and contiguous regions exhibit above average levels of integration, particularly in respect of France through the eastern gateway of Le Perthus/La Jonquera (Pyrénées-Orientales).

Figure 6: Sankey diagram. 50 main Spanish exports to the French and Portuguese regions (NUTS 3). Average flows for the period 2004-2018. In Euros.

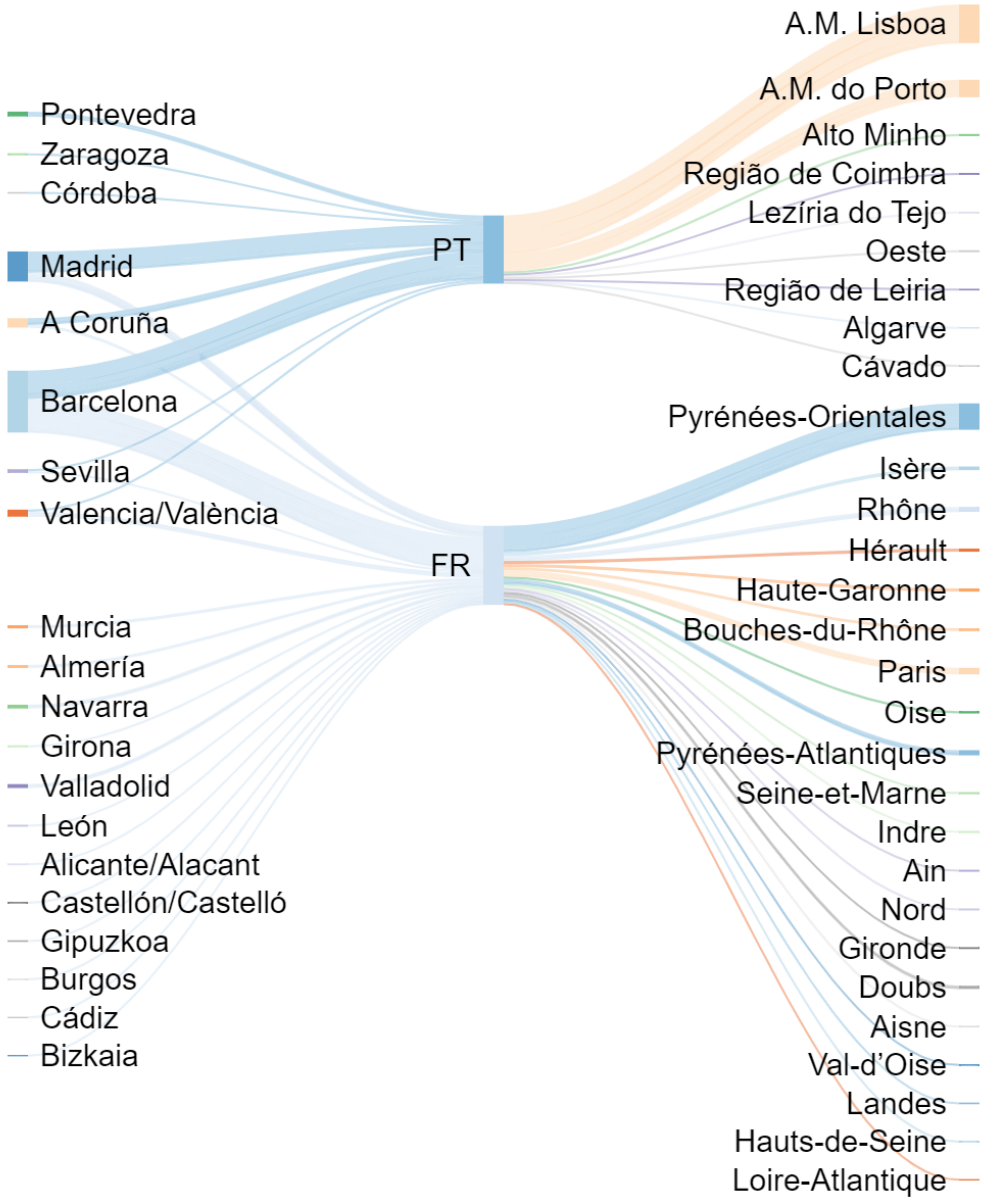
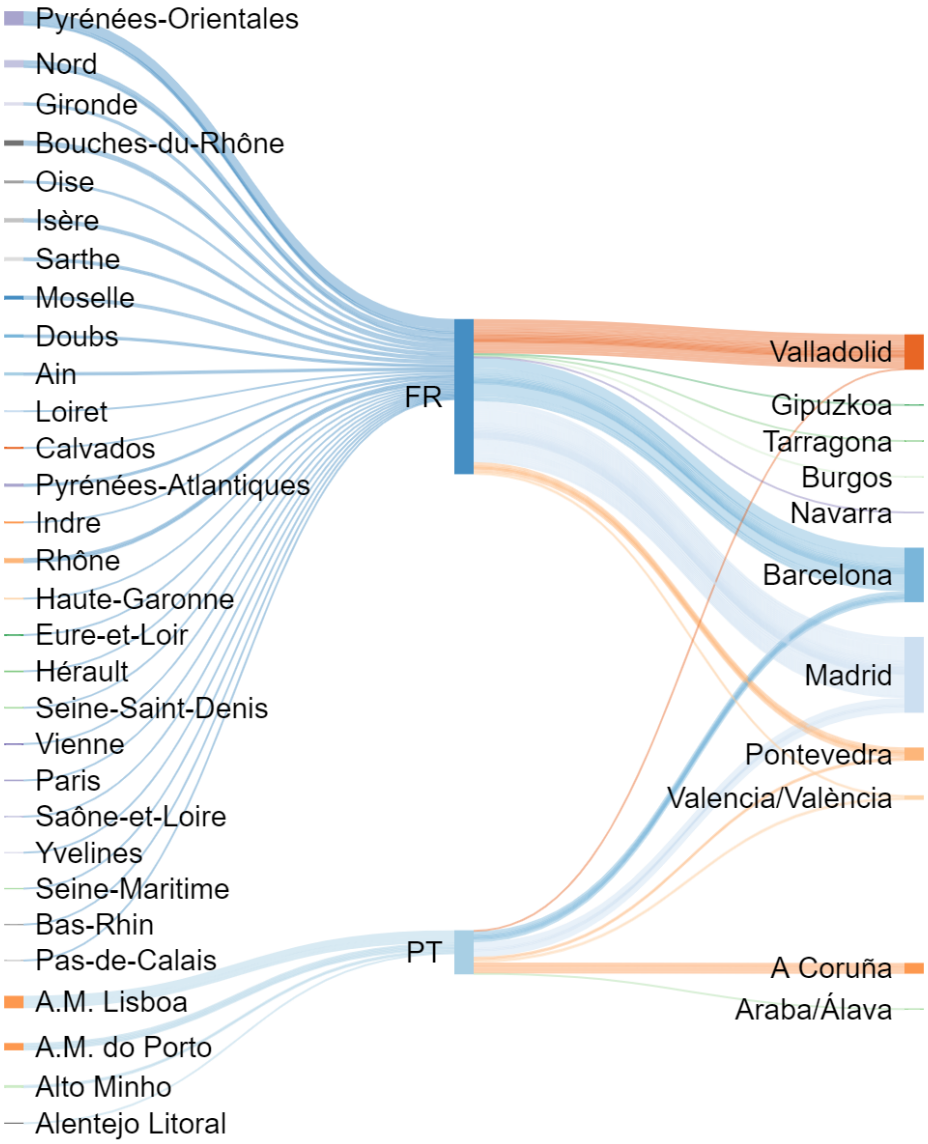


Figure 7 shows the reverse situation and illustrates the trading relationships between the 75th main Spanish regions importing from French and Portuguese regions. It is striking how the regional concentration of imports into Spanish regions is much narrower than in the case of the exports.

Figure 7: Sankey diagram. 75 main Spanish imports form the French and Portuguese regions (NUTS 3). Average flows for the period 2004-2018. In Euros.



Using a GIS network analysis, **Figure 8** shows the optimal overland road routes that the twelve main exports from the Spanish regions use to get to their destinations in France and Portugal. Each origin-destination flow has been obtained by using the minimum travel time, considering the current road network. Obviously, this picture is partial, since it represents just the main flows[1]. In respect of the main exports from Spain to France, it is interesting to compare with **Figure 6**, where the main flows originated mainly in the Mediterranean corridor, with Barcelona clearly predominant. In contrast, the flows using the Atlantic corridor were much narrower (i.e. Navarra-

[1] When focusing on the main flows in absolute terms, exports from Spain to Portugal generate thicker lines than that with France. However, the overall intensity of Spanish exports is larger with France than with Portugal.

Pyrénées-Atlantiques) and this is reflected in the map. Regarding the main export flows from Spain to Portugal, the main origin-destination combinations corresponded to the ranking shown in **Figure 6**, with a Madrid, Barcelona and Galicia predominant.

Figure 9: Optimal routes for the Spanish main exports to France and Portugal (€). NUTS 3. Average flows for 2004-2018.

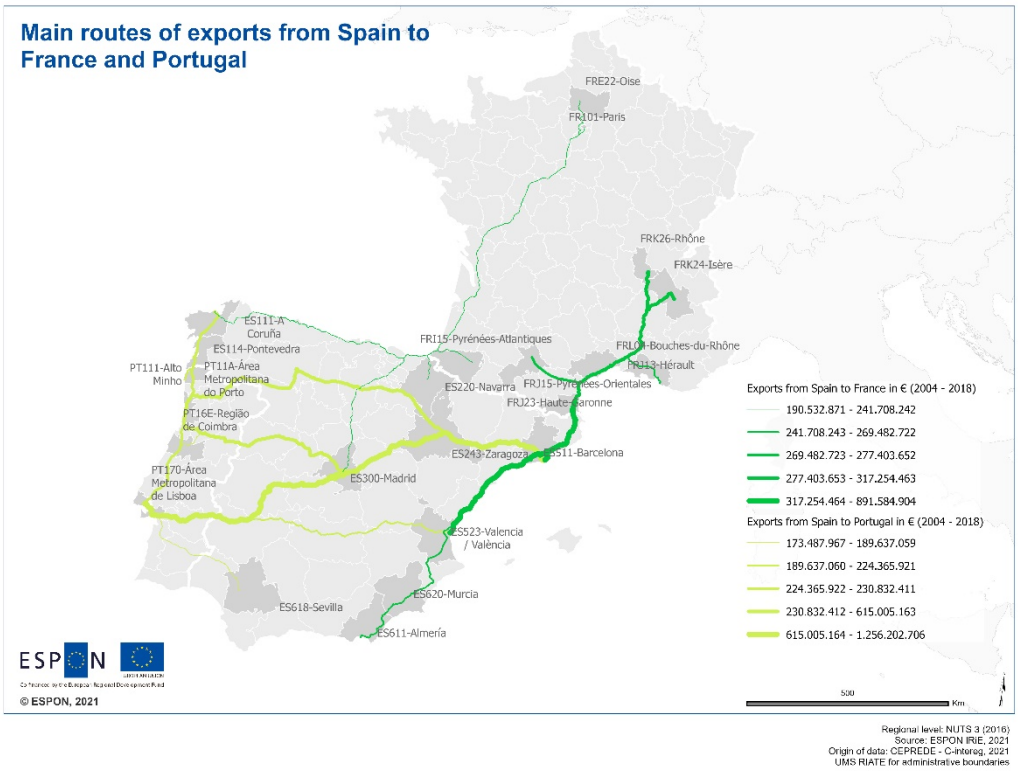
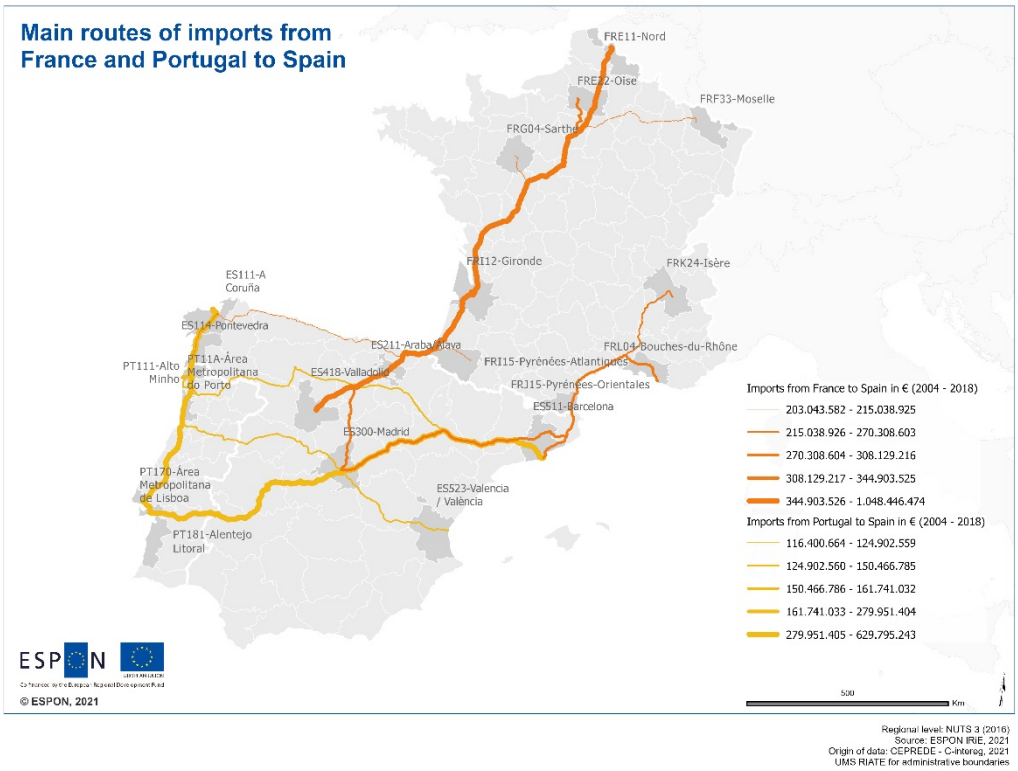


Figure 9 illustrates the routes that are most likely used by French and Portuguese exporters to reach Spanish importing regions, again just focusing on the twelve main flows. In respect of exports from France, the gateways used are more balanced, with even a slightly larger intensity for the Atlantic corridor. The importance of the route connecting Valladolid with Nord, Indre, Oise, Sarthe and Gironde is notable, with a likely clear connection to the automotive sector and Renault. The intense use of the coastal highways in Portugal connecting Lisbon-Oporto and Galicia is evident, while the connections between Barcelona, via Madrid and Valladolid, can also be seen.

Figure 8: Optimal routes for the main Spanish imports from France and Portugal (€). NUTS 3. Average flows for 2004-2018.



The 'Home Bias' Effect

The 'Home Bias' effect refers to how regions are more integrated with other regions of the same country, despite the strong linkages and geographic proximity that these regions may have with adjacent regions in another country. Creating a European Single Market is, of course, concerned with promoting international cooperation such that the regions of different countries trade with the same intensity as equivalent regions within own country. However, the result of this analysis reveals that national borders still matter greatly, even when considering countries with a great level of integration.

At his stage, it is important to remember that a large *'home bias'* can be explained by several factors. It does not necessarily imply the presence of external barriers to trade, such as tariffs or non-tariffs measures stablished by the national or regional governments. In some cases, a large *home bias* can arise endogenously, caused by the mere presence of economies of scale around strong industrialized regions or highly dense metropolitan areas. In these cases, stronger concentrations of trade within these territories are generated by the centripetal forces described in the core-periphery model. Such economies of scale accumulate through History, and might have been induced, originally, by historical accidents (e.g., being or had been the capital city of a country or an empire) or the singular geographical features of a region (e.g., being a border region, with the main gateways for crossing a national border; being a coastal region with a well stablished maritime port; being the preferred location for big multinational firms or other relevant institutions creating and diffusing knowledge, etc.). Having said that, it is also true that territories with strong agglomeration forces are also the ones more clearly engaged in Global Value Chains (GVC), so, once that all factors are controlled for, a large home bias in a region is usually perceived as a sign of a "less open economy", with a lower capacity for interacting with foreign markets, both as an exporter and as an importer. In a world where interconnection and diversification are especially relevant, it seems crucial to be able to measure such interconnections, going beyond what national or even regional (NUTS2) level data suggests.

To this regard, in order to analyse the 'Home Bias' effect, the gravity equation, used in the previous sections, was modified, again using NUTS 3 data covering the period 2004-2018. Surprisingly, the contiguity effect (i.e., being located adjacent to an international border) is only significant for trade flows in the cases of the contiguous NUTS 3 regions between Spain and Portugal. In contrast, the contiguity effect for NUTS 3 regions on the Spanish-French frontier is close to zero. The reason for this is, while the NUTS 3 regions may be border regions, thy are not the core exporting regions within their corresponding NUTS 2 regions.

With respect to origin regions for international exports, Spanish border regions adjacent to France tend to export more, while Spanish border regions adjacent to Portugal are non-significant when controlled for all the geographical variables.

With respect to destination border regions, border regions in Portugal tend to import less than non-border regions, which is consistent with the analysis presented above. Conversely, French border regions tend to import more from Spain than non-border regions.

On average, Spanish regions tend to export 14 times less to Portuguese region than to another Spanish regions and 13 times less to French regions of equivalent size at a comparable distance. When the geographical factors are included, this Home Bias effect increases to 18 times. It is interesting to remember that the original analysis conducted by McCallum for the US and Canada in the 90', revisited many times afterwards, found that for these two highly integrated countries the border effect might range from a factor of 22 to 3, depending on the perspective (USA versus Canada), the periods or the estimation methods.

Conclusions

The aim of this Working Paper is to inform policy makers, managers, and researchers that what we knew about international trade between three neighbouring countries, sharing the same currency within the EU is just the tip of the iceberg. Using just country-to-country statistics for trade between Spain, France and Portugal is like assuming that all trade concentrates in three points in space, with the reductionist temptation of identifying them with Madrid, Paris, and Lisbon.

Even for the lucky countries that periodically publish trade flows at the region-to country level, the possibilities to really measure the level of integration and the exact allocation of economic interactions in the space remains partial. The analysis presented in this Working Paper suggest that it is not enough to have a static view of trade interrelations or just to focus on one spatial grid; such as the NUTS 2 level, for example; and to argue that this is the scale that most decentralised countries use for policymaking e.g. devolved regional government for the case of Spain. Many economic phenomena are sensitive to the “Modifiable Areal Unit Problem” (MAUP), and trade is one clear example.

This Working Paper has shown that, with very simple visualisations and robust econometric analysis, that what we might expect at one spatial scale is not necessarily true for another, or at least, requires a more nuanced consideration. This is so because of the great heterogeneity of the economic relations in space, as well as the clear persistence of certain dynamics, where the current spatial interactions between different regions are clearly conditioned by persistent geographical and historical factors. On the other hand, a single leading firm can produce very strong international connections. Without having considered firm-specific information, some non-predictable flows analysed in this Working Paper are driven by a small number of big firms (some of which are multinationals) operating in very few locations e.g. in the automobile sector.

This analysis has shown that trade between Spain-France and Portugal performs, in general, following the rules of the gravity equation, where two big economies that are close together have more probability of interacting. But we have also learned that this relation is not linear, and that many other factors can also be at work. Firstly, economic geography, and all factors linked to the first nature (geography) and the second nature (human action) are relevant. In principle, being a border region to the foreign market will increase your trade with that partner, but this positive effect is moderated by natural features (e.g., the Pyrenees), or if, historically, border regions have turned their backs on each other. EU Cohesion Policy, cross-border cooperation and building common infrastructure (Ten-T) is all about bridging these inertial forces.

Before undertaking this analysis, it was thought that being a Spanish border NUTS 2 regions with France and Portugal increased the intensity of trade with these two countries. The typical example was the Basque Country and Catalonia, which are two main Spanish exporting regions and have geographical advantages through the two main gateways in the northern border with France. However, at the NUTS 3 level, the predominant provinces within these NUTS 2 regions are Vizcaya and Barcelona, which are not border regions. The analysis has shown similar trends in the case of Portugal, where the results at the NUTS 2 and NUTS 3 level are sensitive to the administrative units used, given the strong concentration of the population and the economic activity along the coast and the flatter economic landscape in the inner-border regions with Spain.

The analysis has also shown that, once that the strong and growing trade relationships between these three countries are identified, they are much smaller than the ones that take place within the national borders. For a given region, everything that is outside of its administrative border is 'the rest of the world'. This shows that economic relations have inertia, and the most important markets corresponds, first and foremost, to the local region and proximate neighbours in the same country. Thus, in general, finding a positive 'Home Bias' effect should be interpreted as a sign of internal integration, and not necessarily as an indication of disconnection with other countries. However, it is also evident that barriers to trade with the foreign neighbours remain.

It is therefore critical to implement territorially sensitive policies with a diversified range of polices to support a vibrant entrepreneurial and work force to be able to take advantage, or simply overcome geography and historical burdens. A good mix of human capital, good institutions and permanent efforts at innovation are critical. Here, resilience and smart specialization are key concepts, which unfortunately, in many cases, are not well routed in a detailed knowledge of the territorial relations affecting each region. 'Smartness' requires good data, and in the 21st Century, this also means georeferenced data.

Far from being conclusive, the analysis presented in this Working Paper also suggests that, once we have unveiled the spatial dimension of the bilateral trade flows within and between countries, interesting new questions arise, such as, for example, predicting the most optimal trade routes. By doing so, it is possible to better understand how production, transportation and consumption decisions are taken, and how policy interventions can help to compensate geographical and historical obstacles that leaves some regions behind. Better understanding origin-destination flows therefore open new avenues for the policy actions in terms of creating the required infrastructure for facilitating the interaction for both leading and the lagging regions. The current COVID 19 shock, for example, is instructive as to how relevant exact knowledge of the routes followed by trade flows is for the current and future performance.

Recommendations for data providers

Researchers in empirical trade do not live in a world with perfect traceability, where products can be followed from an exact point of production to the exact final point of consumption. Instead, they usually confront the frustrating reality of a world of incomplete information, full of statistical gaps, disconnections, and data constraints. This is clear for Europe, where the information with respect to the economic flows (goods, services, people, capital, and knowledge) between regions in different countries is almost non-existent.

Consequently, the spatial pattern of the EU single market at the sub-national scale, and several important questions regarding the dynamics of its level of integration, are simply unknown.

Several recommendations for data providers are therefore drawn from this Working Paper:

(1) The fastest way to improve the information about interregional economic relations between European countries is to publish the data that is already available but, for different reasons, it is not usually disclosed. This analysis proves that a layer of truly valuable information, such as the region of origin and destination of the international freight flows by road can be of great interest when it is combined with other information, such as the official trade flows. All EU countries produce equivalent datasets in the field of the road freight survey, coordinated by Eurostat, but most of them do not publish any information about the intra-national or the international deliveries with the equivalent spatial grid that was used in this Working Paper.

(2) In many EU countries, and in Eurostat as a whole, trade statistics do not offer any information about the region of origin or destination. Instead, country-to-country flows are published with detail at the product level by month. In some other countries, such as Spain, these official statistics are published at the NUTS 3 scale every month. Furthermore, there are even large samples with international exports at the firm-level, which can be geo-localised at the zip code level. The harmonisation and publication of data that is already collected would be a great improvement for researchers and the development of evidence-based policy.

(3) The efforts by Eurostat in harmonizing and publishing the European Road Freight Survey in the microdata format is highly appreciated. However, using this data source to analyse the whole of Europe faces clear limitations. On the one hand, the spatial level offered is restricted to NUTS 2. Moreover, the time series covered is limited to 2011-2019, which prohibits longitudinal analyses.

(4) Many economic phenomena are sensitive to the spatial administrative unit used. It is important to remark that the NUTS 3 scale is probably the most homogeneous spatial unit in Europe, and better represents the economy of cities, the main nodes in the knowledge-based economy. Thus, although the most powerful sub-national institutions correspond to the NUTS 2 level, and, therefore, this is the common denominator for European regional statistics, an extra effort on downscaling and covering the NUTS 3 level is also desirable.

(5) The transport modes that are supposed to be the mode of the future in a European Green Economy (train and ship), have the worst statistical information. There is no sectoral information regarding region-to-region freight flows between the regions, train stations or ports of any country in the EU, something that considerably diverges from the information available for road transport.

(6) All in all, the collection of data about trade and freight flows in each country, and for the whole Europe, can be clearly improved if each statistical exercise is defined with a spatial perspective and a holistic approach. For example, it is reasonable that transport and trade statistics should be more comparable, both in terms of the product classifications and their correspondence, the coverage of the spatial unit of reference, or the units of measurement used. Moreover, with focus in the transport statistics, it is desirable that each transport mode should not be considered in isolation, including fields related with multimodality and intermediation. This aspect is critical in the context of 'the last mile revolution', the political interest on tracking the environmental footprint of trade flows, and the additional difficulties introduced by the parallel development of the e-commerce, where transactions are arranged over non-located digital platforms, and the complex logistic network that serves the deliveries, which multiplies the number of transit locations from the producer to the final destination.

(7) Finally, a true statistical revolution regarding the spatial tracking of economic flows will come from the unveiling of fiscal information, always with full respect to firms and individual data protection rights. Assuming that VAT is the most homogeneous pan-European tax, it would be highly beneficial if this information was available for knowing the origin-destination of trade flows in Europe. Some exploratory analyses are being conducted in certain countries, but they are completely disconnected to the rest of the statistical system.

Policy Messages

The Pyrenees impose a clear barrier for economic and human interaction between Spain and France. The high cost of developing fast infrastructures have polarised the traffic and the economic interaction around the two main gateways at Biriatou/Irun and Perthus/La Jonquera. Greater cross-border cooperation between the regions in the Atlantic and Mediterranean corridors (Ten-T) will be critical.

But, furthermore, the analysis of trade flows also suggests the need for improving transport infrastructure connecting non-border regions in the north-centre of Spain (Aragón-Middy-Pyrenees) in line with some current projects, such as the development of the highway of the Pyrenees connecting the Atlantic and Mediterranean corridor, or further strengthening of North-South links. The relations between the Spanish border regions and those of the south of France, and the improvement of the connections with the nodes of the Bordeaux-Toulouse-Montpelier axis, can also help consolidate a cross-border macro-region.

Part of the trade flows observed in this Working Paper are likely to be associated with the role played by multi-country-multi-region firms, whose efficient contribution to the economy requires enjoying economies of scale. All efforts towards providing a friendly and stable legal framework at different spatial levels will help to reduce the transaction costs that remain after the elimination of tariffs and the introduction of the euro. Technical barriers, overlapping regulations, taxes and legal differences between regions within and between countries also hamper an efficient deployment of the production and exchange of goods and services within territories. Greater harmonisation and cooperation between all levels of government are desirable. All the efforts conducted in favour of the European Single Market at the country level, should be also followed by an equivalent effort at the sub-national level, considering not just the governance at the NUTS 2 level, but also at lower scales such as provinces or municipalities.

This analysis has centred in the flows by road, given the lack of equivalent information for the other transport modes. An important implication of the intra-national and inter-national trade is the environmental impact that generates, which do not affect just the exporting and importing regions, but also the transit locations. Thus, improving the quality of the information for all modes and their multi-modal combinations seems critical to have the whole picture of the production-trade-environment linkage of the current trade flows of each country and region. This information is also needed to formulate precise policy actions to promote the decarbonisation of the current trade-transport mix; enabling transport-mode shifts from air and road to train and ship; and promote the introduction of less polluting technologies in each mode.

The results suggest that an extra effort is needed to compensate the burdens imposed to some geographical and historical factors, improving the quality of the transport infrastructure connecting these three countries and promoting the social and economic cooperation in all dimensions. In this regard, reinforcing the cooperation between the border-regions seems to be critical.

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Inspire Policy Making with Territorial Evidence

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