AN ANALYSIS OF THE SPANISH INTERREGIONAL COMMERCIAL FLOWS. AN INPUT-OUTPUT APPROACH.

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ABSTRACT

The development of a national or regional economy depends on its own actions as much as on those of its commercial partners. Trade transmits economic events among economies. The sort and the degree of interdependence among territories —regions or countries— determines the consequences of external actions over a region. Multipliers translate the effects of change in one variable upon others. Using an input-output scheme to express interregional commercial flows, some coefficients are developed to classify and identify the role that each region plays in interregional trade. An empirical application of the methodology to Spanish Comunidades Autónomas is shown.

1.- Introduction.

The political and economic events that took place during the last quarter of the XX century in Spain have caused a deep transformation of its society and economy. On the one hand, the entrance of Spain to the European Union has produced a decisive opening of the Spanish economy and a restructuring of its national and international economic exchanges. On the other, the regional reorganisation of the country that emerges from the democratic Constitution of 1978 has driven at a higher decentralised geo-political division of the country and at a higher sensitivity to regional issues. So, one of the main tasks of national authorities consists in articulating proper policies to reduce economic differences among regions.

An increase in government spending in one region will stimulate that region's economy, but since many of the resources needed for that are likely to be produced outside of that region, the multiplier effects will also be dissipated among other regions or countries. Therefore, to correctly establish national and regional economic policies, it is fundamental to understand how the economy of a region impacts on the rest of the regional economies. It is, to know how economic growth impinges on the regions, what the most integrated regions are, how the economic flows among regions are transmitted, and what regions have higher multiplying effects.

Economic events are transmitted among economies through trade. So, it is essential to analyse commercial flows among regions in order to find some answers to the above questions. Furthermore, since an effort by a single region to stimulate its economy —for example, through tax cuts or an increase in government spending— is likely to spill over into neighbouring regions while having a relative smaller effect than the one expected on the local economy, the analysis should be performed from an multiregional perspective. In this sense, and in order to take into account both the direct and indirect effects of interregional trade, an input-output approach could be suitable.

The total demand of a regional economy could be divided —attending to its geographical origin— into exports to the rest of regions of the country, foreign exports, and local demand; while, in the same way, the total offer of the region could be classified into imports from the rest of the regions of the country, foreign imports and domestic production. So, if we denote by x_i^X the exports of region i to other countries, by d_i the domestic demand of region i, by x_j^I the imports of region j from other countries, by q_j the local production of region j, and by x_{ij} the exports of region i to region j —with $x_{ii} = 0$, since the domestic utilisation by region i of its own output is included in d_i—; we have, under the supply-demand equilibrium, the relationships:

$$\sum_{j=1}^{R} x_{ij} + x_i^X + d_i = x_i = \sum_{j=1}^{R} x_{ji} + x_i^I + q_i \qquad (i = 1,..., R) \qquad (1)$$

where R represents the number of regions in which the country is divided, and x_i the total demand of region i.

The commercial balance of the regions of a country could be, therefore, expressed through an input-output scheme (Leontief, 1936), where the intersectorial transaction matrix is replaced by the matrix of interregional trade, see Figure 1. Thus, if we define by **T** the R×R matrix of interregional transactions and transfers among regions —which (i,j)-component is x_{ij}—, we find R linear relationships for equation (1) can be written compactly as:

$$\mathbf{Ax} + \mathbf{y} = \mathbf{x}, \qquad (2)$$

where $\mathbf{A} = \mathbf{T}\hat{\mathbf{X}}^{-1}$ is the technical trade coefficient matrix, **x** is the R×1 vector of total output —where x_i is its *ith* component—, $\hat{\mathbf{X}}$ = diag(**x**) is the R×R diagonal matrix of regional total demand values, and **y** is the R×1 vector of foreign and domestic demand —with *ith* component: $y_i = x_i^X + d_i$.

Figure 1: Input-output table of interregional commercial balance.

	Region 1	...	Region j	...	Region R	Aggregated Regional Exports	Foreign Exports	Domestic Demand	**Total Demand**
Region 1	...	...	...	...	...				
...	...	...	...	...	...				
Region i	...	...	x_{ij}	...	...	$\sum_j x_{ij}$	x_i^X	d_i	x_i
...	...	...	...	...	...				
Region R	...	...	...		...				
Aggregated Regional Imports			$\sum_i x_{ij}$						
Foreign Imports			x_j^I						
Domestic Production			q_j						
Total Offer			x_j						

Source: Own elaboration.

The coefficients a_{ij} of matrix **A** show the marginal propensity of region j to import products from region i and capture, in some way, the extent of relationship between the economies of region j and i. This matrix permits to study the direct effects that the interregional trade flows have over the regions. While, the Leontief inverse matrix, $\mathbf{L} = (\mathbf{I} - \mathbf{A})^{-1}$, also permit to study the indirect effects of the phenomenon. This last matrix is obtained by solving the system of (2) for the vector of gross outputs **x** as function of **y**, that yields the relationship:

$$\mathbf{x} = (\mathbf{I} - \mathbf{A})^{-1}\,\mathbf{y} = \mathbf{L}\,\mathbf{y} \qquad (3)$$

A joint analysis of the regional economic flows can help us to capture the multiregional feature of the problem, to identify the strategic regions, and to classify the regions into offering regions and demanding regions. To do this we are going to use both the technical trade coefficient and the Leontief inverse matrix, **A** and **L**. Particularly, we recycle for the current problem the indicators proposed to analyse the relationship among economic sectors by Chenery and Watanabe (1958), Rasmussen (1963), and Streit (1969).

The rest of the paper is structured as follows. In Section 2, we adapt some indicators previously proposed in input-output literature to quantify the direct effects of regional trade. Section 3 extends: additional coefficients that also capture the indirect effects are defined. In section 4 an application of the methodology is carried out. Particularly, as a base to answer the previous questions to the Spanish case, we consider the Spanish interregional trade in goods matrix available in Oliver et al (2002), and we use the battery of coefficients defined in sections two and three to characterise and classify the Spanish regions. Finally, in section 5, we summarise and conclude the paper.

2.- The direct or first order interregional dependence.

In the input-output analysis it is usual to classify the effects of intersectorial flows in direct and indirect ones. Within the first group we can find the so-called direct backward linkages and direct forward linkages, that —applied to commercial flows among regions— help, respectively, to measure the distribution of imports according to its regional origin and the export distribution according to its regional destination. Chenery and Watanabe (1958) proposed two coefficients to quantify these effects. Particularly, they suggest achieving them using expressions (4) and (5).

$$\mu_j = \frac{\sum_{i=1}^{R} x_{ij}}{x_j} = \sum_{i=1}^{R} a_{ij} \ , \qquad (4)$$

$$\omega_i = \frac{\sum_{j=1}^{R} x_{ij}}{x_i} \ , \qquad (5)$$

The direct backward linkages are measured as the column sums of matrix **A** and reflect the direct dependence of a region j on imports from the rest of the regions. Thus, a region that has a relatively high value for μ_j shows a relatively higher dependence on imports from the rest of the country and, therefore, a higher need of exports from others regions to satisfy an increase in its domestic demand. We will identify as importing regions those regions that register a high value in this coefficient, while we will consider regions with a smaller potential as importers those regions that exhibit a relatively small value for μ_j.

The direct forward linkages, on other hand, are obtained as the row sums of matrix $\hat{\mathbf{X}}^{-1}\mathbf{T}$. That is, the coefficient ω_i measures the relative importance that the demand of the rest of the country has over the total demand of the region i and reflects the direct dependence that interregional trade has on region i. So, the higher the value of this coefficient in a region is, the higher the need that this region has of exporting to the other regions is. The regions that show a high value in ω_i will be catalogued as exporting regions, while the regions with a low figure in this coefficient will show a smaller capacity to export.

Both coefficients make possible to evaluate the relative importance of commercial flows in the economy of each region. The values of these indicators and their corresponding averages —$\overline{\mu}$ y $\overline{\omega}$— permit to establish a four-category regional classification, see Figure 2. In the first quadrant of Figure 2, they will be classified those regions mainly exporters. The second quadrant is for those regions that show a high degree of commercial opening since they import and export in a percentage above average. In the third quadrant, we will find the regions that show a relatively higher dependence on imports from the rest of the regions to satisfy its demand. And, the fourth quadrant is for those regional economies relatively isolated of its neighbouring regions.

Figure 2: Chenery-Watanabe regional classification of trade flows.

	$\omega_j > \overline{\omega}$	$\omega_j < \overline{\omega}$
$\mu_j < \overline{\mu}$	1 Exporting Region Non Importing Region	4 Non Exporting Region Non Importing Region
$\mu_j > \overline{\mu}$	2 Exporting and Importing Region	3 Non Exporting Region Importing Region

Source: Own elaboration.

These indicators and the classification derived from them provide a very valuable information. However, the Chenery-Watenabe coefficients show several important restrictions. Among others, we can underline the following ones. (i) They are unweighted indicators, so they do not take into account the relative potencial of each region to produce tensions on the interregional trade flows. (ii) These coefficients do not discriminate between commercial flows concentrated on a few regions and scattered commercial flows. (iii) They only measure direct effects of interregional trade and omit the indirect ones. And, (iv) they are very general indicators that do not consider in their construction the degree of economic integration among regions. In fact, the Chenery-Watanabe coefficients are more useful to indicate the general character of the dependence than to show the specific characteristics of the regions.

In order to surpass some of the limitations exposed above, Streit (1969) proposed the use of the coefficients ST_{ij} and ST_i —see equations (6) and (7). These indicators try to identify the order of dependence between two regions or a region and the rest of the regions, and permit to delimit groups of regions that display an intensive commercial traffic among them. In particular, the coefficient ST_{ij} measures the specific relations between the regions i and j as the average of the weight that exports and imports from and to the other regions have within their structure of interregional exchange.

$$ST_{ij} = \frac{1}{4}\left[\frac{x_{ij}}{\sum_{i=1}^{R} x_{ij}} + \frac{x_{ij}}{\sum_{j=1}^{R} x_{ij}} + \frac{x_{ji}}{\sum_{i=1}^{R} x_{ij}} + \frac{x_{ji}}{\sum_{j=1}^{R} x_{ij}}\right] \quad (6)$$

Besides, the coefficients ST_i, that are obtained as the sum of the specific relations of that region and the rest of the regions —see equation (7)—, inform about the global commercial dependence of each region and permit to stablish a regional ranking of commercial dynamism.

$$ST_i = \sum_{j \neq i}^{R} ST_{ij}\ , \quad (7)$$

3.- The indirect or second order interregional dependence. The strategic regions.

In the previous section, we have only taken into account direct commercial dependences among regions to construct the different coefficients. However, the commercial flows among regions can induce at the same time transactions in other regions. For example, if region j requires inputs from region i and for producing these inputs, region i in its turn requires inputs from region k; region j depends indirectly also on inputs from region k. So, to properly analyse commercial flows we should also take higher order effects into consideration. All direct and indirect effects are captured by the Leontief inverse matrix —$\mathbf{L} = \{l_{ij}\}$. Its typical element l_{ij} indicates the (aditional) amount of exports in region i that is required, directly and indirectly, for one (additional) unit of domestic or foreign demand in region j. From the elements of this matrix it is possible to build different indicators about the imported and exported capacity of a region including both direct and indirect effects. These coefficients will be used to determine the role played by each region on interregional trade traffic and to identify what the strategic regions are. Backward linkages and classical forward linkages are some of the simpler coefficients proposed in literature to solve that issue.

The backward linkages are obtained as the colum sums of the Leontief inverse —see equation (8)— and aim at measuring region j dependence on imports from others regions. The coefficient B_j calibrates, in some way, the intensity in which, by means of commercial flows, a change in domestic demand of region j is spread over the rest of the regions.

$$B_j = \sum_{i=1}^{R} l_{ij} \tag{8}$$

The classical forward linkages are obtained as the row sums of the Leontief inverse —see equation (9)— and represent the additional exports in region i as induced by one unit of additional domestic demand in all regions. F_i measures, in some way, the capacity that the region i has to respond, through commercial flows, to an increase in the domestic demand in each region.

$$F_i = \sum_{j=1}^{R} l_{ij} \,, \tag{9}$$

These indicators, however, have as a drawback the fact that they are unweight coefficients. The size of the regional economy significatively affects the magnitude they reach. To solve that, Rasmussen (1963) suggested constructing two new indicators, with a similar meaning to B and F coefficients but measured in relative terms. In particular, Rasmussen proposed using the following expressions:

$$C_i = \frac{\sum_{j=1}^{R} l_{ij}}{\frac{1}{R}\sum_{i=1}^{R}\sum_{j=1}^{R} l_{ij}} \,, \tag{10}$$

$$G_j = \frac{\sum_{i=1}^{R} l_{ij}}{\frac{1}{R}\sum_{j=1}^{R}\sum_{i=1}^{R} l_{ij}}, \qquad (11)$$

In this way, the condition $C_i > 1$ will be verified for those regions with a relative greater capacity to face, via exports, an increase in the domestic demand in all regions. We will consider that this kind of regions significantly drag forward interregional trade. On the other hand, the regions that verify $G_j > 1$ are regions that in order to cover an additional unit in its domestic demand produce tensions on interregional commercial flows above the average. This sort of regions will be considered as regions that drag backward interregional trade. Using these coefficients it is possible to constitute a new four-category regional classification, see Figure 3.

Figure 3: Rasmussen regional classification of trade flows.

	$G_i > 1$	$G_i < 1$
$C_i > 1$	Exporting and Importing Region Drag forward and backward	Exporting Region Drag forward
$C_i < 1$	Importing Region Drag backward	Non Exporting Region Non Importing Region No significant drag effects

Source: Own elaboration..

4.- An analysis of the Spanish interregional trade matrix.

The geo-political organisation of Spain divides the country into 17 regions (European NUTS II division), called Comunidades Autónomas —*equivalent* to the division of the USA into states and with an autonomy greater than that of the German länders. In this section we empirically illustrate the proposal offered in sections above. We analyse the Spanish interregional commercial flows in order to characterise commercial relationships among Spanish regions. The analysis is carried out by working on the 1995-1998 average Spanish interregional trade in goods matrix available in Oliver et al (2002). Obviously, trade in goods are not the only feasible interregional transactions and transfers. However, since there is not reliable trade services statistics at a regional level in Spain, we have considered trade in goods as a proper indicator of degree of relationship between regional economies. The input-output scheme, suggested in Figure 1, had been completed using regional statistics of foreign goods exports and imports and regional total demand figures derived from Llano (2001), Oliver et al (2002), and INE (2003).

Table 1: Some statistics of interregional trade in Spanish regions.

Region	Code	% regional exports [a]	% regional imports [b]	% regional trade [c]	Trade weight [d]	% GDP [e]
Andalusia	AN	52.50	70.78	63.73	57.05	13.41
Aragon	AR	67.13	70.34	68.66	166.92	3.26
Asturias	AS	76.91	71.30	74.34	80.92	2.39
Balearic Islands	BA	71.60	80.49	79.23	52.77	2.34
Basque Country, The	BC	52.37	57.78	54.88	97.01	6.31
Canary Islands	CA	67.13	55.57	58.44	39.87	3.87
Cantabria	CN	70.08	64.43	67.14	100.57	1.25
Castile and Leon	CL	73.72	72.81	73.27	86.89	5.98
Castile La Mancha	CM	79.54	78.53	78.96	82.05	3.54
Catalonia	CT	62.57	49.44	55.98	121.07	19.00
Estremadura	ES	82.68	88.32	85.13	53.12	1.72
Galicia	GA	64.11	49.68	57.59	75.08	5.75
Madrid	MA	57.45	36.34	43.83	61.51	16.99
Murcia	MU	66.44	72.97	69.61	103.43	2.32
Navarre	NA	58.33	63.80	60.75	154.80	1.72
Rioja, La	RL	76.47	80.30	78.19	125.57	0.76
Valencia Region	VR	60.70	62.97	61.68	105.84	9.56
Average		67.04	66.23	66.55	96.51	5.88

Source: Own elaboration from data of INE (2003) and Oliver et al (2002).
[a] Percentage of exports to others regions over the total exports of the region.
[b] Percentage of imports from the rest of regions over the total imports of the region.
[c] Percentage of trade with the rest of the country over total trade of the region.
[d] Percentage of total imports plus total exports on regional Gross Domestic Product (GDP).
[e] Economic importance of region. Percentage of GDP of the region over national GDP.

Table 1 gives some aggregated statistics about interregional commercial flows. As we can observe, more than two thrids of external trade in goods of Spanish regions is interregional trade. Madrid is the region whose economy devotes the greatest percentage of its exports and imports —almost a 57%— to exchange goods with other countries . However, regarding its value for trade weight, it presents one of the closest regional economies as its total (regional plus foreign) goods flows (import plus exports) only reach a mere 61% of its GDP[1]. In spite of that, Madrid is, behind Catalonia and with a similar level to Valencia Region, the region that registers the highest value in total trade in goods. Catalonia and Valencia Regions, on their hand, show an interest in Spanish markets slightly smaller than the majority of the regions, although both regions display a commercial opening superior than the average one. Table 1, moreover, reports some codes. To alleviate the presentation of results of the interregional trade in goods matrix analysis, each region has been assigned a code.

The calculation of the direct backward and direct forward linkages produces the regional clusters that appears in Figure 4. Balearic Islands is the only region identified as predominantly importing region, showing, therefore, a higher dependence on exports from the rest of the regions to satisfy its domestic demand. On other hand, Aragon, Castile La Mancha, Catalonia, Murcia, Navarre, and La Rioja are other regions that according Chenery-Watanabe classification can also drag other regional economies through imports.

Figure 4: Chenery-Watanabe trade in goods classification of Spanish regions.

	$\omega_j > \bar{\omega}$	$\omega_j < \bar{\omega}$
$\mu_j < \bar{\mu}$	AS, CN, GA, VR Exporting Regions Non Importing Regions	AN, CA, CL, ES, MA, BC Non Exporting Region Non Importing Region
$\mu_j > \bar{\mu}$	AR, CM, CT, MU, NA, RL Exporting and Importing Regions	BA Non Exporting Region Importing Region

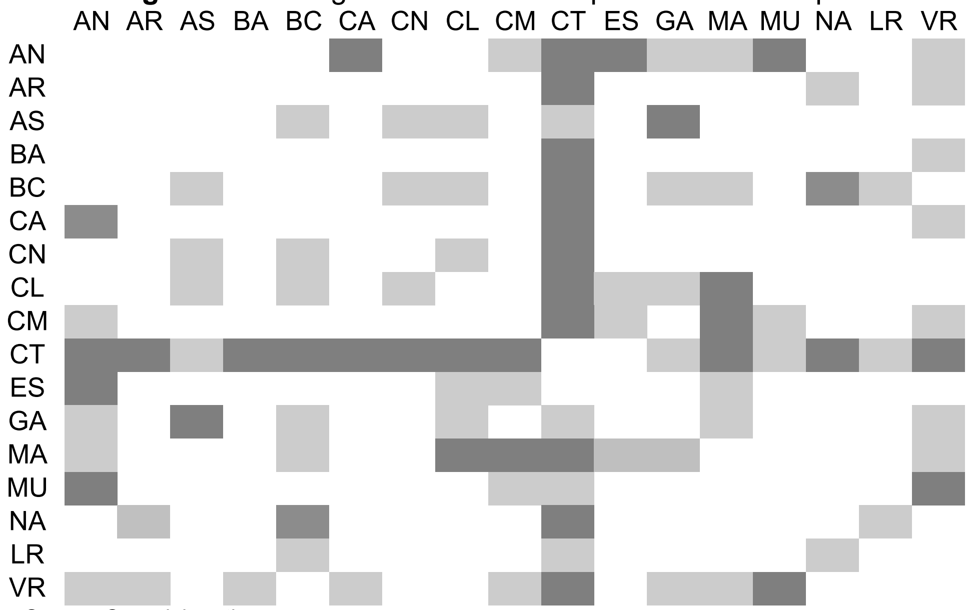
Source: Own elaboration.

The classification of Figure 4, nevertheless, also generates other remarkable facts. For example, in the division above, Andalusia, Madrid and The Basque Country are described as regions with a scarce interregional multiplier capacity and, however,

[1] This drawing for Madrid, however, is not entirely exact. A lot of national government services and company headquarters are located in Madrid, since the capital of Spain is in that region. So, on the one hand, the relative weight of services sector in this region is above average and, on the other hand, its interregional services imports and exports represent a percentage of its interregional total trade higher than the one of other regions. Therefore, its total percentage regional trade and total trade weight will be quite subestimated in comparision with other regions.

they have a great potential to create tensions in interregional commercial flows because of their economic size. This result, though, should not be a surprise since the region size weights inversely in the construction of the coefficients ω_j and μ_j. In any case, as a consequence of limitations of Chenery-Watanabe indicators pointed out in section 2, the conclusions above should be reviewed at the light of the rest of coefficients. The specific trade dependence between regions can be identified trough ST_{ij} indicators. In Figure 5 different degrees of commercial relationship between regions have been marked by three intensities of the same colour.

Figure 5: Interregional commercial specific relationship.



Source: Own elaboration.

From Figure 5, we can deduce that —except for Catalonia and to a lower extent for Valencia Region—the geographical proximity is, in general terms, the most relevant variable to determinate the commercial dependence. We can find groups of regions geographically close with a high degree of trade relationship, such as: Andalusia – Canary Islands – Estremadura – Murcia; The Basque Country – Navarre – La Rioja; Madrid – Castile Leon – Castila La Mancha – Estremadura; or, Galicia – Asturies – Castile Leon – Cantabria. Nevertheless, the region that maintains more trade interdependence with the rest of regions is Catalonia. In fact, almost all regions have a strong commercial relationship with Catalonia. Valencia Region also presents an important number of associated regions, but almost all its main commercial partners are its border regions —Catalonia, Murcia, Castile La Mancha, Aragon, and Balearic Islands.

Table 2: Streit interregional commercial degree relationship.

Region	ST_i	Region	ST_i	Region	ST_i
CT	3.062	GA	0.955	CN	0.622
VR	1.409	AR	0.863	LR	0.615
AN	1.395	CM	0.795	ES	0.605
MA	1.230	AS	0.746	CA	0.577
BC	1.147	NA	0.712	BA	0.544
CL	1.029	MU	0.693		

Source: Own elaboration.

The results for the Streit global commercial relationship coefficient are reported in Table 2. Catalonia is by far the region that reaches the largest value in this indicator as the left top panel in the table shows. In addition to Catalonia, Valencia Region, Andalusia, Madrid, The Basque Country, and Castile Leon are the regions that evince a greater commercial dynamism. In fact, this result is already implicit in Figure 5 since it is precisely in these regions where the number of significant Streit parcial coefficients is higher. So, the global magnitude of interregional trade lies in an important measure in these regions. They are precisely the biggest economic regions and they have, therefore, a higher theoretical capacity to create tensions on interregional commercial flows. This result is, nevertheless, quite logical. The Streit coeffcients have not into account the regional economic size and they depend on x_{ij} magnitude which tend to increase with the size of the region.

The previous analysis gives some interesting results, but they have been obtained only taken into account the direct effects of interregional trade. So, to provide more accurate conclussions, the indirect effects of regional commercial flows must be incorporated into the study. The four categories classification derived from backward and classical forward linkages is offered in Figure 6.

Figure 6: Rasmussen regional classification of trade flows.

	$G_i > 1$	$G_i < 1$
$C_i > 1$	CT Drag forward and backward	AN, BC, CL, MA, VR Drag forward
$C_i < 1$	AR, BA, CM, MU, NA, LR Drag backward	AS, CA, CN, ES, GA Non significant drag effects

Source: Own elaboration..

Figure 6 reveals that Catalonia is a key region for Spanish interregional trade. Both an alteration of its domestic demand and a change in the home demand of each regions will influence on its imports and exports. The economic circumstances of Catalonia will have a strong incidence on the rest of the Spain and, at the same time, the evolution of Spanish regions will decisively mark Catalonian growth. Asturias, Canary Islands, Cantabria, Estremadura and Galicia are on the opposite side. These regions manifest an elasticity below average to pull over exports from others regions with an increase of their domestic demands or to respond to a change in domestic demand of each region with a relatively important modification of their exports. The behavior of these regions is, therefore, more independent from the others regions and their economic events have a smaller incidence on interregional commercial flows. Aragon, Balearic Islands, Castile La Mancha, Murcia, Navarre, and La Rioja, on other hand, are regions that significantly drag backward interregional commercial flows to cover an additional unit in its home demand. It indicates that these regions have a larger dependence on external sources and, therefore, they spill over other regions an increase in their domestic demand. Andalusia, The Basque Country, Castile Leon, Madrid and Valencia Region are regions with a relative greater capacity to cover by exports an increase in the domestic demand in all regions. Aditionally, These regions and Catalonia are the largest ones. This implies that a small region depends much more on imports from the other regions than a large region does.

5.-Final remarks and conclusions.

The development of a national or regional economy depends on its own actions as well as on those of its trading partners. An expansion in private consumption or government spending in one region will cheer up that region's economy, but since many of the materials needed for that are probably produced outside its territory, the effects will also be spilt over into neighbouring regions or countries. The input-output table of a region can help us to know how an increase in its regional final demand will affect the level of aggregate regional GDP and how it will impact on each of its sectors. Moreover, the IO table can inform us about the proportion of spending that *escapes* from the region, although it cannot tell us how the non-domestic effects are distributed among its neighbouring territories. However, to properly evaluate national and regional economic policies, it is crucial to understand how changes in a regional economy hava an influence on the rest of the regional economies. It is essential to know the degree of interdependence among regions. So, since economic events are transmitted among economies through commercial flows, the analysis of the regional trade relationships is required.

In this paper, we put forward studying interregional commercial flows through an input-output scheme. In this way, we try to capture both the direct and indirect effects of interregional trade by multipliers, which translate the consequences of change in one variable upon others, taking into account sometimes complicated and roundabout linkages. Particularly, we take advantage of the existing literature to develop some coefficients that enable to identify the role that each region plays for regional growth and development, and to classify them.

An empirical application completes the paper. The average 1995-1998 Spanish interregional trade matrix is analysed and the Spanish *Comunidades Autónomas* are identified and classified according to it. The research shows Catalonia as a strategic region in Spanish economy. Almost all the regions maintain an intense trade relationship with it and its evolution has a strong incidence on Spanish growth. Additionally, the analysis reveals that Aragon, Balearic Islands, Castile La Mancha, Murcia, Navarre, and La Rioja are regions that have a larger dependence on imports from other regions, while regions like Canary Islands or Estremadura display a more independent progress. We also identify geographical proximity as a relevant variable for explaining commercial flows. Some different groups of regions, geographically close, with a high degree of trade relationship are found. Finally, we additionally emphasize that this kind of analysis also provides insights into structure and spatial linkages that cannot be revealed from the more usual regional data sources (such as sector employment data or regional account series).

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