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Abstract:

The purpose of this paper is to perform an exploratory investigation of the similarity between the economic structure of interregional trade and migration flows within Spain for the years 1998 and 1999. Both variables act upon regional economic growth, but their flows rely on different driving forces. We apply SONIS' ,1980, extreme tendency decomposition to the flow matrices. The results reveal that half of the most important trade and migration flows have the same origin and destination regions and take place mostly between neighbors. This may be due to increasing transportation and non-pecuniary costs with distance. The same conclusions hold for flow growth.

Keywords: Regions, Trade, Migration, Decomposition

JEL Classification: R12, R15, R23

1 Introduction

Since the mid-1980s in Spain, poor and high unemployment regions (like Andalucia and Extremadura) are no longer net outmigration regions while rich and low unemployment ones (like Madrid and Cataluña) are no longer net immigration regions. As noted by ANTOLIN and BOVER, 1997, high regional unemployment does not necessarily trigger migration to more prosperous regions within the country. The decline in the role of migration as a labor market clearing mechanism helps explain why regional disparities within Spain (at the NUTS 2 level[1]) have been growing over the last two decades (DALL'ERBA and HEWINGS, 2003; FAYOLLE and LECUYER, 2000). The region of Extremadura, for instance, is the poorest one and its per capita income has been less than 70% of the national average for more than fifteen years. In contrast, Rioja, Aragon, Madrid and Cataluña continue to enjoy incomes per capita above the national average, creating and sustaining a significant gap. Recent economic geography models of trade, like those developed by KRUGMAN, 1991, provide sources of explanation for these phenomena. He introduces imperfect competition as an explanation for agglomeration: because of increasing transaction costs with distance, firms concentrate in a region with a larger market and close to the supply of production factors and intermediate goods. Hence, concentrated firms benefit from greater pecuniary externalities, technological externalities and increasing returns than isolated firms.

The aim of this paper is to perform an exploratory investigation of the similarity between the economic structure of trade flows and migration flows between the Spanish autonomous communities (also called NUTS 2 regions) for the years 1998 and 1999. Both trade and migration are studied because they are important determinants of regional economic growth. However, their flows rely on different driving forces that are depicted in section 2. SONIS' ,1980, extreme tendency decomposition, that is used to uncover the structure of these flows, is described in section 3. In essence, this hierarchical decomposition orders interregional flows by extracting the most important ones first. In section 4 we apply the decomposition to each of the matrices of trade and migration flows for 1998 and 1999, whereas it is applied on the matrices of changes between these two years in section 5. The methodology enables exploration of the degree to which yearly changes may themselves be decomposed hierarchically. The last section provides some summary interpretation of the findings.

2 The Features of Interregional Trade and Migration

To understand regional trade specialization, appeal may be made tointernational trade theorems. According to traditional international trade theory, based on the Hecksher-Ohlin model, different factor endowments and regional specialization in the most abundant local factor in conjunction with free factor mobility within the studied countries build regional comparative advantages, which are at the origin of trade (HECKSHER-OHLIN model). However, this traditional theory is not sufficient to explain the concentration of activities or the increasing trade that is developing between the increasingly similar economies of the European Union members. As an alternative to traditional theory, MARSHALL, 1890, and PERROUX, 1950, introduced the logic of agglomeration. They consider that concentration of activity in one place increases the incentive for other firms to locate there, in large part to benefit from external economies (mainly technological externalities) of agglomeration.

More recently KRUGMAN, 1991, KRUGMAN and VENABLES, 1995 and VENABLES, 1996, introduced imperfect competition as an explanation to agglomeration: because of increasing transaction costs with distance, firms concentrate in a region with a larger market and close to supply of production factors and intermediary goods. Hence, concentrated firms benefit from greater pecuniary externalities, technological externalities and increasing returns than isolated firms. As soon as an agglomeration becomes important, centripetal forces are self-sustained above a certain threshold. According to this approach, increasing returns and decreasing transportation costs are the key elements at the origin of uneven spatial distribution of activity and development. They can explain how countries without any significant comparative advantage can develop very different production structures based on differences in market access due to varying transportation costs.

In the European case, greater integration has favored interregional dependence at the expense of intraregional dependence (for an example, see SONIS *et al.*, 1993). In addition, the structures of these economies are becoming similar which is reflected by a growing dominance of intraindustry trade (indicating diversification) as opposed to interindustry trade (specialization). Moreover, interregional trade is increasingly based on the distinction between horizontal differentiation (by variety) versus vertical differentiation (by quality) of products traded within the same industry. Since spatial barriers have fallen, product differentiation precludes price differentiation (IRMEN and THISSE, 1998). The EU countries differentiate by the variety and the quality of the intraindustry goods they trade.

Differences in goods' quality result from differences in factor composition. For instance, countries with a comparative advantage in technology will be net exporters of high quality products. However, these comparative advantages are not due to differences in factor endowments as suggested in the traditional theory, but to previous investments in human capital and R&D, to regional size and limited technological externalities over space. These comparative advantages are dynamic. The rich regions tend specialize in high quality goods, because their higher development and income allow them greater efforts in human capital, R&D and technological externalities, whereas peripheral and poor regions countries tend to specialize in lower quality goods. Comparative advantages tend to lower intraindustry trade based on horizontal differentiation, but increase intraindustry trade based on vertical differentiation (MAUREL *et al.*, 1999).

The Single Market has not led to a strong specialization of European economies, but rather to a possible specialization of regional economies within countries, depending on the geographic position of the region at the European scale, and their level of investment in technology and human capital. FATAS, 1997, demonstrates that specialization in technology and quality is more obvious between EU regions than between EU countries. In addition, it seems that agglomeration forces are limited to the country where they take place: lower transaction costs and higher factor mobility within countries than between countries (due to cultural, linguistic differences) can maintain regional dynamics in the form of increasing polarization/specialization.

As regions within a country become less similar over time, we may expect that region-specific fluctuations increase within countries, whereas the greater diversification of the national economies makes them less sensitive to specific shock. As a result, disparities increase within countries, but decrease between countries (MARTIN, 1999).

With regard to interregional migration flows, traditional theory predicts that it is the characteristics of the origin and destination region that are influencing migration. Labor is assumed to move to regions with higher real wages. However, there is evidence of a tendency towards wage equality across regions despite substantial regional differences in the excess supply of labor. To the extent that the necessary wage signals to migration fail to appear, it is regional differences in unemployment and job opportunities which become the main determinants of migration (ARMSTRONG and TAYLOR, 2000). Unemployment does not always increase out-migration. Manual workers are those with the highest unemployment rate, but they are part of a group of those less willing to migrate. In addition, increases in the unemployment rate at the national level tend to reduce mobility.

JACKMAN and SAVOURI, 1992, HUGHES and MCCORMICK, 1994, add other determinants to labor migration, like the institutional framework within which migration takes place and the personal and family characteristics of the migrants. The first one reflects the failure of labor and other markets to operate in a perfectly competitive manner. PARTRIDGE and RICKMAN (1997) recall the relationship between unemployment and wage comparing the Harris-Todaro model (positive relationship) to the Blanchflower-Oswald approach (negative relationship). Staffing and promotion policies of employers also affect the behavior of significant numbers of migrants (within-firm career moves depicted by SELL, 1990 and SALT, 1990), the housing market (local authorities and financial institutions), those operating on the labor market (recruitment agencies and job centers), the government itself through the taxation and unemployment benefit policies.

Migration is also influenced by personal characteristics like family ties, consideration of one's partner career and its own career, lifecycle effects such as retirement (MINCER, 1978; GREEN, 1997). There is also a difference between anticipatory moves, where no job offer has been received (speculative migrants) and job-in-hand move (contracted migrants). Younger and more highly educated people are more likely to leave their home region (ANTOLIN and BOVER, 1997). Being single and not head of household reduces significantly the probability of migration because family bonds are still strong in Spain (BOVER and VELILLA, 2001). The migrant stock plays also a determinant role because people tend to follow the footsteps of previous generations of migrants. The existence of a community of migrants reduces the migration costs, both pecuniary and non-pecuniary. The non-pecuniary benefits of a job such as climate and amenity considerations also have their importance (CUSHING, 1987).

BOVER and VELILLA, 2001 note that since the mid-80's, despite persistent unemployment differentials within Spain, poor and high unemployment regions (Andalucia and Extremadura) are not longer net outmigration regions while rich and low unemployment ones (like Madrid and Cataluña) are no longer net immigration regions. Registered unemployed (probably reflecting unemployed receiving benefits) living in regions with high unemployment rarely change regions. The reason comes from unemployment benefits since registration is a necessary condition for receiving benefits and the official register does not perform well as an employment agency. Only non-registered unemployed respond to their own unemployment.

Trade and migration patterns play a potentially important role in regional development and growth. Both do not conform to the simplistic assumptions of the classical model. Interregional trade and migration flows tend to depend on a wide range of determinants which are not necessarily similar for each of them. In order to explore for similarities or differences in the structure of interregional trade and migration flows, we will use the pull-push methodology described below.

3 Methodology description[1]

In order to get some insights into the structure of flows, we use the superposition flow decomposition method because it provides a way of decomposing a flow matrix into a hierarchically weighted sum of extreme tendencies by taking into account the degree of its importance (SONIS, 1980; JACKSON *et al.*, 1989). In addition, it is a useful tool to measure the

[1] This section draws on Sonis (1980).

degree of complexity of an economy, where the degree of complexity reflects the degree of sectoral intermediate production interactions in an economy. The larger the first weight, the less complex the economy; this might also be true up to a certain level, say the third level; a greater proportion of the total flows will be accounted for by the initial levels in a simple economy reflecting the fewer interactions among production sectors. In a very simple economy with few interactions, a small set of flows might well satisfy regional trade/migration flows. The number of levels in the hierarchy would be small and the value of the first tendency would be large. The more complex become the interregional relationships, the more the necessary degree of interaction and the corresponding number of levels in the hierarchy increase, while the value of the first tendency decreases (JACKSON *et al*., 1989).

Formally, a given flow matrix Y can be rewritten as a weighted sum of some extreme tendencies matrices: $Y = \sum_{i=1}^{k} p_i X_i$, in which $1 > p_1 \geq p_2 \geq \cdots \geq p_k > 0$ and $\sum_{i=1}^{k} p_i = 1$. In this fashion, the successively decreasing weights indicate the decreasing contribution of each additional set of flows in the hierarchy. Each value represents the *i*th decomposition and may be calculated using either rows (push) or columns (pull). For instance, the first weight of the pull (push) decomposition equals the smallest of the greatest tendencies by columns (rows).

Geometrically, the solution of a linear programming optimization problem takes into account only one vertex of the convex polyhedron of all admissible solutions. In reality, from the point of view of optimization, the representation of the actual state of a regional system requires the application of multi-objective programming. However, simultaneous optimization of two or more objective functions is difficult (BOLTIANSKY, 1973). Hence, as an alternative, it is assumed that each actual state of the linear system (for example, an actual flow system) is the superposition of a set of extreme states of the flow system, that are the optimal solutions of the sequence of optimization problems, presenting the simultaneous action of different extreme tendencies within the linear system. The weights of the extreme states define the measure of their realization in the actual state. Thus, in a very simple system, each region would sell its outputs to only one other region while making purchases from only one region. However, most input-output tables have much more sophisticated systems of intermediation with purchases and sales relationships involving multiple regions. The superposition principle attempts to separate out this complexity into a hierarchically ordered set of relations where, at each level, interactions are restricted to the simple set, i.e.

each region has interaction with only one other region (in either a backward or forward sense).

Let $\mathbf{Y}$ be an admissible solution of the system of linear constraints:

$$\begin{cases} \mathbf{AX} = \mathbf{b} \\ \mathbf{X} \geq 0 \end{cases}$$

and let $f_1(\mathbf{X}), f_2(\mathbf{X}), \cdots, f_s(\mathbf{X})$ be a ordered set of linear or concave objective functions. Then, $\mathbf{X}_1, \mathbf{X}_{2,} \cdots, \mathbf{X}_s$ are the optimal solutions to the optimization problem in the form of extreme tendencies:

$$\max f_i(\mathbf{X})$$

subject to constraints:

$$\begin{cases} \mathbf{AX} = \mathbf{b} \\ \mathbf{X} \geq 0 \end{cases}$$

but with additional constraints on coordinates of vector $\mathbf{X}$:

$$\mathbf{X}_{k_1} = \mathbf{X}_{k_2} = \cdots = \mathbf{X}_{k_{i-1}} = 0 .$$

The optimal solution of a linear flow system $\mathbf{Y}$ can be written as the weighted sum of $p_1\mathbf{X}_1 + p_2\mathbf{X}_2 + \cdots + p_k\mathbf{X}_k$, which is also the optimal solution of the same linear flow system according to the superposition principle. Note that $1 > p_1 \geq p_2 \geq \cdots \geq p_k > 0$ and $\sum_{i=1}^{k} p_k = 1$.

Figure 1 shows the possible changes in the values of the weights for one economy over time as this economy becomes more complicated, in the sense that the degree of intermediation increases.

<<Insert figure 1 here>>

Superposition decomposition is conducted by decomposing the flow systematically according to the importance of each decomposed extreme tendency. On the other hand, since the decomposition is based on hierarchical weighted extreme tendencies, with the weights representing the share of total flow, much attention can be paid to the more important decomposed flows. Furthermore, each decomposed extreme tendency shows the pattern of the flow represented by ones and zeros, as a way to explore the flows' interaction relationship.

4 Application to Interregional Trade and Migration Flows

We use the trade and migration matrices between the fifteen continental Spanish autonomous communities in 1998 and 1999. Data for other years do not exist. These regions are described in figure 2 below. The four matrices come from the National Statistical Office of Spain (INE). Four autonomous communities (Ceuta, Melilla, the Canaries, the Balearic Islands) are deleted from our sample because of the lack of data, possibly due to their remoteness.

<<Insert figure 2 here>>

The following tables will show the results of the methodology depicted in the previous section for the sum of the two most important tendencies. We have chosen to base our analysis on the sum of the first two tendencies instead of focusing on the first one only because they represent the structure of about 1/3 of total flows. Indeed, the first tendency represents at most 22% of total flows (for pull of migration in 1998)[2]. In this section, the terms "pull" and "push" will be used and must be understood as describing respectively imports and exports in the case of trade, in-migration and out-migration in the case of migration.

<<Insert table 1 and figure 3 here>>

Table 1 above shows the pattern of the pull analysis for trade and migration in 1998. The ones in dark cells represent trade, the ones in white cells represent migration, and the cells with thick borders indicate that the pattern is valid for both trade and migration. The sum of the two first tendencies represents 28.9% (15.8+13.1) of total trade flows whereas it represents 33.8% (22.0+11.8) of total migration flows. Since the sum is greater for migration, it means that the economic structure of in-migration is less complex than the one of imports. In other words, the degree of interregional interactions is smaller for in-migration than for imported goods.

If we now turn to a comparison of the patterns of trade and migration described in table 1, we note that 14 (out of 25 for trade, out of 28 for migration) common interactions take place between the same origin and destination regions. These interactions are in bold. They are also displayed in figure 3 where the thick arrow means that imports and in-migration have both the same origin and destination. The thin black arrows represent imports only and the grey arrows represent in-migration only. Looking at the results by column, the first column indicates that most of imported goods by Andalucia come from Madrid or Castilla-la-Mancha, whereas most in-migration going to Andalucia comes from Madrid or Cataluña. The economic structures of Andalucia and Madrid are very different because the first region is poor and specialized in agricultural goods whereas the second one is rich and specialized in services and technology goods. Concerning migration, the previous result confirms those of ANTOLIN and BOVER, 1997, i.e. regional unemployment differences do not act as a migration factor. Climate and better quality of life may also be the reasons for this pattern.

All the other interactions where trade and migration show the same origin and destination region have a common characteristics which relies on neighboring effects. For instance, the second column indicates that most of goods and migration in Aragon comes from its rich neighbor Cataluña. There is a neighboring effect both for trade and migration also for Asturias which imports and receives in-migration from Castilla y León, Cantabria from Pays Vasco, Castilla-la-Mancha from Madrid, Castilla y León from Madrid and Pays Vasco, Cataluña from Communidad Valenciana, Extremadura from Andalucia, Galicia from Castilla y León, Madrid from Castilla-la-Mancha, Murcia from Communidad Valenciana, Navarra from Pais Vasco, La Rioja from Pais Vasco. The reason for the existence of such neighboring effects may come from transportation costs that increase with distance. Neighboring regions tend also to be more similar in their economic structure. Therefore these results tend to indicate that trade is mostly taking place between similar economies. With regard to migration, there is a powerful tendency for migrants to move to the nearby regions rather than to non-contiguous regions for the various reasons depicted in section 2 (family ties, non-pecuniary costs). Finally, when looking at the results by rows, Castilla y Leon and Pays Vasco are the regions from which the other regions import most of their goods (4 patterns), while Madrid is the region from which most of interregional migration comes (8 patterns).

In the previous tables, the dark cells representing the sum of the two most important tendencies are one or two in number by column. When there are two dark cells, like in the case of Andalucia importing goods from both Castilla-La-Mancha and Madrid (table 1), it means that one of these two regions is the origin of most of its imports (first tendency), whereas the other one is the origin of its second most important flow (second tendency). On the opposite, when the column displays only one dark cell, like in the case of Extremadura importing mostly from Andalucia, it means that the import links are stronger than in the previous case because the two most important flows (two first tendencies) come from the same origin. This is valid in the push decomposition described below as well, where the results must be taken by row.

<<Insert table 2 and figure 4 here>>

If we now look at the push decomposition displayed in table 2, it appears that the sum of the two first tendencies represents 31.9% (17.7+14.2) of total trade flows whereas it represents 28.8% (16.7+12.1) of total migration flows. On the opposite of the previous case, it means that the economic structure of exports is less complex than the one of out-migration. In other words, the degree of interregional interactions is greater for out-migration than for exported goods.

When we compare the patterns of exports and out-migration, we note that 17 (out of 26 for trade, out of 27 for migration) common interactions take place between the same origin and destination regions. These interactions are in bold. We note that the ratio of common flows for both variables is greater than in the case of imports and in-migration. While looking at the results by rows, they indicate that Andalucia does not have most of its exports and out-migrants going to the same region. On the contrary, most of the exported goods and out-migration from Aragon go to its rich neighbors, Cataluña and Communidad Valenciana. Identically, exports and out-migration from Asturias mostly go to Castilla y León and Galicia, from Cantabria to Castilla y León and Pais Vasco, from Castilla-la-Mancha and Castilla y León to Madrid, from Cataluña to Communidad Valenciana and inversely, from Extremadura to Andalucia, from Madrid to Castilla-la-Mancha, from Murcia to Communidad Valenciana, from Navarra to Pais Vasco, from Pais Vasco to Castilla-y-Leon, from La Rioja to Pais Vasco and Navarra. As in the case of imports and in-migration, it appears that the existence of a neighboring effect is obvious for exports and out-migration. These relationships are represented in figure 4, where the nature of the arrows corresponds to the one of figure 3. When looking at the results by columns, they indicate that Castilla y Leon is the region to which most of regions export (5 patterns) , while Madrid and Andalucia are the favorite destination regions of migrants coming from other regions (5 patterns).

The results for the year 1999 are not displayed here because they are pretty similar to the ones of 1998[3]. However, the next section proposes to focus on the flows variations between both years in order to explore the degree to which structural changes may themselves be decomposed hierarchically.

5 Decomposition of Yearly Changes

Decomposing structural changes is a more difficult exercise than the previous one because absolute changes in migration or trade can be either positive or negative. Basically, there has been more migration and more trade in 1999 than in 1998, even if the structure of flows did not radically change, as we have seen in the previous section. In other words, absolute changes in flows are mostly positive. In this section, we will perform the pull-push decomposition on positive changes only and not consider the negative ones because the methodology we use has been developed to study the structure of flows, i.e. these last ones are assumed to be always positive[4] . Table 3 (resp. 4) below displays the patterns of the pull (resp. push) decomposition for positive trade and migration changes.

<<Insert tables 3 and 4 here>>

Looking at the pull patterns, the sum of the two first tendencies represents 41.2% (24.2+17.0) of total trade flow changes whereas it represents 32.6% (18.7+13.9) of total migration flow changes. Since the sum is greater for trade changes, it means that the economic structure of increases in imports is less complex than the one of increases in in-migration. This is valid for increases in export and in out-migration as well. Indeed, the push patterns show that the sum of the two first tendencies represents 38.9% (22.9+16.0) of export flows changes but represents only 33.2% (17.6+15.6) of total out-migration flows changes.

When we compare the patterns of flows changes, we note that 10 (out of 25 for trade, out of 27 for migration) common pull patterns take place between the same origin and destination region. The results for push are 12 common patterns (out of 23 for trade, out of 25 for migration). The results in tables 3 and 4 show the presence of a neighboring effect as well. The patterns representing the origin and destination regions are not radically different from the ones found in tables 1 and 2. It reflects some cumulative effect since the greater are the levels of trade and migration flows, the higher is their growth.

Finally, when looking at the results of table 3 by row, Castilla y Leon and Madrid are the regions from which the other regions have increased their imports the most (4 patterns), while Madrid is the region from which migration flows have grown the most (6 patterns). When looking at the results of table 4 by column, they indicate that Castilla y Leon and Madrid are the regions to which exports have increased the most (4 patterns), while Madrid and Communidad Valenciana are the destinations to which increases in migration flows have been the highest (6 patterns).

6 Conclusion

The aim of this paper is to perform an exploratory investigation of the similarity between the economic structure of trade flows and migration flows between the Spanish autonomous communities (also called NUTS 2 regions) for the years 1998 and 1999. Trade and migration are studied because they are important determinants of regional economic growth. We use SONIS',1980, extreme tendency decomposition to analyze the degree to which the structure of migration and trade flows might be decomposed into a set of subflows to reflect the structure of interactions between Spanish regions. In essence, this hierarchical decomposition orders interregional flows by extracting the most important ones first.

The results of the two most extreme tendencies indicate that about half of the most important flows of trade and migration have the same origin and destination regions. The decomposition results also reveal the presence of neighboring effects in interregional flows. This may be explained by increasing transportation costs of trade and non-pecuniary costs of migration (due to family ties) with distance. The results of the pull decomposition reveal that the economic structure of in-migration is less complex than the one of imports. Castilla y Leon and Pays Vasco are the regions from which the other regions import most of their goods, while Madrid is the region from which most migrants come. Inversely, the results of the push decomposition show that the economic structure of out-migration is less complex than the one of exports. Castilla y Leon is the region to which most of the regions export, while Madrid and Andalucia are the regions receiving most of the migrants.

These patterns do not change radically for the following year, but there is an obvious increase in the extent of interregional flows. Therefore we apply the decomposition to the increase in flows. A bit less than one half of the most important increases in trade and migration flows takes place between the same origin and destination regions. The results reveal also the presence of neighboring effects, and a lower complexity of the economic structure of increases in imports (resp. exports) than the one of increases in in-migration (resp. out-migration). Castilla y Leon and Madrid are the regions from (to) which the other regions have increased their imports (exports) most. Madrid is also the origin and destination region of the highest increases in migration flows. It should be noted however that these empirical findings might, in part, result from the particular nature of the model we use.

Endnotes:

1- NUTS: Nomenclature of Territorial Units for Statistics. The Commission uses as regional statistical concept the spatial classification established by Eurostat on the basis of national administrative units. Europe can therefore be shared either in 77 NUTS I level regions, or 211 NUTS II, 1031 NUTS III, and so on.

2- Complete results available from the authors upon request.

3- Complete results available from the authors upon request.

4- Another problem occurred while trying to decompose the absolute value of negative flows only: two regions display no negative change, i.e. the weight of the first and second tendencies would be zero.

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Figure 1- Extreme tendencies: temporal change expectations (Source: JACKSON *et al.*, 1989)

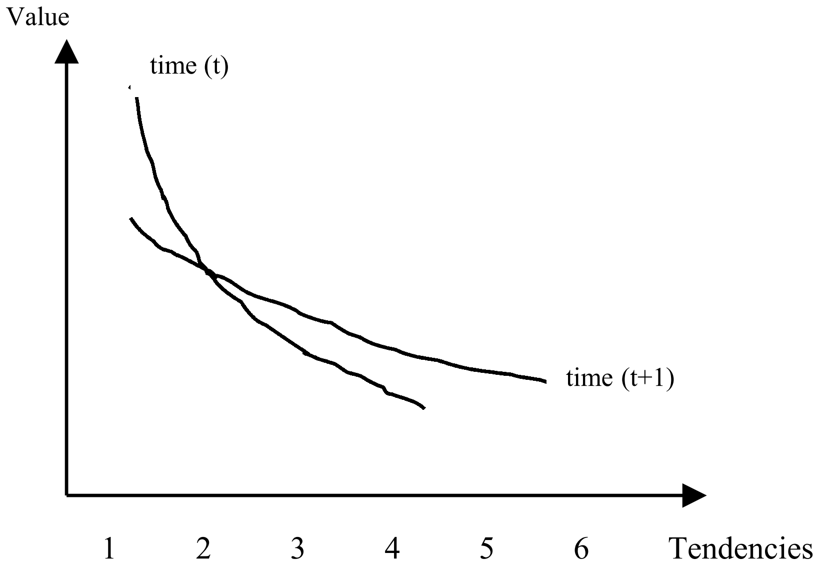
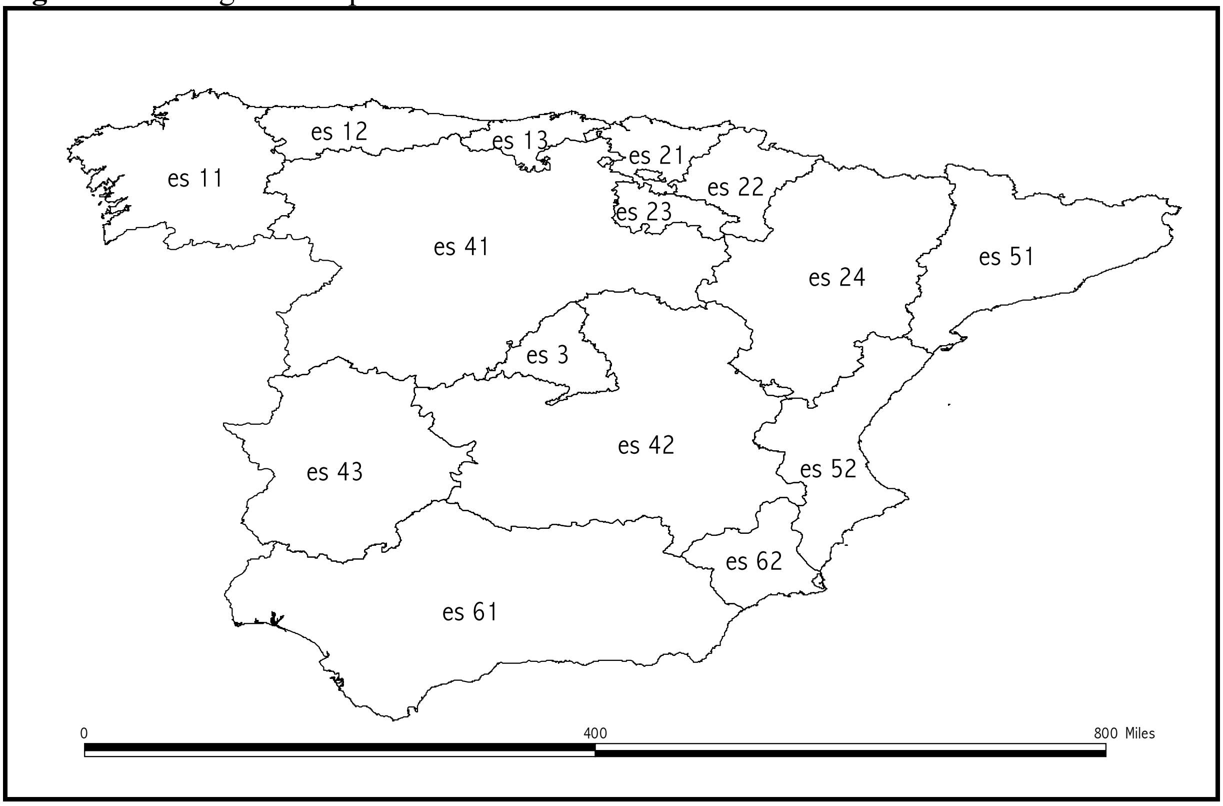


Figure 2- The regions of Spain



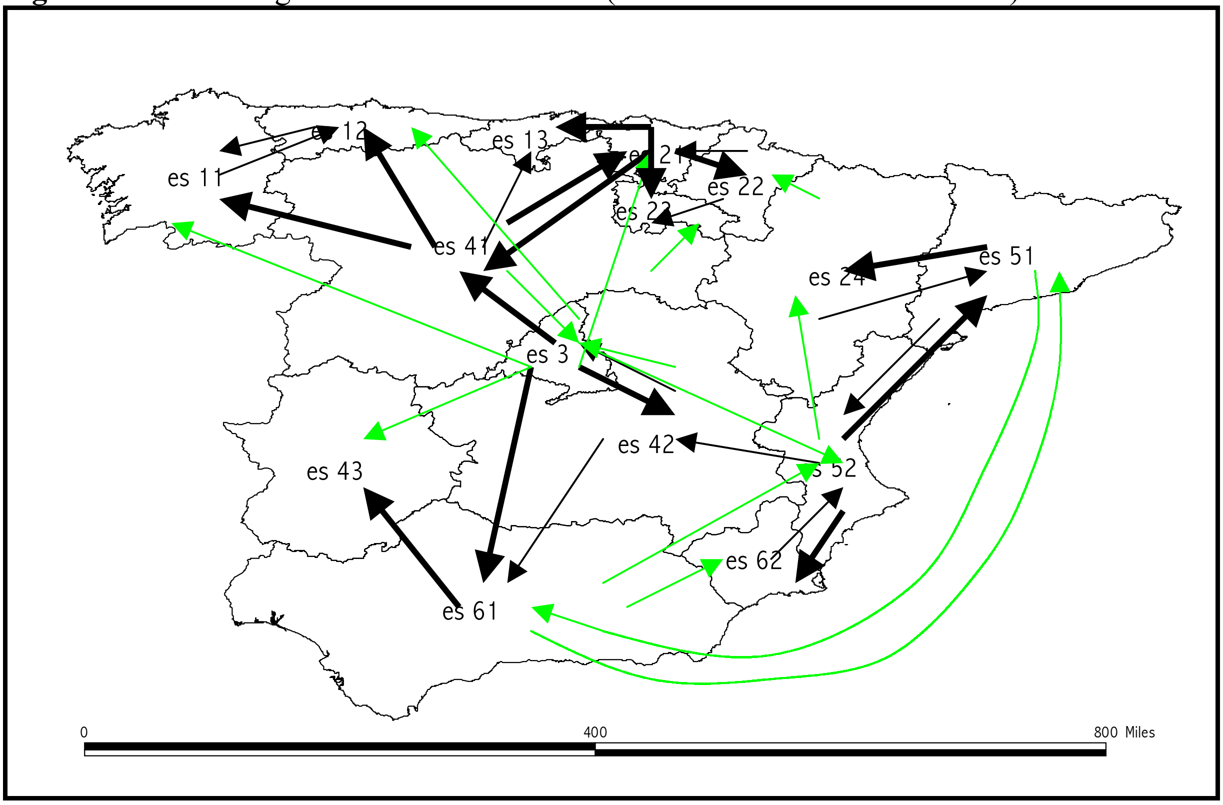
Note: ES 11 (Galicia), ES 12 (Asturias), ES 13 (Cantabria), ES 21 (Pais Vasco), ES 22 (Navarra), ES 23 (La Rioja), ES 24 (Aragón), Madrid: ES 3 (Madrid), ES 41 (Castilla y León), ES 42 (Castilla-la-Mancha), ES 43 (Extremadura), ES 51 (Cataluña), ES 52 (Communidad Valenciana), ES 61 (Andalucia), ES 62 (Murcia)

Table 1- Pull for trade (dark cell) and migration (white cell) in 1998 (sum of the two first tendencies)

	ES61	ES24	ES12	ES13	ES42	ES41	ES51	ES52	ES43	ES11	ES3	ES62	ES22	ES21	ES23
ES61							1	1	1			1			
ES24							1						1		
ES12										1					
ES13															
ES42	1										1				
ES41			1	1						1	1			1	1
ES51	1	1						1							
ES52		1			1		1					1			
ES43															
ES11			1												
ES3	1		1		1	1		1	1	1				1	
ES62								1							
ES22														1	1
ES21				1		1							1		1
ES23															

Note: See figure 2 for the regions' code and name.

Figure 3- Pull for migration and trade in 1998 (sum of the two first tendencies)



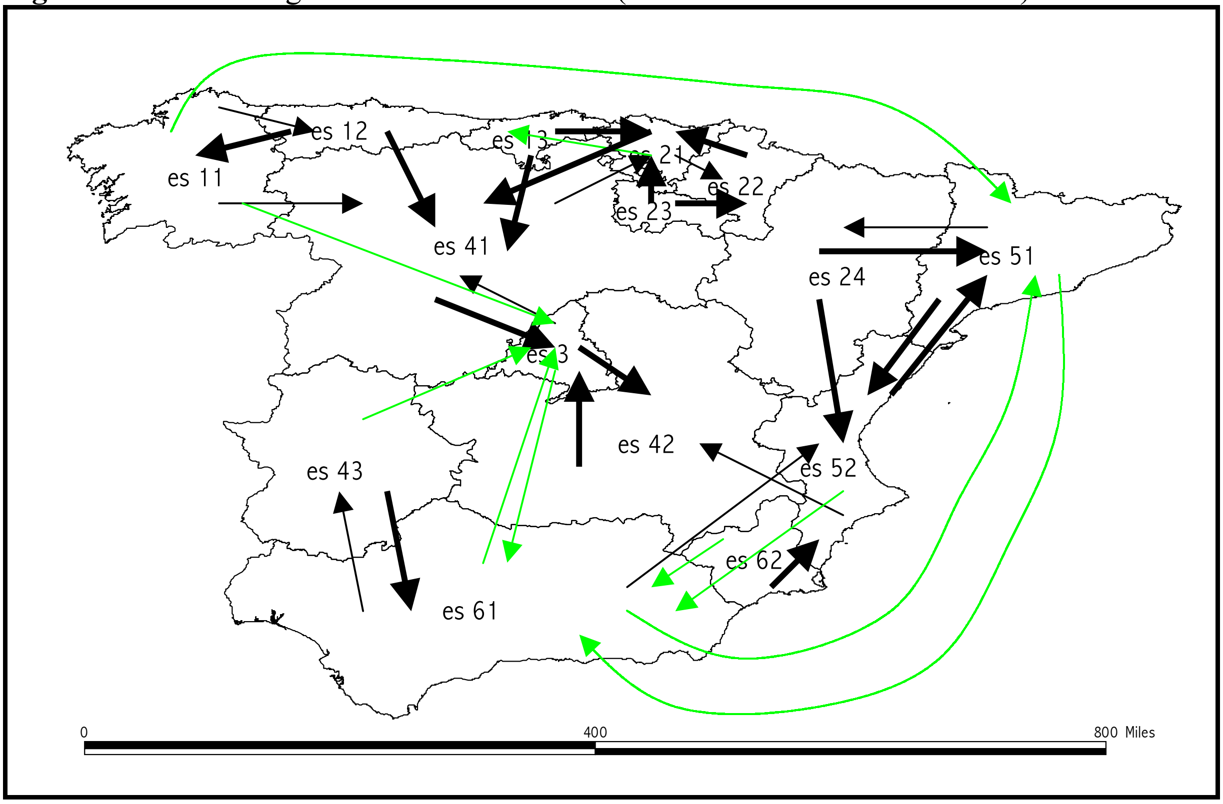
Note: ES 11 (Galicia), ES 12 (Asturias), ES 13 (Cantabria), ES 21 (Pais Vasco), ES 22 (Navarra), ES 23 (La Rioja), ES 24 (Aragón), Madrid: ES 3 (Madrid), ES 41 (Castilla y León), ES 42 (Castilla-la-Mancha), ES 43 (Extremadura), ES 51 (Cataluña), ES 52 (Communidad Valenciana), ES 61 (Andalucia), ES 62 (Murcia).

Table 2- Push for trade (dark cell) and migration (white cell) in 1998 (sum of the two first tendencies)

	ES61	ES24	ES12	ES13	ES42	ES41	ES51	ES52	ES43	ES11	ES3	ES62	ES22	ES21	ES23
ES61							1	1	1		1				
ES24							1	1							
ES12						1				1					
ES13						1								1	
ES42											1				
ES41											1			1	
ES51	1	1						1							
ES52	1				1		1								
ES43	1										1				
ES11			1			1	1				1				
ES3	1				1	1									
ES62	1							1							
ES22														1	
ES21				1		1							1		
ES23													1	1	

Note: See figure 2 for the regions' code and name.

Figure 4- Push for migration and trade in 1998 (sum of the two first tendencies)



Note: ES 11 (Galicia), ES 12 (Asturias), ES 13 (Cantabria), ES 21 (Pais Vasco), ES 22 (Navarra), ES 23 (La Rioja), ES 24 (Aragón), Madrid: ES 3 (Madrid), ES 41 (Castilla y León), ES 42 (Castilla-la-Mancha), ES 43 (Extremadura), ES 51 (Cataluña), ES 52 (Communidad Valenciana), ES 61 (Andalucia), ES 62 (Murcia)

Table 3- Pull for positive trade (dark cell) and migration (white cell) flow changes between 1998 and 1999 (sum of the two first tendencies)

	ES61	ES24	ES12	ES13	ES42	ES41	ES51	ES52	ES43	ES11	ES3	ES62	ES22	ES21	ES23
ES61							1	1	1			1	1		
ES24							1								1
ES12						1									
ES13														1	
ES42									1		1	1			1
ES41			1						1	1	1			1	1
ES51		1						1		1			1		
ES52	1						1			1		1			
ES43															
ES11			1												
ES3	1	1		1	1	1	1		1	1					
ES62								1							
ES22		1													
ES21				1		1									1
ES23													1		

Note: See figure 2 for the regions' code and name.

Table 4- Push for positive trade (dark cell) and migration (white cell) flow changes between 1998 and 1999 (sum of the two first tendencies)

	ES61	ES24	ES12	ES13	ES42	ES41	ES51	ES52	ES43	ES11	ES3	ES62	ES22	ES21	ES23
ES61							1	1				1			
ES24							1	1							
ES12						1		1			1				
ES13						1					1			1	
ES42											1				
ES41								1			1			1	
ES51								1			1				
ES52							1				1				
ES43	1										1				
ES11	1					1									
ES3	1				1										
ES62	1							1							
ES22		1												1	1
ES21	1			1		1									
ES23		1											1	1	

Note: See figure 2 for the regions' code and name.