

## EMPIRICAL ASSESSMENT OF REGIONAL AGGLOMERATION DYNAMICS

### Madrid's agglomeration dynamics at the industry-level

#### *Introduction*

This part of the essay uses the input-output tables (I-O tables, here after) produced by the Community of Madrid between 1999 and 2002 to further assess that regional economy. As discussed in chapter one, I-O tables are powerful instruments for economic analysis. Especially at the regional level and over limited time-line (as in this case, 3 years) we can consider I-O tables a reliable source of information that can be used with two different aims. First of all, it is possible to detect the existence of local productive specialisations. In this case, when a sector acts as a driver to the local economy, the other sectors (tradable or not) are somehow connected with it and participate to enhance local specialisation. Local employment is concentrated as well, even though the quantity of jobs in non-tradable sectors overcomes those in the “base-sector” (Alexanderson, 1947). Through the I-O tables one can move further the sectoral analysis of the economy and may start looking at integrated supply chains that support regional economy.

The second possibility offered to economic analysis by I-O tables is to assess the trajectories of the local economy in case of a specific change of the present local equilibrium due to an exogenous shock, an endogenous improvement, or a policy. Through the I-O tables it is possible to evaluate *ex ante* the impact of a specific policy to support one given sector, or assess the change of local output due to variations of factors productivity, or to variation or local demand.

This section will focus on the inter-sectoral linkages within the regional economy. It will discuss the possibility of detecting local industrial specialisation through the I-O matrix by taking into account the case of the Madrid metro-region. Broadly arguing empirical evidence demonstrates that regional economies may present either a given specialisation in a single supply-chain or hosting a diversified economy. Usually, small regions tend to be specialised in a single supply chain. Because of the relatively small dimension of their labour market, the local human capital as well as the investment must be concentrated in a single supply chain (or product) to generate an optimal level of positive externalities (Marshall, 1890). When this happens, i.e. when local resources are *specialised*, the small region can compete on the international market regardless of its dimension, as, for instance, in the case of Italian Marshallian industrial districts. It is worth noting that besides manufacturing, industrial districts are home to high qualified services that support firms' competitiveness. Such finding goes against the theories of the “traditional economic geography” underlying the biunivocal relation between dimension

and specialised services' location (i.e. hierarchical position of a region/community) (Christaller, 1933; Losch, 1944).

Larger regions may present a diversified economy, where thanks to the large labour supply of labour and the large investment capacity, the local economy can have multiple specialisations and export many different kinds of goods and services. The multiple-specialisations are supported by the so-called *urbanisation economies* (Jacobs, 1969) that are common and intense in large FURs (functional urban regions).<sup>90</sup>

### ***Measuring the productive specialisation of the Madrid FUR***

#### *Numerical solution for cluster analysis: the de-specialised Madrid FUR*

The department of statistics of the Community of Madrid produced a 61 branch I-O matrix in 2000 and 2002. A larger matrix is also available for 1999.<sup>91</sup> That's a considerable amount of data available at the regional level. Such data can be used to verify the productive specialisation of the metro-region by measuring the linkages among the different branches within the local economy. This will help us to verify the findings presented in chapter two about Madrid's clusters, i.e. that the metro-region does not present a strong specialisation in one single supply chains, yet seems to be home to a complex productive framework in which, besides a relevant economic growth, there is a transition from a traditional economy based on informality (families producing their own domestic services), to a market economy where low value added services are provided by immigrants (Mingione, 1999).

The regional economy is characterised by the presence of expanding knowledge intensive sectors and a large service sector dominated by domestic services and business services.<sup>92</sup> There is also a very large *wholesale and retail* "cluster" whose role is to connect the different sectors of local economy (through intermediate goods) as well as to satisfy the soaring demand of goods and services coming from citizens.

A cluster analysis of the Leontief inverse matrix (LIM, here after) for 2002 is the first numerical instrument implemented in this essay for detecting the existence of local clusters through the I-O tables. Cluster analysis is an exploratory data analysis tool which aims at sorting different objects into groups in a way that the degree of association between two objects is maximal if they belong to the same group and minimal otherwise. Given the above, cluster analysis can be used to discover structures in data without providing an explanation/interpretation. In other words, cluster analysis simply discovers structures in data without explaining why they exist.

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90 . For a definition of FUR (functional urban region) see pag. 32.

91 . Input-Output tables referring to the Community of Madrid are available on the site of the Instituto de Estadísticas de la Comunidad de Madrid ([http://www8.madrid.org/cerrar\\_apli/apli-iestadis-migrada.htm](http://www8.madrid.org/cerrar_apli/apli-iestadis-migrada.htm))

92 . It must be recalled that a large part of business services are cleaning services, see chapter two.

The general logic of the clustering algorithm implemented in this essay (*K-means*) is to verify whether there are detectable clusters in a given dataset. In this method of clustering the number of clusters is determined *ex ante* and the algorithm forms the clusters that are to be as distinct as possible. It should be mentioned that the best number of clusters  $k$  leading to the greatest separation (distance) is not known a priori and must be computed from the data. In other words, in this method it is important to set the hypothesis about clustering before starting the cluster analysis. The means on the different measures of distances for each cluster would represent a quantitative way of expressing these hypothesis or intuition. Computationally, this kind of cluster analysis is a sort of analysis of variance (ANOVA, here after) “in reverse”. The iteration will start with  $k$  random clusters, and then move objects between those clusters with the goal to: (i) minimize variability within clusters, and (ii) maximize variability between clusters. In other words, the similarity rules will apply maximally to the members of one cluster and minimally to members belonging to the rest of the clusters. This is analogous to “ANOVA in reverse” in the sense that the significance test in ANOVA evaluates the between-group variability against the within-group variability when computing the significance test for the hypothesis that the means in the groups are different from each other. In *k-means* clustering, iterations try to move objects (e.g., cases) in and out of groups (clusters) to get the most significant ANOVA results. Usually, as the result of a *k-means* clustering analysis, the analysis will focus on the means for each cluster on each dimension to assess how distinct the  $k$  clusters are. Ideally, the output will be very different means for most, if not all dimensions, used in the analysis. The magnitude of the  $F$  values from the analysis of variance performed on each dimension is another indication of how well the respective dimension discriminates between clusters.

As it is shown in the tables below, the local economy does not have any specific specialisation in a given sector (branch) that can be considered relevant vis-à-vis the others (a part of the branches that are part of the *wholesale and retail* sector). In the first step of the cluster analysis, three numerical clusters are taken into account. In the tables below (Table 25) one can see that there are stable centres of the cluster, and the ANOVA values are quite low, thus showing a homogenous productive framework with multiple specialisations.<sup>93</sup> This preliminary conclusion is coherent with our hypothesis that a large metropolitan region may present multiple specialisations thanks to a large labour market and a high investment capacity. Iterations are run at three different levels of aggregation.

In the first iteration three centres of the LIM are taken into account.

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93 . It is worth recalling that in this methodology the centres of the clusters are pre-determined by the software SPSS. This is the reason why the number of clusters has been changed in three different interetions. The aim was to force the sw to detect any significant centre for the given matrix

**Table 25 - Notes of the iterations**

<b>Output Created</b>		01-JUL-2007 13:56:31
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	<b>Cases Used</b>	Statistics are based on cases with no missing values for any clustering variable used.
<b>Syntax</b>	<p>QUICK CLUSTER  v2 v3 v4 v5 v6 v7 v8 v9 v10 v11 v12 v13 v14 v15 v16  v17 v18 v19 v20 v21 v22  v23 v24 v25 v26 v27 v28 v29 v30 v31 v32 v33 v34 v35  v36 v37 v38 v39 v40 v41  v42 v43 v44 v45 v46 v47 v48 v49 v50 v51 v52 v53 v54  v55 v56 v57 v58 v59 v60  v61 v62  /MISSING=LIST WISE  /CRITERIA= CLUSTER(3)  /METHOD=CLASSIFY  /PRINT ID(v1 ) INITIAL ANOVA CLUSTER DISTANT.</p>	
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	<b>Workspace Required</b>	7208 bytes

**Table 26 - Initial cluster membership**

<b>Case Number</b>	<b>Matriz de coeficientes técnicos.</b>	<b>Cluster</b>	<b>Distance</b>
1	1. Productos de la agricultura y ganadería	1	,000
2	2. Electricidad, gas, agua y combustibles	3	,634
3	3. Minerales no energéticos	2	,655
4	4. Productos de la metalurgia básica y fund	3	,602
5	5. Productos de forja y talleres	3	,651
6	6. Estructuras metálicas	3	,638
7	7. Maquinaria industrial	3	,590
8	8. Material eléctrico	3	,690
9	9. Material electrónico	3	,744
10	10. Máquinas oficina y precisión	2	,633

11	11. Vehículos y sus piezas	2	,000
12	12. Otro material de transporte	3	,631
13	13. Productos cárnicos	1	,522
14	14. Productos lácteos	3	,586
15	15. Otros productos alimenticios	3	,607
16	16. Bebidas y tabaco	3	,658
17	17. Productos textiles	3	,788
18	18. Productos de la confección	3	,604
19	19. Productos de cuero y calzado	3	,691
20	20. Papel y productos de papel	3	,654
21	21. Productos impresos	3	,610
22	22. Productos de la edición	3	,582
23	23. Productos farmacéuticos	3	,657
24	24. Otros productos químicos	3	,583
25	25. Productos de la química industrial	3	,000
26	26. Productos de la química básica	3	,393
27	27. Productos del viario	3	,639
28	28. Cemento y derivados	3	,610
29	29. Productos de otras industrias no metáli	3	,654
30	30. Madera, corcho y sus productos	2	,736
31	31. Productos de caucho y materias plástica	3	,628
32	32. Muebles	3	,587
33	33. Otras manufacturas	3	,599
34	34. Trabajos de construcción	2	,620
35	35. Servicios de comercio al por mayor e in	3	,563
36	36. Servicios de comercio de vehículos y co	3	,576
37	37. Servicios de comercio al por menor y re	3	,582
38	38. Servicios de hostelería	3	,582
39	39. Servicios de transporte terrestre	3	,538
40	40. Servicios de transporte no terrestre	3	,575
41	41. Servicios anexos al transporte	3	,581
42	42. Comunicaciones	3	,590
43	43. Servicios inmobiliarios y de alquiler	3	,601
44	44. Servicios de informática	3	,586
45	45. Servicios de asesoramiento	3	,573
46	46. Servicios técnico	3	,583
47	47. Servicios de publicidad	3	,572

48	48. Otros servicios profesionales	3	,576
49	50.1. Servicios de educación de mercado	3	,578
50	50.2. Servicios de educación de no mercado	3	,585
51	51.1. Servicios sanitarios de mercado	3	,585
52	51.2. Servicios sanitarios de no mercado	3	,584
53	52.1. Servicios recreativos de mercado	3	,604
54	52.2. Servicios recreativos de no mercado	3	,585
55	53. Servicios personales	3	,585
56	54. Servicios de intermediación financiera	3	,567
57	55. Servicios de seguros y planes de pensio	3	,570
58	56. Servicios de saneamiento público	3	,592
59	57. Servicios de asociaciones	3	,585
60	58. Servicio doméstico	3	,585
61	59. Servicios de administración pública	3	,585

**Table 27 - Final Cluster Centres**

	Cluster		
	1	2	3
<b>01. Agricultura y ganadería</b>	,0165	,0070	,0078
<b>02. Energía y minería</b>	,0009	,0013	,0058
<b>03. Metálicas básicas</b>	,0000	,0224	,0119
<b>04. Estructuras metálicas</b>	,0000	,0848	,0046
<b>05. Forja y talleres</b>	,0000	,0113	,0110
<b>06. Artículos metálicos</b>	,0000	,0245	,0108
<b>07. Maquinaria industrial</b>	,0001	,0130	,0108
<b>08. Material eléctrico</b>	,0000	,0153	,0118
<b>09. Material electrónico</b>	,0002	,0168	,0116
<b>10. Máquinas oficina y precisión</b>	,0003	,0534	,0075
<b>11. Vehículos y sus piezas</b>	,0000	,1314	,0024
<b>12. Otro material de transporte</b>	,0000	,0360	,0086
<b>13. Industrias cárnicas</b>	,3165	,0006	,0027
<b>14. Industrias lácteas</b>	,1516	,0007	,0076
<b>15. Otras alimenticias</b>	,1454	,0009	,0084
<b>16. Bebidas y tabaco</b>	,0021	,0000	,0106
<b>17. Industria textil</b>	,0000	,0054	,0123
<b>18. Confección</b>	,0075	,0003	,0130

<b>19. Cuero y calzado</b>	,0085	,0001	,0132
<b>20. Industria del papel</b>	,0006	,0036	,0123
<b>21. Imprentas</b>	,0001	,0030	,0116
<b>22. Edición</b>	,0000	,0003	,0121
<b>23. Productos farmacéuticos</b>	,0015	,0062	,0125
<b>24. Otra química final</b>	,0001	,0002	,0138
<b>25. Química industrial</b>	,0002	,0010	,0139
<b>26. Química de base</b>	,0001	,0012	,0139
<b>27. Vidrio</b>	,0000	,0033	,0113
<b>28. Cemento y derivados</b>	,0000	,0038	,0122
<b>29. Otras industrias no metálica</b>	,0000	,0117	,0111
<b>30. Madera</b>	,0000	,0875	,0057
<b>31. Caucho y plástico</b>	,0000	,0057	,0113
<b>32. Industria del mueble</b>	,0000	,0548	,0074
<b>33. Otras manufacturas</b>	,0000	,0135	,0131
<b>34. Construcción</b>	,0002	,0262	,0086
<b>35. Comercio mayorista</b>	,0019	,0091	,0080
<b>36. Comercio vehículos y combust</b>	,0000	,0432	,0062
<b>37. Otro comercio menor y repara</b>	,0033	,0034	,0049
<b>38. Hostelería</b>	,0445	,0022	,0091
<b>39. Transporte terrestre</b>	,0001	,0058	,0129
<b>40. Transporte no terrestre</b>	,0000	,0000	,0125
<b>41. Servicios anexos al trans por</b>	,0000	,0048	,0045
<b>42. Comunicaciones</b>	,0002	,0068	,0094
<b>43. Inmobiliarias y alquileres</b>	,0000	,0362	,0040
<b>44. Actividades informáticas</b>	,0000	,0324	,0079
<b>45. Asesoramiento</b>	,0000	,0059	,0092
<b>46. Servicios tecnico</b>	,0008	,0135	,0111
<b>47. Publicidad</b>	,0014	,0010	,0126
<b>48. Otros servicios profesionale</b>	,0003	,0058	,0081
<b>50.1. Educación de mercado</b>	,0058	,0088	,0078
<b>50.2. Educación de no mercado</b>	,0003	,0016	,0022
<b>51.1. Sanidad de mercado</b>	,0062	,0150	,0078
<b>51.2. Sanidad de no mercado</b>	,0013	,0124	,0054
<b>52.1. Servicios recreativos de m</b>	,0087	,0016	,0106
<b>52.2. Servicios recreativos de n</b>	,0005	,0125	,0064
<b>53. Servicios personales</b>	,0114	,0153	,0073

54. Intermediación financiera	,0000	,0050	,0043
55. Seguros y planes de pensión	,0000	,0022	,0064
56. Servicios de saneamiento	,0000	,0088	,0077
57. Actividades asociativas	,0008	,0051	,0072
58. Servicio doméstico	,0000	,0000	,0000
59. Administraciones públicas	,0013	,0042	,0040

Table 28 - Distances between Final Cluster Centres

Cluster	1	2	3
1		,439	,379
2	,439		,202
3	,379	,202	

Table 29 - ANOVA

	Cluster		Error		F	Sig.
	Mean Square	df	Mean Square	df		
01. Agricultura y ganadería	,000	2	,001	58	,110	,896
02. Energía y minería	,000	2	,001	58	,114	,893
03. Metálicas básicas	,000	2	,001	58	,383	,683
04. Estructuras metálicas	,015	2	,001	58	14,667	,000
05. Forja y talleres	,000	2	,002	58	,072	,930
06. Artículos metálicos	,001	2	,001	58	,509	,604
07. Maquinaria industrial	,000	2	,001	58	,146	,865
08. Material eléctrico	,000	2	,002	58	,085	,919
09. Material electrónico	,000	2	,003	58	,070	,933
10. Máquinas oficina y precisión	,005	2	,001	58	4,291	,018
11. Vehículos y sus piezas	,038	2	,004	58	9,586	,000
12. Otro material de transporte	,002	2	,002	58	1,159	,321
13. Industrias cárnicas	,095	2	,001	58	95,095	,000
14. Industrias lácteas	,020	2	,001	58	19,497	,000
15. Otras alimenticias	,018	2	,001	58	20,562	,000
16. Bebidas y tabaco	,000	2	,002	58	,185	,831
17. Industria textil	,000	2	,003	58	,080	,923
18. Confección	,000	2	,002	58	,172	,843
19. Cuero y calzado	,000	2	,003	58	,149	,862



20. Industria del papel	,000	2	,002	58	,144	,866
21. Imprentas	,000	2	,001	58	,337	,715
22. Edición	,000	2	,001	58	,323	,725
23. Productos farmacéuticos	,000	2	,002	58	,116	,890
24. Otra química final	,001	2	,001	58	,409	,666
25. Química industrial	,001	2	,002	58	,215	,807
26. Química de base	,001	2	,003	58	,178	,837
27. Vidrio	,000	2	,002	58	,163	,850
28. Cemento y derivados	,000	2	,002	58	,188	,829
29. Otras industrias no metálica	,000	2	,001	58	,109	,897
30. Madera	,015	2	,003	58	5,768	,005
31. Caucho y plástico	,000	2	,002	58	,091	,914
32. Industria del mueble	,005	2	,001	58	8,152	,001
33. Otras manufacturas	,000	2	,001	58	,171	,844
34. Construcción	,001	2	,001	58	1,570	,217
35. Comercio mayorista	,000	2	,000	58	,212	,810
36. Comercio vehículos y combust	,003	2	,001	58	4,884	,011
37. Otro comercio menor y repara	,000	2	,000	58	,048	,953
38. Hostelería	,001	2	,000	58	4,233	,019
39. Transporte terrestre	,000	2	,001	58	,399	,673
40. Transporte no terrestre	,000	2	,001	58	,382	,684
41. Servicios anexos al transpor	,000	2	,000	58	,154	,857
42. Comunicaciones	,000	2	,001	58	,158	,854
43. Inmobiliarias y alquileres	,002	2	,000	58	7,648	,001
44. Actividades informáticas	,001	2	,001	58	2,138	,127
45. Asesoramiento	,000	2	,000	58	,211	,810
46. Servicios técnicos	,000	2	,000	58	,254	,776
47. Publicidad	,000	2	,001	58	,337	,715
48. Otros servicios profesionale	,000	2	,000	58	,355	,703
50.1. Educación de mercado	,000	2	,000	58	,043	,958
50.2. Educación de no mercado	,000	2	,000	58	,129	,879
51.1. Sanidad de mercado	,000	2	,001	58	,187	,830
51.2. Sanidad de no mercado	,000	2	,000	58	,682	,510
52.1. Servicios recreativos de m	,000	2	,001	58	,314	,732
52.2. Servicios recreativos de n	,000	2	,000	58	1,059	,353
53. Servicios personales	,000	2	,000	58	,470	,627
54. Intermediación financiera	,000	2	,000	58	,203	,817

<b>55. Seguros y planes de pensione</b>	,000	2	,000	58	,345	,710
<b>56. Servicios de saneamiento</b>	,000	2	,000	58	,184	,832
<b>57. Actividades asociativas</b>	,000	2	,000	58	,184	,833
<b>58. Servicio doméstico</b>	,000	2	,000	58	.	.
<b>59. Administraciones públicas</b>	,000	2	,000	58	,179	,837

Note: The F tests should be used only for descriptive purposes because the clusters have been chosen to maximize the differences among cases in different clusters. The observed significance levels are not corrected for this and thus cannot be interpreted as tests of the hypothesis that the cluster means are equal.

**Table 30 - Number of Cases in each Cluster**

<b>Cluster</b>	<b>1</b>	2,000
	<b>2</b>	5,000
	<b>3</b>	54,000
<b>Valid</b>		61,000
<b>Missing</b>		,000

In the second iteration the number of centres is eight.

**Table 31 - Notes of the iteration**

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<b>Missing Value Handling</b>	<b>Definition of Missing</b>	User-defined missing values are treated as missing.
	<b>Cases Used</b>	Statistics are based on cases with no missing values for any clustering variable used.
<b>Syntax</b>	QUICK CLUSTER v2 v3 v4 v5 v6 v7 v8 v9 v10 v11 v12 v13 v14 v15 v16 v17 v18 v19 v20 v21 v22 v23 v24 v25 v26 v27 v28 v29 v30 v31 v32 v33 v34 v35 v36 v37 v38 v39 v40 v41 v42 v43 v44 v45 v46 v47 v48 v49 v50 v51 v52 v53 v54 v55 v56 v57 v58 v59 v60 v61 v62 /MISSING=LISTWISE /CRITERIA= CLUSTER(8) MXITER(10) CONVERGE(0) /METHOD=KMEANS(NOUPDATE) /PRINT ID(v1 ) INITIAL ANOVA CLUSTER DISTAN.	

Resources	Elapsed Time	0:00:00,05
	Workspace Required	18808 bytes

Table 32 – Initial Cluster Centres

	Cluster							
	1	2	3	4	5	6	7	8
01. Agricultura y ganadería	,0328	,0249	,0021	,0003	,0007	,0001	,0001	,0001
02. Energía y minería	,0016	,0045	,0007	,0022	,0035	,0016	,0001	,0007
03. Metálicas básicas	,0000	,0285	,0339	,0001	,0049	,0006	,0000	,0024
04. Estructuras metálicas	,0000	,0010	,0012	,0000	,0007	,0234	,0002	,0112
05. Forja y talleres	,0000	,0943	,0027	,0000	,0043	,0014	,0001	,0594
06. Artículos metálicos	,0000	,0085	,0033	,0001	,0094	,0005	,0029	,0290
07. Maquinaria industrial	,0002	,0010	,0022	,0000	,0037	,0038	,0457	,1695
08. Material eléctrico	,0000	,0005	,0011	,0000	,0041	,0226	,0026	,3346
09. Material electrónico	,0002	,0002	,0009	,0000	,0044	,0003	,4062	,0141
10. Máquinas oficina y precisión	,0002	,0022	,0015	,0000	,0009	,0012	,1073	,0129
11. Vehículos y sus piezas	,0000	,0003	,0250	,0002	,0005	,5597	,0004	,0018
12. Otro material de transporte	,0000	,0018	,0003	,0000	,0003	,0277	,0003	,0005
13. Industrias cárnicas	,4840	,0114	,0001	,0002	,0025	,0001	,0001	,0001
14. Industrias lácteas	,3017	,0218	,0034	,0000	,0246	,0000	,0000	,0000
15. Otras alimenticias	,2758	,1123	,0038	,0000	,0186	,0000	,0000	,0001
16. Bebidas y tabaco	,0040	,0011	,0001	,0000	,0039	,0000	,0000	,0000
17. Industria textil	,0000	,0019	,0005	,4208	,0114	,0000	,0001	,0001
18. Confección	,0149	,0012	,0000	,3298	,0040	,0000	,0000	,0001
19. Cuero y calzado	,0169	,0001	,0003	,0274	,0045	,0000	,0001	,0000
20. Industria del papel	,0012	,0599	,0080	,0002	,3369	,0000	,0002	,0001
21. Imprentas	,0001	,1381	,0032	,0004	,1540	,0006	,0011	,0006
22. Edición	,0001	,0507	,0004	,0000	,2733	,0000	,0001	,0007
23. Productos farmacéuticos	,0029	,0444	,0001	,0001	,0087	,0000	,0000	,0005
24. Otra química final	,0002	,1311	,0006	,0024	,0441	,0000	,0001	,0000
25. Química industrial	,0003	,3605	,0045	,0052	,0097	,0001	,0002	,0020
26. Química de base	,0003	,3254	,0042	,0007	,0005	,0011	,0010	,0005
27. Vidrio	,0000	,0026	,0140	,0006	,0132	,0017	,0001	,0002
28. Cemento y derivados	,0000	,0049	,0011	,0000	,0048	,0000	,0000	,0009
29. Otras industrias no metálica	,0000	,0293	,0356	,0000	,0050	,0000	,0000	,0001

<b>30. Madera</b>	,0000	,0059	,4251	,0000	,0012	,0016	,0004	,0002
<b>31. Caucho y plástico</b>	,0001	,0350	,0029	,0014	,0100	,0111	,0085	,0007
<b>32. Industria del mueble</b>	,0000	,0044	,1782	,0018	,0071	,0020	,0442	,0147
<b>33. Otras manufacturas</b>	,0001	,0040	,0139	,0056	,0872	,0000	,0552	,0143
<b>34. Construcción</b>	,0003	,0012	,0020	,0000	,0002	,0092	,0065	,0417
<b>35. Comercio mayorista</b>	,0028	,0044	,0010	,0004	,0028	,0191	,0052	,0048
<b>36. Comercio vehículos y combust</b>	,0000	,0002	,0001	,0000	,0001	,1852	,0001	,0043
<b>37. Otro comercio menor y repara</b>	,0029	,0002	,0001	,0001	,0002	,0012	,0016	,0005
<b>38. Hostelería</b>	,0436	,0056	,0034	,0039	,0012	,0000	,0009	,0008
<b>39. Transporte terrestre</b>	,0001	,0018	,0005	,0001	,0009	,0184	,0013	,0033
<b>40. Transporte no terrestre</b>	,0000	,1880	,0000	,0000	,0000	,0000	,0000	,0002
<b>41. Servicios anexos al transpor</b>	,0000	,0006	,0097	,0000	,0014	,0001	,0001	,0002
<b>42. Comunicaciones</b>	,0003	,0004	,0002	,0004	,0077	,0001	,0274	,0204
<b>43. Inmobiliarias y alquileres</b>	,0000	,0029	,0021	,0001	,0153	,0155	,0098	,0027
<b>44. Actividades informáticas</b>	,0000	,0002	,0004	,0000	,0006	,0002	,1292	,0037
<b>45. Asesoramiento</b>	,0000	,0011	,0000	,0000	,0069	,0022	,0007	,0000
<b>46. Servicios técnicos</b>	,0013	,0091	,0014	,0020	,0175	,0111	,1211	,0313
<b>47. Publicidad</b>	,0000	,0091	,0048	,0000	,0056	,0000	,0001	,0000
<b>48. Otros servicios profesionale</b>	,0004	,0038	,0011	,0007	,0158	,0018	,0011	,0036
<b>50.1. Educación de mercado</b>	,0044	,0018	,0005	,0008	,0068	,0011	,0209	,0008
<b>50.2. Educación de no mercado</b>	,0002	,0000	,0000	,0002	,0013	,0000	,0008	,0003
<b>51.1. Sanidad de mercado</b>	,0002	,0095	,0002	,0012	,0012	,0001	,0039	,0008
<b>51.2. Sanidad de no mercado</b>	,0004	,0175	,0000	,0006	,0003	,0000	,0000	,0000
<b>52.1. Servicios recreativos de m</b>	,0076	,0009	,0001	,0000	,0030	,0000	,0107	,0000
<b>52.2. Servicios recreativos de n</b>	,0007	,0008	,0014	,0029	,0074	,0000	,0017	,0047
<b>53. Servicios personales</b>	,0227	,0010	,0735	,0013	,0000	,0010	,0001	,0000
<b>54. Intermediación financiera</b>	,0000	,0000	,0000	,0000	,0085	,0002	,0007	,0034
<b>55. Seguros y planes de pensione</b>	,0000	,0001	,0001	,0000	,0021	,0006	,0130	,0006
<b>56. Servicios de saneamiento</b>	,0000	,0176	,0001	,0004	,0006	,0206	,0000	,0001
<b>57. Actividades asociativas</b>	,0011	,0011	,0001	,0003	,0046	,0000	,0002	,0004
<b>58. Servicio doméstico</b>	,0000	,0000	,0000	,0000	,0000	,0000	,0000	,0000
<b>59. Administraciones públicas</b>	,0018	,0001	,0001	,0016	,0051	,0028	,0006	,0004

**Table 33 - Iteration History(a)**

Iteration	Change in Cluster Centres							
	1	2	3	4	5	6	7	8
1	,000	,196	,196	,000	,000	,000	,220	,368
2	,000	,000	,196	,000	,000	,000	,000	,003
3	,000	,000	,000	,000	,000	,000	,000	,000

a Convergence achieved due to no or small change in cluster centres. The maximum absolute coordinate change for any center is ,000. The current iteration is 3. The minimum distance between initial centres is ,567.

**Table 34 - Cluster Membership**

Case Number	Matriz de coeficientes técnicos.	Cluster	Distance
1	1. Productos de la agricultura y ganadería	1	,000
2	2. Electricidad, gas, agua y combustibles	8	,317
3	3. Minerales no energéticos	8	,331
4	4. Productos de la metalurgia básica y fund	8	,153
5	5. Productos de forja y talleres	8	,361
6	6. Estructuras metálicas	8	,269
7	7. Maquinaria industrial	8	,137
8	8. Material eléctrico	8	,368
9	9. Material electrónico	7	,220
10	10. Máquinas oficina y precisión	7	,220
11	11. Vehículos y sus piezas	6	,000
12	12. Otro material de transporte	8	,273
13	13. Productos cárnicos	8	,161
14	14. Productos lácteos	8	,112
15	15. Otros productos alimenticios	8	,218
16	16. Bebidas y tabaco	8	,301
17	17. Productos textiles	4	,000
18	18. Productos de la confección	8	,176
19	19. Productos de cuero y calzado	8	,361
20	20. Papel y productos de papel	5	,000
21	21. Productos impresos	8	,243
22	22. Productos de la edición	8	,075

23	23. Productos farmacéuticos	8	,351
24	24. Otros productos químicos	8	,106
25	25. Productos de la química industrial	2	,196
26	26. Productos de la química básica	2	,196
27	27. Productos del viario	8	,279
28	28. Cemento y derivados	8	,186
29	29. Productos de otras industrias no metáli	8	,336
30	30. Madera, corcho y sus productos	3	,000
31	31. Productos de caucho y materias plástica	8	,349
32	32. Muebles	8	,109
33	33. Otras manufacturas	8	,150
34	34. Trabajos de construcción	8	,223
35	35. Servicios de comercio al por mayor e in	8	,110
36	36. Servicios de comercio de vehículos y co	8	,081
37	37. Servicios de comercio al por menor y re	8	,057
38	38. Servicios de hostelería	8	,091
39	39. Servicios de transporte terrestre	8	,257
40	40. Servicios de transporte no terrestre	8	,052
41	41. Servicios anexos al transporte	8	,056
42	42. Comunicaciones	8	,227
43	43. Servicios inmobiliarios y de alquiler	8	,300
44	44. Servicios de informática	8	,076
45	45. Servicios de asesoramiento	8	,096
46	46. Servicios tecnico	8	,096
47	47. Servicios de publicidad	8	,211
48	48. Otros servicios profesionales	8	,153
49	50.1. Servicios de educación de mercado	8	,054
50	50.2. Servicios de educación de no mercado	8	,066
51	51.1. Servicios sanitarios de mercado	8	,068
52	51.2. Servicios sanitarios de no mercado	8	,067
53	52.1. Servicios recreativos de mercado	8	,153
54	52.2. Servicios recreativos de no mercado	8	,067
55	53. Servicios personales	8	,066
56	54. Servicios de intermediación financiera	8	,088
57	55. Servicios de seguros y planes de pensio	8	,104
58	56. Servicios de saneamiento público	8	,122
59	57. Servicios de asociaciones	8	,067

60	58. Servicio doméstico	8	,067
61	59. Servicios de administración pública	8	,067

**Table 35 - Final Cluster Centres**

	Cluster							
	1	2	3	4	5	6	7	8
<b>01. Agricultura y ganadería</b>	,0328	,0294	,0021	,0003	,0007	,0001	,0001	,0076
<b>02. Energía y minería</b>	,0016	,0046	,0007	,0022	,0035	,0016	,0008	,0058
<b>03. Metálicas básicas</b>	,0000	,0229	,0339	,0001	,0049	,0006	,0001	,0129
<b>04. Estructuras metálicas</b>	,0000	,0007	,0012	,0000	,0007	,0234	,0004	,0124
<b>05. Forja y talleres</b>	,0000	,0475	,0027	,0000	,0043	,0014	,0001	,0105
<b>06. Artículos metálicos</b>	,0000	,0051	,0033	,0001	,0094	,0005	,0038	,0130
<b>07. Maquinaria industrial</b>	,0002	,0008	,0022	,0000	,0037	,0038	,0253	,0113
<b>08. Material eléctrico</b>	,0000	,0004	,0011	,0000	,0041	,0226	,0151	,0126
<b>09. Material electrónico</b>	,0002	,0001	,0009	,0000	,0044	,0003	,2158	,0053
<b>10. Máquinas oficina y precisión</b>	,0002	,0016	,0015	,0000	,0009	,0012	,1809	,0059
<b>11. Vehículos y sus piezas</b>	,0000	,0106	,0250	,0002	,0005	,5597	,0249	,0025
<b>12. Otro material de transporte</b>	,0000	,0009	,0003	,0000	,0003	,0277	,0007	,0118
<b>13. Industrias cárnicas</b>	,4840	,0058	,0001	,0002	,0025	,0001	,0001	,0054
<b>14. Industrias lácteas</b>	,3017	,0151	,0034	,0000	,0246	,0000	,0000	,0069
<b>15. Otras alimenticias</b>	,2758	,0568	,0038	,0000	,0186	,0000	,0001	,0065
<b>16. Bebidas y tabaco</b>	,0040	,0006	,0001	,0000	,0039	,0000	,0000	,0109
<b>17. Industria textil</b>	,0000	,0015	,0005	,4208	,0114	,0000	,0001	,0050
<b>18. Confección</b>	,0149	,0037	,0000	,3298	,0040	,0000	,0003	,0070
<b>19. Cuero y calzado</b>	,0169	,0208	,0003	,0274	,0045	,0000	,0000	,0123
<b>20. Industria del papel</b>	,0012	,0306	,0080	,0002	,3369	,0000	,0002	,0053
<b>21. Imprentas</b>	,0001	,0700	,0032	,0004	,1540	,0006	,0009	,0065
<b>22. Edición</b>	,0001	,0253	,0004	,0000	,2733	,0000	,0003	,0063
<b>23. Productos farmacéuticos</b>	,0029	,0649	,0001	,0001	,0087	,0000	,0153	,0103
<b>24. Otra química final</b>	,0002	,1840	,0006	,0024	,0441	,0000	,0001	,0064
<b>25. Química industrial</b>	,0003	,2464	,0045	,0052	,0097	,0001	,0002	,0047
<b>26. Química de base</b>	,0003	,2963	,0042	,0007	,0005	,0011	,0007	,0030
<b>27. Vidrio</b>	,0000	,0014	,0140	,0006	,0132	,0017	,0002	,0114
<b>28. Cemento y derivados</b>	,0000	,0028	,0011	,0000	,0048	,0000	,0005	,0128
<b>29. Otras industrias no metálica</b>	,0000	,0148	,0356	,0000	,0050	,0000	,0001	,0113
<b>30. Madera</b>	,0000	,0030	,4251	,0000	,0012	,0016	,0003	,0059

31. Caucho y plástico	,0001	,0228	,0029	,0014	,0100	,0111	,0048	,0107
32. Industria del mueble	,0000	,0027	,1782	,0018	,0071	,0020	,0240	,0083
33. Otras manufacturas	,0001	,0047	,0139	,0056	,0872	,0000	,0335	,0113
34. Construcción	,0003	,0007	,0020	,0000	,0002	,0092	,0063	,0110
35. Comercio mayorista	,0028	,0042	,0010	,0004	,0028	,0191	,0068	,0083
36. Comercio vehículos y combust	,0000	,0001	,0001	,0000	,0001	,1852	,0000	,0070
37. Otro comercio menor y repara	,0029	,0001	,0001	,0001	,0002	,0012	,0013	,0054
38. Hostelería	,0436	,0028	,0034	,0039	,0012	,0000	,0038	,0101
39. Transporte terrestre	,0001	,0009	,0005	,0001	,0009	,0184	,0048	,0134
40. Transporte no terrestre	,0000	,0940	,0000	,0000	,0000	,0000	,0000	,0093
41. Servicios anexos al transpor	,0000	,0004	,0097	,0000	,0014	,0001	,0003	,0049
42. Comunicaciones	,0003	,0003	,0002	,0004	,0077	,0001	,0241	,0093
43. Inmobiliarias y alquileres	,0000	,0015	,0021	,0001	,0153	,0155	,0126	,0065
44. Actividades informáticas	,0000	,0001	,0004	,0000	,0006	,0002	,1444	,0058
45. Asesoramiento	,0000	,0005	,0000	,0000	,0069	,0022	,0063	,0097
46. Servicios técnicos	,0013	,0061	,0014	,0020	,0175	,0111	,0789	,0089
47. Publicidad	,0000	,0045	,0048	,0000	,0056	,0000	,0001	,0128
48. Otros servicios profesionale	,0004	,0028	,0011	,0007	,0158	,0018	,0039	,0083
50.1. Educación de mercado	,0044	,0009	,0005	,0008	,0068	,0011	,0313	,0076
50.2. Educación de no mercado	,0002	,0000	,0000	,0002	,0013	,0000	,0011	,0023
51.1. Sanidad de mercado	,0002	,0048	,0002	,0012	,0012	,0001	,0390	,0080
51.2. Sanidad de no mercado	,0004	,0088	,0000	,0006	,0003	,0000	,0291	,0053
52.1. Servicios recreativos de m	,0076	,0006	,0001	,0000	,0030	,0000	,0059	,0110
52.2. Servicios recreativos de n	,0007	,0005	,0014	,0029	,0074	,0000	,0072	,0073
53. Servicios personales	,0227	,0007	,0735	,0013	,0000	,0010	,0004	,0076
54. Intermediación financiera	,0000	,0000	,0000	,0000	,0085	,0002	,0117	,0043
55. Seguros y planes de pensioe	,0000	,0001	,0001	,0000	,0021	,0006	,0081	,0065
56. Servicios de saneamiento	,0000	,0123	,0001	,0004	,0006	,0206	,0005	,0080
57. Actividades asociativas	,0011	,0006	,0001	,0003	,0046	,0000	,0104	,0075
58. Servicio doméstico	,0000	,0000	,0000	,0000	,0000	,0000	,0000	,0000
59. Administraciones públicas	,0018	,0001	,0001	,0016	,0051	,0028	,0014	,0043

Table 36 - Distances between Final Cluster Centres

Cluster	1	2	3	4	5	6	7	8
1		,753	,787	,825	,775	,870	,720	,628
2	,753		,647	,699	,592	,740	,564	,445



3	,787	,647		,712	,657	,736	,569	,462
4	,825	,699	,712		,705	,798	,632	,530
5	,775	,592	,657	,705		,757	,569	,461
6	,870	,740	,736	,798	,757		,658	,588
7	,720	,564	,569	,632	,569	,658		,325
8	,628	,445	,462	,530	,461	,588	,325	

Table 37 - ANOVA

	Cluster		Error		F	Sig.
	Mean Square	df	Mean Square	df		
01. Agricultura y ganadería	,000	7	,001	53	,373	,914
02. Energía y minería	,000	7	,001	53	,025	1,000
03. Metálicas básicas	,000	7	,001	53	,186	,987
04. Estructuras metálicas	,000	7	,002	53	,098	,998
05. Forja y talleres	,000	7	,002	53	,277	,960
06. Artículos metálicos	,000	7	,001	53	,090	,999
07. Maquinaria industrial	,000	7	,001	53	,160	,992
08. Material eléctrico	,000	7	,002	53	,058	1,000
09. Material electrónico	,012	7	,001	53	8,305	,000
10. Máquinas oficina y precisión	,009	7	,000	53	27,017	,000
11. Vehículos y sus piezas	,044	7	,000	53	968,294	,000
12. Otro material de transporte	,000	7	,002	53	,095	,998
13. Industrias cárnicas	,032	7	,000	53	74,265	,000
14. Industrias lácteas	,012	7	,000	53	43,515	,000
15. Otras alimenticias	,011	7	,000	53	43,902	,000
16. Bebidas y tabaco	,000	7	,002	53	,060	1,000
17. Industria textil	,024	7	,000	53	243,989	,000
18. Confección	,015	7	,001	53	26,600	,000
19. Cuero y calzado	,000	7	,003	53	,050	1,000
20. Industria del papel	,016	7	,000	53	98,999	,000
21. Imprentas	,004	7	,000	53	11,086	,000
22. Edición	,010	7	,000	53	67,880	,000
23. Productos farmacéuticos	,001	7	,002	53	,507	,825
24. Otra química final	,009	7	,000	53	23,325	,000
25. Química industrial	,016	7	,001	53	26,651	,000

26. Química de base	,024	7	,000	53	294,499	,000
27. Vidrio	,000	7	,002	53	,061	1,000
28. Cemento y derivados	,000	7	,002	53	,088	,999
29. Otras industrias no metálica	,000	7	,001	53	,152	,993
30. Madera	,025	7	,000	53	102,116	,000
31. Caucho y plástico	,000	7	,002	53	,040	1,000
32. Industria del mueble	,004	7	,000	53	11,726	,000
33. Otras manufacturas	,001	7	,001	53	1,071	,395
34. Construcción	,000	7	,001	53	,150	,993
35. Comercio mayorista	,000	7	,000	53	,226	,977
36. Comercio vehículos y combust	,005	7	,000	53	18,920	,000
37. Otro comercio menor y repara	,000	7	,000	53	,155	,993
38. Hostelería	,000	7	,000	53	,598	,755
39. Transporte terrestre	,000	7	,001	53	,208	,982
40. Transporte no terrestre	,002	7	,001	53	1,890	,090
41. Servicios anexos al transpor	,000	7	,000	53	,180	,988
42. Comunicaciones	,000	7	,001	53	,208	,982
43. Inmobiliarias y alquileres	,000	7	,000	53	,128	,996
44. Actividades informáticas	,005	7	,000	53	58,258	,000
45. Asesoramiento	,000	7	,001	53	,127	,996
46. Servicios técnicos	,001	7	,000	53	4,151	,001
47. Publicidad	,000	7	,001	53	,100	,998
48. Otros servicios profesionale	,000	7	,000	53	,239	,974
50.1. Educación de mercado	,000	7	,000	53	1,429	,213
50.2. Educación de no mercado	,000	7	,000	53	,126	,996
51.1. Sanidad de mercado	,000	7	,001	53	,467	,854
51.2. Sanidad de no mercado	,000	7	,000	53	,929	,492
52.1. Servicios recreativos de m	,000	7	,001	53	,135	,995
52.2. Servicios recreativos de n	,000	7	,000	53	,240	,973
53. Servicios personales	,001	7	,000	53	2,515	,026
54. Intermediación financiera	,000	7	,000	53	,335	,934
55. Seguros y planes de pensione	,000	7	,000	53	,146	,994
56. Servicios de saneamiento	,000	7	,000	53	,213	,981
57. Actividades asociativas	,000	7	,000	53	,154	,993
58. Servicio doméstico	,000	7	,000	53	.	.
59. Administraciones públicas	,000	7	,000	53	,250	,970

*Note:* The F tests should be used only for descriptive purposes because the clusters have been chosen to maximize the differences among cases in different clusters. The observed significance levels are not corrected for this and thus cannot be interpreted as tests of the hypothesis that the cluster means are equal.

**Table 38 - Number of Cases in each Cluster**

<b>Cluster</b>	<b>1</b>	1,000
	<b>2</b>	2,000
	<b>3</b>	1,000
	<b>4</b>	1,000
	<b>5</b>	1,000
	<b>6</b>	1,000
	<b>7</b>	2,000
	<b>8</b>	52,000
<b>Valid</b>	61,000	
<b>Missing</b>	,000	

And, finally, in the last iteration the number of centres is three again (but with different centres).

Table 39 - Notes of the iteration

<b>Output Created</b>		01-JUL-2007 13:57:32
<b>Comments</b>		
<b>Input</b>	<b>Filter</b>	<none>
	<b>Weight</b>	<none>
	<b>Split File</b>	<none>
	<b>N of Rows in Working Data File</b>	61
<b>Missing Value Handling</b>	<b>Definition of Missing</b>	User-defined missing values are treated as missing.
	<b>Cases Used</b>	Statistics are based on cases with no missing values for any clustering variable used.
<b>Syntax</b>	<p>QUICK CLUSTER  v2 v3 v4 v5 v6 v7 v8 v9 v10 v11 v12 v13 v14 v15 v16  v17 v18 v19 v20 v21 v22  v23 v24 v25 v26 v27 v28 v29 v30 v31 v32 v33 v34 v35  v36 v37 v38 v39 v40 v41  v42 v43 v44 v45 v46 v47 v48 v49 v50 v51 v52 v53 v54  v55 v56 v57 v58 v59 v60  v61 v62  /MISSING=LISTWISE  /CRITERIA= CLUSTER(3)  /METHOD=CLASSIFY  /PRINT ID(v1 ) INITIAL ANOVA CLUSTER DISTAN.</p>	
<b>Resources</b>	<b>Elapsed Time</b>	0:00:00,05
	<b>Workspace Required</b>	7208 bytes

Table 40 - Initial Cluster Centres

	Cluster		
	1	2	3
<b>01. Agricultura y ganadería</b>	,0328	,0001	,0249
<b>02. Energía y minería</b>	,0016	,0016	,0045
<b>03. Metálicas básicas</b>	,0000	,0006	,0285
<b>04. Estructuras metálicas</b>	,0000	,0234	,0010
<b>05. Forja y talleres</b>	,0000	,0014	,0943
<b>06. Artículos metálicos</b>	,0000	,0005	,0085
<b>07. Maquinaria industrial</b>	,0002	,0038	,0010
<b>08. Material eléctrico</b>	,0000	,0226	,0005
<b>09. Material electrónico</b>	,0002	,0003	,0002
<b>10. Máquinas oficina y precisión</b>	,0002	,0012	,0022
<b>11. Vehículos y sus piezas</b>	,0000	,5597	,0003
<b>12. Otro material de transporte</b>	,0000	,0277	,0018

<b>13. Industrias cárnicas</b>	,4840	,0001	,0114
<b>14. Industrias lácteas</b>	,3017	,0000	,0218
<b>15. Otras alimenticias</b>	,2758	,0000	,1123
<b>16. Bebidas y tabaco</b>	,0040	,0000	,0011
<b>17. Industria textil</b>	,0000	,0000	,0019
<b>18. Confección</b>	,0149	,0000	,0012
<b>19. Cuero y calzado</b>	,0169	,0000	,0001
<b>20. Industria del papel</b>	,0012	,0000	,0599
<b>21. Imprentas</b>	,0001	,0006	,1381
<b>22. Edición</b>	,0001	,0000	,0507
<b>23. Productos farmacéuticos</b>	,0029	,0000	,0444
<b>24. Otra química final</b>	,0002	,0000	,1311
<b>25. Química industrial</b>	,0003	,0001	,3605
<b>26. Química de base</b>	,0003	,0011	,3254
<b>27. Vidrio</b>	,0000	,0017	,0026
<b>28. Cemento y derivados</b>	,0000	,0000	,0049
<b>29. Otras industrias no metálica</b>	,0000	,0000	,0293
<b>30. Madera</b>	,0000	,0016	,0059
<b>31. Caucho y plástico</b>	,0001	,0111	,0350
<b>32. Industria del mueble</b>	,0000	,0020	,0044
<b>33. Otras manufacturas</b>	,0001	,0000	,0040
<b>34. Construcción</b>	,0003	,0092	,0012
<b>35. Comercio mayorista</b>	,0028	,0191	,0044
<b>36. Comercio vehículos y combust</b>	,0000	,1852	,0002
<b>37. Otro comercio menor y repara</b>	,0029	,0012	,0002
<b>38. Hostelería</b>	,0436	,0000	,0056
<b>39. Transporte terrestre</b>	,0001	,0184	,0018
<b>40. Transporte no terrestre</b>	,0000	,0000	,1880
<b>41. Servicios anexos al transpor</b>	,0000	,0001	,0006
<b>42. Comunicaciones</b>	,0003	,0001	,0004
<b>43. Inmobiliarias y alquileres</b>	,0000	,0155	,0029
<b>44. Actividades informáticas</b>	,0000	,0002	,0002
<b>45. Asesoramiento</b>	,0000	,0022	,0011
<b>46. Servicios tecnico</b>	,0013	,0111	,0091
<b>47. Publicidad</b>	,0000	,0000	,0091
<b>48. Otros servicios profesionale</b>	,0004	,0018	,0038
<b>50.1. Educación de mercado</b>	,0044	,0011	,0018

<b>50.2. Educación de no mercado</b>	,0002	,0000	,0000
<b>51.1. Sanidad de mercado</b>	,0002	,0001	,0095
<b>51.2. Sanidad de no mercado</b>	,0004	,0000	,0175
<b>52.1. Servicios recreativos de m</b>	,0076	,0000	,0009
<b>52.2. Servicios recreativos de n</b>	,0007	,0000	,0008
<b>53. Servicios personales</b>	,0227	,0010	,0010
<b>54. Intermediación financiera</b>	,0000	,0002	,0000
<b>55. Seguros y planes de pensión</b>	,0000	,0006	,0001
<b>56. Servicios de saneamiento</b>	,0000	,0206	,0176
<b>57. Actividades asociativas</b>	,0011	,0000	,0011
<b>58. Servicio doméstico</b>	,0000	,0000	,0000
<b>59. Administraciones públicas</b>	,0018	,0028	,0001

**Table 41 - Cluster Membership**

<b>Case Number</b>	<b>Matriz de coeficientes técnicos.</b>	<b>Cluster</b>	<b>Distance</b>
<b>1</b>	1. Productos de la agricultura y ganadería	1	,000
<b>2</b>	2. Electricidad, gas, agua y combustibles	3	,634
<b>3</b>	3. Minerales no energéticos	2	,655
<b>4</b>	4. Productos de la metalurgia básica y fund	3	,602
<b>5</b>	5. Productos de forja y talleres	3	,651
<b>6</b>	6. Estructuras metálicas	3	,638
<b>7</b>	7. Maquinaria industrial	3	,590
<b>8</b>	8. Material eléctrico	3	,690
<b>9</b>	9. Material electrónico	3	,744
<b>10</b>	10. Máquinas oficina y precisión	2	,633
<b>11</b>	11. Vehículos y sus piezas	2	,000
<b>12</b>	12. Otro material de transporte	3	,631
<b>13</b>	13. Productos cárnicos	1	,522
<b>14</b>	14. Productos lácteos	3	,586
<b>15</b>	15. Otros productos alimenticios	3	,607
<b>16</b>	16. Bebidas y tabaco	3	,658
<b>17</b>	17. Productos textiles	3	,788
<b>18</b>	18. Productos de la confección	3	,604
<b>19</b>	19. Productos de cuero y calzado	3	,691
<b>20</b>	20. Papel y productos de papel	3	,654
<b>21</b>	21. Productos impresos	3	,610

22	22. Productos de la edición	3	,582
23	23. Productos farmacéuticos	3	,657
24	24. Otros productos químicos	3	,583
25	25. Productos de la química industrial	3	,000
26	26. Productos de la química básica	3	,393
27	27. Productos del viario	3	,639
28	28. Cemento y derivados	3	,610
29	29. Productos de otras industrias no metáli	3	,654
30	30. Madera, corcho y sus productos	2	,736
31	31. Productos de caucho y materias plástica	3	,628
32	32. Muebles	3	,587
33	33. Otras manufacturas	3	,599
34	34. Trabajos de construcción	2	,620
35	35. Servicios de comercio al por mayor e in	3	,563
36	36. Servicios de comercio de vehículos y co	3	,576
37	37. Servicios de comercio al por menor y re	3	,582
38	38. Servicios de hostelería	3	,582
39	39. Servicios de transporte terrestre	3	,538
40	40. Servicios de transporte no terrestre	3	,575
41	41. Servicios anexos al transporte	3	,581
42	42. Comunicaciones	3	,590
43	43. Servicios inmobiliarios y de alquiler	3	,601
44	44. Servicios de informática	3	,586
45	45. Servicios de asesoramiento	3	,573
46	46. Servicios tecnico	3	,583
47	47. Servicios de publicidad	3	,572
48	48. Otros servicios profesionales	3	,576
49	50.1. Servicios de educación de mercado	3	,578
50	50.2. Servicios de educación de no mercado	3	,585
51	51.1. Servicios sanitarios de mercado	3	,585
52	51.2. Servicios sanitarios de no mercado	3	,584
53	52.1. Servicios recreativos de mercado	3	,604
54	52.2. Servicios recreativos de no mercado	3	,585
55	53. Servicios personales	3	,585
56	54. Servicios de intermediación financiera	3	,567
57	55. Servicios de seguros y planes de pensio	3	,570
58	56. Servicios de saneamiento público	3	,592

59	57. Servicios de asociaciones	3	,585
60	58. Servicio doméstico	3	,585
61	59. Servicios de administración pública	3	,585

**Table 42 - Final Cluster Centres**

	Cluster		
	1	2	3
<b>01. Agricultura y ganadería</b>	,0165	,0070	,0078
<b>02. Energía y minería</b>	,0009	,0013	,0058
<b>03. Metálicas básicas</b>	,0000	,0224	,0119
<b>04. Estructuras metálicas</b>	,0000	,0848	,0046
<b>05. Forja y talleres</b>	,0000	,0113	,0110
<b>06. Artículos metálicos</b>	,0000	,0245	,0108
<b>07. Maquinaria industrial</b>	,0001	,0130	,0108
<b>08. Material eléctrico</b>	,0000	,0153	,0118
<b>09. Material electrónico</b>	,0002	,0168	,0116
<b>10. Máquinas oficina y precisión</b>	,0003	,0534	,0075
<b>11. Vehículos y sus piezas</b>	,0000	,1314	,0024
<b>12. Otro material de transporte</b>	,0000	,0360	,0086
<b>13. Industrias cárnicas</b>	,3165	,0006	,0027
<b>14. Industrias lácteas</b>	,1516	,0007	,0076
<b>15. Otras alimenticias</b>	,1454	,0009	,0084
<b>16. Bebidas y tabaco</b>	,0021	,0000	,0106
<b>17. Industria textil</b>	,0000	,0054	,0123
<b>18. Confección</b>	,0075	,0003	,0130
<b>19. Cuero y calzado</b>	,0085	,0001	,0132
<b>20. Industria del papel</b>	,0006	,0036	,0123
<b>21. Imprentas</b>	,0001	,0030	,0116
<b>22. Edición</b>	,0000	,0003	,0121
<b>23. Productos farmacéuticos</b>	,0015	,0062	,0125
<b>24. Otra química final</b>	,0001	,0002	,0138
<b>25. Química industrial</b>	,0002	,0010	,0139
<b>26. Química de base</b>	,0001	,0012	,0139
<b>27. Vidrio</b>	,0000	,0033	,0113
<b>28. Cemento y derivados</b>	,0000	,0038	,0122
<b>29. Otras industrias no metálica</b>	,0000	,0117	,0111



30. Madera	,0000	,0875	,0057
31. Caucho y plástico	,0000	,0057	,0113
32. Industria del mueble	,0000	,0548	,0074
33. Otras manufacturas	,0000	,0135	,0131
34. Construcción	,0002	,0262	,0086
35. Comercio mayorista	,0019	,0091	,0080
36. Comercio vehículos y combust	,0000	,0432	,0062
37. Otro comercio menor y repara	,0033	,0034	,0049
38. Hostelería	,0445	,0022	,0091
39. Transporte terrestre	,0001	,0058	,0129
40. Transporte no terrestre	,0000	,0000	,0125
41. Servicios anexos al transpor	,0000	,0048	,0045
42. Comunicaciones	,0002	,0068	,0094
43. Inmobiliarias y alquileres	,0000	,0362	,0040
44. Actividades informáticas	,0000	,0324	,0079
45. Asesoramiento	,0000	,0059	,0092
46. Servicios tecnico	,0008	,0135	,0111
47. Publicidad	,0014	,0010	,0126
48. Otros servicios profesionale	,0003	,0058	,0081
50.1. Educación de mercado	,0058	,0088	,0078
50.2. Educación de no mercado	,0003	,0016	,0022
51.1. Sanidad de mercado	,0062	,0150	,0078
51.2. Sanidad de no mercado	,0013	,0124	,0054
52.1. Servicios recreativos de m	,0087	,0016	,0106
52.2. Servicios recreativos de n	,0005	,0125	,0064
53. Servicios personales	,0114	,0153	,0073
54. Intermediación financiera	,0000	,0050	,0043
55. Seguros y planes de pensione	,0000	,0022	,0064
56. Servicios de saneamiento	,0000	,0088	,0077
57. Actividades asociativas	,0008	,0051	,0072
58. Servicio doméstico	,0000	,0000	,0000
59. Administraciones públicas	,0013	,0042	,0040

Table 43 - Distances between Final Cluster Centres

Cluster	1	2	3
1		,439	,379

2	,439		,202
3	,379	,202	

Table 44 - ANOVA

	Cluster		Error		F	Sig.
	Mean Square	df	Mean Square	df		
01. Agricultura y ganadería	,000	2	,001	58	,110	,896
02. Energía y minería	,000	2	,001	58	,114	,893
03. Metálicas básicas	,000	2	,001	58	,383	,683
04. Estructuras metálicas	,015	2	,001	58	14,667	,000
05. Forja y talleres	,000	2	,002	58	,072	,930
06. Artículos metálicos	,001	2	,001	58	,509	,604
07. Maquinaria industrial	,000	2	,001	58	,146	,865
08. Material eléctrico	,000	2	,002	58	,085	,919
09. Material electrónico	,000	2	,003	58	,070	,933
10. Máquinas oficina y precisión	,005	2	,001	58	4,291	,018
11. Vehículos y sus piezas	,038	2	,004	58	9,586	,000
12. Otro material de transporte	,002	2	,002	58	1,159	,321
13. Industrias cárnicas	,095	2	,001	58	95,095	,000
14. Industrias lácteas	,020	2	,001	58	19,497	,000
15. Otras alimenticias	,018	2	,001	58	20,562	,000
16. Bebidas y tabaco	,000	2	,002	58	,185	,831
17. Industria textil	,000	2	,003	58	,080	,923
18. Confección	,000	2	,002	58	,172	,843
19. Cuero y calzado	,000	2	,003	58	,149	,862
20. Industria del papel	,000	2	,002	58	,144	,866
21. Imprentas	,000	2	,001	58	,337	,715
22. Edición	,000	2	,001	58	,323	,725
23. Productos farmacéuticos	,000	2	,002	58	,116	,890
24. Otra química final	,001	2	,001	58	,409	,666
25. Química industrial	,001	2	,002	58	,215	,807
26. Química de base	,001	2	,003	58	,178	,837
27. Vidrio	,000	2	,002	58	,163	,850
28. Cemento y derivados	,000	2	,002	58	,188	,829
29. Otras industrias no metálica	,000	2	,001	58	,109	,897

<b>30. Madera</b>	,015	2	,003	58	5,768	,005
<b>31. Caucho y plástico</b>	,000	2	,002	58	,091	,914
<b>32. Industria del mueble</b>	,005	2	,001	58	8,152	,001
<b>33. Otras manufacturas</b>	,000	2	,001	58	,171	,844
<b>34. Construcción</b>	,001	2	,001	58	1,570	,217
<b>35. Comercio mayorista</b>	,000	2	,000	58	,212	,810
<b>36. Comercio vehículos y combust</b>	,003	2	,001	58	4,884	,011
<b>37. Otro comercio menor y repara</b>	,000	2	,000	58	,048	,953
<b>38. Hostelería</b>	,001	2	,000	58	4,233	,019
<b>39. Transporte terrestre</b>	,000	2	,001	58	,399	,673
<b>40. Transporte no terrestre</b>	,000	2	,001	58	,382	,684
<b>41. Servicios anexos al transpor</b>	,000	2	,000	58	,154	,857
<b>42. Comunicaciones</b>	,000	2	,001	58	,158	,854
<b>43. Inmobiliarias y alquileres</b>	,002	2	,000	58	7,648	,001
<b>44. Actividades informáticas</b>	,001	2	,001	58	2,138	,127
<b>45. Asesoramiento</b>	,000	2	,000	58	,211	,810
<b>46. Servicios técnicos</b>	,000	2	,000	58	,254	,776
<b>47. Publicidad</b>	,000	2	,001	58	,337	,715
<b>48. Otros servicios profesionale</b>	,000	2	,000	58	,355	,703
<b>50.1. Educación de mercado</b>	,000	2	,000	58	,043	,958
<b>50.2. Educación de no mercado</b>	,000	2	,000	58	,129	,879
<b>51.1. Sanidad de mercado</b>	,000	2	,001	58	,187	,830
<b>51.2. Sanidad de no mercado</b>	,000	2	,000	58	,682	,510
<b>52.1. Servicios recreativos de m</b>	,000	2	,001	58	,314	,732
<b>52.2. Servicios recreativos de n</b>	,000	2	,000	58	1,059	,353
<b>53. Servicios personales</b>	,000	2	,000	58	,470	,627
<b>54. Intermediación financiera</b>	,000	2	,000	58	,203	,817
<b>55. Seguros y planes de pensione</b>	,000	2	,000	58	,345	,710
<b>56. Servicios de saneamiento</b>	,000	2	,000	58	,184	,832
<b>57. Actividades asociativas</b>	,000	2	,000	58	,184	,833
<b>58. Servicio doméstico</b>	,000	2	,000	58	.	.
<b>59. Administraciones públicas</b>	,000	2	,000	58	,179	,837

*Note:* The F tests should be used only for descriptive purposes because the clusters have been chosen to maximize the differences among cases in different clusters. The observed significance levels are not corrected for this and thus cannot be interpreted as tests of the hypothesis that the cluster means are equal.

**Table 45 - Number of Cases in each Cluster**

	1	2,000
<b>Cluster</b>	2	5,000
	3	54,000
<b>Valid</b>		61,000
<b>Missing</b>		,000

*Backward and forward linkages in the Madrid productive framework*

The paragraph above has showed that there is not any clear specialisation within the Madrid-based productive framework, thus it is possible to state that many different sectors act as drivers for of the regional economy. However, the analysis has been conducted without taking into account the functional linkages among sectors, yet their position and distance on the LIM. A more robust way to understand which sectors represent the pillars of the local economy is to detect and evaluate the intensity of backward and forward linkages among the 61 branches of the I-O tables. Recalling what we stated in the first chapter of this essay, we detect both backward linkages and forward linkages within the Madrid productive framework.<sup>94</sup>

The output multipliers, defined as the column sum of the Leontief inverse indicate backward linkages. Using the row sums of the Leontief inverse, the output multipliers are given by  $(I-A)^{-1} \cdot i$ . Table 46, below, shows the *i*th(s) sectoral multipliers and report the backward linkages of each given sector as in index in which  $z_{ij}$  is an element of  $(I-A)^{-1}$ .

**Table 46 – Sectoral output multipliers in the Madrid metro-region (2002)**

Sector	output multiplier	index $n \sum_i z_{ij} / \sum_j \sum_i z_{ij}$ (BW linkages)
Servicio doméstico	1,0000	0,393589724
Educación de no mercado	1,3090	0,515228072
Administraciones públicas	1,5792	0,621570029
Intermediación financiera	1,5817	0,622552568
Otro comercio menor y reparación	1,6401	0,645536018

94 See pag. 26.

Energía y minería	1,6419	0,646229961
Servicios anexos al transporte	1,6706	0,657544692
Seguros y planes de pensiones	1,7925	0,705494021
Sanidad de no mercado	1,9489	0,767062403
Actividades asociativas	1,9796	0,779135537
Servicios recreativos de no mercado	1,9822	0,780153911
Inmobiliarias y alquileres	1,9962	0,785681129
Servicios de saneamiento	2,1250	0,836367296
Otros servicios profesionales	2,1374	0,841260785
Educación de mercado	2,1791	0,857675023
Comercio mayorista	2,1806	0,858257168
Asesoramiento	2,2408	0,881949956
Servicios personales	2,2723	0,894343866
Comunicaciones	2,3073	0,908145636
Agricultura y ganadería	2,3317	0,917730445
Sanidad de mercado	2,3820	0,937549932
Bebidas y tabaco	2,4729	0,973322004
Hostelería	2,4735	0,973562204
Servicios recreativos de mercado	2,4982	0,983271898
Vidrio	2,5033	0,985261172
Actividades informáticas	2,5281	0,995048717
Comercio vehículos y combustibles	2,5283	0,995124964
Cemento y derivados	2,5374	0,998698916
Construcción	2,5517	1,004337101
Otras industrias no metálicas	2,6716	1,051508962
Transporte no terrestre	2,6911	1,059198688

Caucho y plástico	2,7080	1,065848445
Transporte terrestre	2,7237	1,072031256
Otro material de transporte	2,7299	1,074479011
Edición	2,7411	1,078850376
Publicidad	2,7646	1,088135968
Imprentas	2,7793	1,093889925
Servicios tecnico	2,7962	1,100567751
Industrias lácteas	2,8152	1,108028498
Maquinaria industrial	2,8263	1,112409731
Industria textil	2,8332	1,115115596
Máquinas oficina y precisión	2,8497	1,121620548
Forja y talleres	2,8541	1,123327932
Estructuras metálicas	2,8642	1,127319803
Industria del papel	2,8767	1,132227608
Industrias cárnicas	2,9200	1,14929122
Industria del mueble	2,9462	1,159601117
Otras alimenticias	2,9673	1,167897434
Metálicas básicas	2,9714	1,169494306
Artículos metálicos	3,0005	1,180974132
Confección	3,0059	1,183095952
Material eléctrico	3,0072	1,18359186
Material electrónico	3,0180	1,187862445
Productos farmacéuticos	3,0578	1,203530056
Otras manufacturas	3,1444	1,237586273
Cuero y calzado	3,1892	1,255234406
Madera	3,2261	1,269745252

Otra química final	3,2551	1,281180642
Química industrial	3,3204	1,306886568
Química de base	3,3671	1,325244527
Vehículos y sus piezas	3,6905	1,452538566

Similarly, according to the model presented above in the essay to determine forward linkages we will assume that intermediate inputs are proportional to total inputs (Jones, 1976)

$$x_{ij} = b_{ij} X_j.$$

This means that the intermediate flows are supply led rather than demand led. Such hypothesis can be considered as true over the short run, even in a regional economy, such as of Madrid, that has shown a remarkable capacity to expand its output. Then the row sums of  $(I-B)^{-1}$  are measures of forward linkages. The table below (Table 47) shows the “input multiplier” and an index measuring the intensity of forward linkages per each sector where  $q_{ij}$  is an element of  $(I-B)^{-1}$ .

**Table 47 – Sectoral input multipliers in the Madrid metro-region (2002)**

Sector	Input multiplier	Index $n \sum_i q_{ij} / \sum_j \sum_i q_{ij}$ (FW linkages)
Servicio doméstico	1,0000	0,39359
Servicios de administración pública	1,0000	0,39359
Servicios recreativos de no mercado	1,0067	0,396237
Servicios sanitarios de no mercado	1,0310	0,40578
Servicios de educación de no mercado	1,0439	0,410859
Servicios personales	1,0627	0,418266
Servicios de asociaciones	1,0994	0,432713
Servicios sanitarios de mercado	1,1664	0,459083
Servicios de comercio al por menor y reparación	1,2020	0,473095

Productos lácteos	1,2358	0,486398
Servicios de saneamiento público	1,2458	0,49034
Productos de la edición	1,2576	0,494991
Otros productos químicos	1,2716	0,500473
Servicios de educación de mercado	1,2989	0,511237
Servicios recreativos de mercado	1,3809	0,543499
Productos de la confección	1,3921	0,547924
Productos cárnicos	1,3961	0,549475
Muebles	1,4082	0,554248
Servicios anexos al transporte	1,4873	0,585379
Servicios de transporte no terrestre	1,5177	0,597358
Productos de cuero y calzado	1,6534	0,650768
Bebidas y tabaco	1,7109	0,673409
Productos del vidrio	1,7531	0,69001
Cemento y derivados	1,8457	0,726457
Servicios de informática	1,9050	0,749808
Productos de la metalurgia básica y fundición	1,9115	0,752354
Servicios de seguros y planes de pensiones	1,9629	0,772596
Otros productos alimenticios	1,9896	0,783106
Servicios de hostelería	1,9945	0,785014
Servicios de comercio de vehículos y combustibles	2,0032	0,78843
Productos farmacéuticos	2,1770	0,856862
Otro material de transporte	2,1886	0,861424
Otras manufacturas	2,2938	0,902811
Maquinaria industrial	2,3381	0,920263
Servicios técnico	2,4315	0,957003



Productos impresos	2,6257	1,033446
Productos textiles	2,7913	1,098645
Productos de la agricultura y ganadería	2,9272	1,1521
Servicios de asesoramiento	3,0147	1,186545
Servicios de intermediación financiera	3,0938	1,217671
Servicios de comercio al por mayor e intermediarios	3,1150	1,226046
Productos de forja y talleres	3,1411	1,236305
Trabajos de construcción	3,2093	1,263153
Productos de otras industrias no metálicas	3,3005	1,299031
Estructuras metálicas	3,4059	1,340521
Material eléctrico	3,4514	1,358422
Madera, corcho y sus productos	3,4518	1,35861
Máquinas oficina y precisión	3,5152	1,383537
Productos de caucho y materias plásticas	3,5870	1,411824
Minerales no energéticos	3,6257	1,427019
Otros servicios profesionales	3,6571	1,439409
Comunicaciones	3,7144	1,461947
Servicios de publicidad	3,8233	1,504823
Productos de la química básica	4,0709	1,602252
20. Papel y productos de papel	4,2021	1,653887
Material electrónico	4,3167	1,699006
Vehículos y sus piezas	4,5266	1,781607
Servicios inmobiliarios y de alquiler	5,0641	1,99317
Electricidad, gas, agua y combustibles	5,3715	2,114181
Servicios de transporte terrestre	5,7599	2,267043
Productos de la química industrial	7,5585	2,974949

The indexes of tables 46-47 can be used to measure the relative strength of the forward and backward linkages within the Madrid FUR. Bearing in mind that in the case of the Madrid FUR the dependence on import is very high, since the region is strictly connected with other regions within Spain, it is possible to draw some conclusions looking at the numerical results. According to Hirschman (1958) key sectors of the local economy are those sectors with both backward and forward indices greater than unity. However, the most interesting aspect which might emerge, for developing economies, is the appearance of sectors that “nearly” qualify as key sectors. This conclusion was first introduced by Matallah and Proops (1994), and further developed by the same authors (Matallah, Proops, 1996), and can be summarized by defining "strong", "intermediate", and "weak" as in table 48 below (Matallah, Proops, 1996).

**Table 48 – Three different intensities of backward (forward) linkages**

Strong linkage index	$index > 1$
Intermediate linkage index	$0.9 > index = 1$
Weak linkage index	$index < 0.9$

Source: Matallah, Proops, 1996

Following the methodology showed in the table above it is possible to understand what the key sectors in the Madrid economy are: i.e. those sectors acting as pillars of the local economy by generating a large number of bw and fw linkages. The table 49, below, is the rank of the indexes used as a measure of bw and fw linkages. It is very interesting to note that the traditional manufacturing (and particularly the automotive industry) plays an important role in the regional economy, that, as was assessed in chapter two, it is mainly a post-industrial economy in which the service sector generates the larger part of the regional GDP.

Through this new piece of analysis it possible to assess that the service sector is not autonomous in the region and depends on manufacturing activities. What it is important to note is that these manufacturing activities are probably changing following the evolution of the local technology and the local capacity to innovate. However, to verify this hypothesis it would be necessary to have a long time series and to apply the same methodology at each period to assess how the ranking evolves.

**Table 49 – Rank of Backward and Forward linkages in the Madrid metro-region**

Sector	BW	FW
Servicio doméstico	0,39359	0,39359
Educación de no mercado	0,51523	0,410859
Administraciones públicas	0,62157	0,39359

Intermediación financiera	0,62255	1,217671
Otro comercio menor y reparación	0,64554	0,473095
Energía y minería	0,64623	2,114181
Servicios anexos al transporte	0,65754	0,585379
Seguros y planes de pensiones	0,70549	0,772596
Sanidad de no mercado	0,76706	0,40578
Actividades asociativas	0,77914	0,432713
Servicios recreativos de no mercado	0,78015	0,396237
Inmobiliarias y alquileres	0,78568	1,99317
Servicios de saneamiento	0,83637	0,49034
Otros servicios profesionales	0,84126	1,439409
Educación de mercado	0,85768	0,511237
Comercio mayorista	0,85826	1,226046
Asesoramiento	0,88195	1,186545
Servicios personales	0,89434	0,418266
Comunicaciones	0,90815	1,461947
Agricultura y ganadería	0,91773	1,1521
Sanidad de mercado	0,93755	0,459083
Bebidas y tabaco	0,97332	0,673409
Hostelería	0,97356	0,785014
Servicios recreativos de mercado	0,98327	0,543499
Vidrio	0,98526	0,69001
Actividades informáticas	0,99505	0,749808
Comercio vehículos y combustibles	0,99512	0,78843
Cemento y derivados	0,99870	0,726457
Construcción	1,00434	1,263153

Otras industrias no metálicas	1,05151	1,299031
Transporte no terrestre	1,05920	0,597358
Caucho y plástico	1,06585	1,411824
Transporte terrestre	1,07203	2,267043
Otro material de transporte	1,07448	0,861424
Edición	1,07885	0,494991
Publicidad	1,08814	1,504823
Imprentas	1,09389	1,033446
Servicios tecnico	1,10057	0,957003
Industrias lácteas	1,10803	0,486398
Maquinaria industrial	1,11241	0,920263
Industria textil	1,11512	1,098645
Máquinas oficina y precisión	1,12162	1,383537
Forja y talleres	1,12333	1,236305
Estructuras metálicas	1,12732	1,340521
Industria del papel	1,13223	1,653887
Industrias cárnicas	1,14929	0,549475
Industria del mueble	1,15960	0,554248
Otras alimenticias	1,16790	0,783106
Metálicas básicas	1,16949	0,752354
Artículos metálicos	1,18097	1,427019
Confección	1,18310	0,547924
Material eléctrico	1,18359	1,358422
Material electrónico	1,18786	1,699006
Productos farmacéuticos	1,20353	0,856862
Otras manufacturas	1,23759	0,902811

Cuero y calzado	1,25523	0,650768
Madera	1,26975	1,35861
Otra química final	1,28118	0,500473
Química industrial	1,30689	2,974949
Química de base	1,32524	1,602252
Vehículos y sus piezas	1,45254	1,781607

### *Limits of – and objections to – this methodology*

The results obtained are not neutral to the level of aggregation. In fact, a high level of aggregation may have the following results. First, aggregation reduces the technological factor of the intersectoral relationship described by the input-output table, i.e. reducing the impact of a sector on the economy. Second, it reduces the homogeneity of sectors. In an input-output table, classification and division of the economic sectors might affect the sectoral hierarchy. Another limitation of this approach is that the intersectoral relationship derived from an input-output table should reflect the technological structure of the regional economy. However, the elements of an input-output table are the result of a complex interaction of several factors, i.e. economic, technical, institutional, etc. Thus it is challenging for a model to consider all these variables and to take them into account while assessing the regional productive framework.

There are also external limits. The methods used and the results obtained are based mainly on the current interindustry flow matrices. They do not take into account the transaction of fixed capital within the economy. The integration of fixed capital would modify the results already obtained. Their integration would necessitate the construction of the capital matrices and the utilisation of a dynamic Leontief model (Miernyk, 1977). Moreover, the effects induced by the spending of revenues paid to households are not included. Their integration once more would modify the classification of the economic sectors. Theoretically speaking, their integration is seen as possible by making them endogenous within the economic system (Morrisson and Smith, 1979).

Finally, some objections could be raised against this approach. The first objection concerns the hypothesis of stable technical coefficients, which is based on the assumptions of the static Leontief model. The economy is mainly in a continuous dynamic state, which means that the sectoral hierarchy might not be stable. Given that this essay takes into account very close periods, this objection may not be valid in this context. The second objection is advanced from the relation between linkages and the efficiency of the economy. The indices calculated do not take into account the differential efficiency of the several branches of the national economy. For instance, backward linkages might favour those sectors with limited efficiency with regard to

intermediate consumption. The third and last objection concerns the problem of employment. The methods used do not take the variable of employment into account, bearing in mind that economic sectors have different potential with regard to this aspect. In a region like Madrid the labour market is buoyant, it would have been extremely difficult to take into account the dynamics of local employment.