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Portuguese National Accounts: a network approach

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Abstract

In recent years, the Portuguese economy has gone through a severe adjustment process, which affected almost every sector of the economy. Therefore, it is important to study how the structure of the economy changed during this period. To that end, using data on the annual output by industry and product from National Accounts, we developed a network of industries for the years 2010 and 2013. By comparing the Minimal Spanning Trees and a set of topological coefficients for the years considered, we evaluate the structural evolution of the economy. In order to get a long term view, we extended the analysis to the period between 1995 and 2010. We found that the industries linked to trade activities maintained their centrality, although they decreased their importance over time. Together with construction activities, they were among the most severely affected industries.

Keywords: National Accounts, Network Analysis, Minimal Spanning Trees, Clusters

1 Introduction

The main objective of this study is to analyze the evolution of the structure of the Portuguese economy, from the industries' perspective over the last few years. Since the Portuguese economy went through a period of strong economic adjustment between 2011 and 2013, it becomes important to assess the impact of this process on the relationship between the various industries in the economy. With that purpose, we resort to the graph theory, which grew in importance in recent years, giving rise to a vast literature.

Among the diverse areas of application of this type of methodology, we can find the analysis of international trade[4, 9], as well as of financial flows, particularly the transmission of the effects of financial crises[2, 11, 15, 16].

When considering the application of graph theory to the data on industry and product, the focus has been more on the product space and its relationship with economic development.[5, 6, 8] On the study of economic development at regional level, there are also some studies based on the network approach, such as Lopes and Araújo (2012)[12].

There are some works as well that focus on the study of networks formed by industries/sectors at national level, there are some works in this field[1, 10, 17] such as the McNerney et al. (2013)[14], who studied the intersectoral relations among 20 economies based on National Accounts' input-output tables. Lopes et al. (2010)[13] also studied the industrial clusters of Portuguese economy using the input-output tables from 1995 to 2006.

Following in Lopes et al. (2010), we examine the links between the various industries of the Portuguese economy in recent years. However, our analysis is based on the type of assets they produce (products), and not on input-output tables. The analysis was based on the definition of minimal spanning tree for 2010 and 2013 and topological coefficients. With these instruments it was possible to assess the impact of the economic crisis of the beginning of the decade in the redefinition and diversification of the Portuguese economy. In order to get a long-term analysis, it was also considered the period between 1995 and 2010.

The paper is organized as follows. In Section 2 the data is described. In Section 3 we briefly discuss the methodology used and present the results for the minimal spanning trees. Section 4 explains the topological coefficients used and presents the results for the period 1995-2010 and 2010-2013.Finally, Section 5 presents the concluding remarks.

2 Data

In this exercise we used data from the Annual National Accounts from 1995 to 2013. For each year, we considered the values of production of each industry by type of product. The Annual National Accounts production values can be broken down into four levels: 127; 82; 65 or 38 industries. Simultaneously, the total annual production by type of asset (product) also has four levels of disaggregation: 433; 87; 65 or 38 products. Classification by industry of a given business is determined by its economic activity classification (NACE code), that, in turn, takes into account the main activity of the firm.[1]

In order to ensure a balance between a higher level of detail, provided by a larger breakdown, and a better ability to analyze the results, guaranteed by less branches, we used the breakdown of 65 branches for the years 2010 to 2013. Prior to 2010, only the lowest level of breakdown is available. Table 3 (see appendix) presents the considered industries and their codes for each level of breakdown.[2]

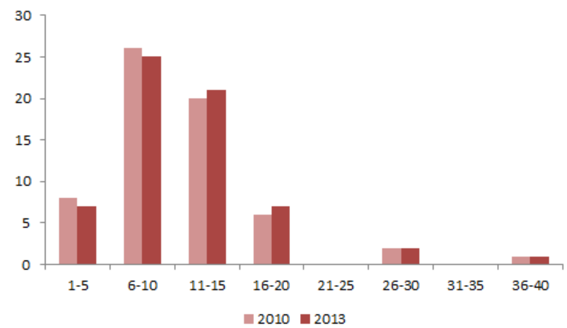

Figure 1: Distribution number of industries per product produced intervals

Figure 1 shows the distribution of branches by number of asset types produced in 2010 and 2013.[3] The vast majority of branches of activity produced between 6 and 15 classes of products, whereas the industry of production activities for own final use only produced an asset and, at the other end, the industry of wholesale trade produced 40 kinds of products in 2010 and 2013. Also noticeable is the slight increase in the diversification of production in the period, with a reduction of the industries that produce only 1-10 products and an increase of the industries that produce 11-20 type of assets.

3 Networks

Graph theory has not only raised a growing interest in various scientific fields, but has also played a key role in the study of complex systems. The network approach can be described as the treatment of complex problems through analysis of the properties of a set of elements. They are interesting because they allow one to depart from the properties of network's elements and highlight the characteristics of the links between them. Having defined the network, comprised of N elements and the connections among them, we can construct a network with the smallest number of necessary links $(N-1)$ to connect all the N elements together. This type of graph is named minimal spanning tree (MST) and it is constructed by applying a hierarchical aggregation

[1] The NACE codes and the activities included in each class can be found athttp://ec.europa.eu/eurostat/documents/3859598/5902521/KS-RA-07-015-EN.PDF

[2] While considering the list of branches, there are no production values for the branch Activities of extraterritorial organizations and bodies (U), so this was not considered in the analysis.

[3] Only levels of production above one million euros were considered. We chose to not consider all the assets produced by each industry because the absolute number of products by industry remains the same over the time series. This problem in the structure of data was also taken into account when constructing the adjacency matrices (Section 4).

process to the original links of the network.

The study of the networks also makes use of a set of coefficients - the topological coefficients - with the aim of characterizing the properties of the links established between a number of elements. In this context, the main coefficients' value allow one to distinguish the different network systems and meet some of the associated mechanisms or even the responsible ones for its formation. In this section, we will describe the methodology used in the construction of the minimal spanning trees for the Portuguese economy and the underlying results. As stated above, Section 4 presents the topological coefficients.

3.1 Minimal Spanning Tree

Given that each branch of activity can produce various types of assets and each type of asset can be produced by various branches of activity, it is possible to build a representative industry-product matrix of the annual output of the Portuguese economy. The assumption made in this exercise is that, the closest two outputs are, the closest their correspondent industries will be. This proximity is measured by the amount of product classes shared by the production of two industries. If only the number of products in common is considered, there may be the case where two industries share a large number of product classes, but with a weak relevance in monetary terms (e.g. the industries 18 and 72 share 13 products but only 5 of them have values above 1 million euros). Moreover, since the number of assets produced by industry does not varies over time, if we only had taken into account the number of assets produced, we would not be able to capture the evolution in industries interlinkages.

Taking this into account, the value of production of each product by each industry was considered in the estimation of adjacency matrix NxN, where the degree of each link is given by:

$$w_{ij} = \sum_{k=1}^{K} p_{ik} p_{jk}$$

where the p_{ik} and p_{jk} are the levels of output of industries i and j for the product k, respectively. Thus, the higher the value of the simultaneous production of two industries (or nodes n_i), the greater the degree of their connection (w_{ij}) in the adjacency matrix. To illustrate why we chose to take into account the output values, we use the example from above: for 2013, using our approach, we obtain the degrees $w_{18,72} \approx 4,132,400,000$ and $w_{65,72} \approx 25,939,650,000$,which means the link between industries 65 and 72 is stronger than the link between 18 and 72. in contrast, If we only considered the products in common we would have $w_{18,72} = 13$ and $w_{65,72} = 2$, which would imply the opposite conclusion.

Having obtained the adjacency matrix, one can build the MST using the nearest neighbor method. In order to do this, it is necessary to obtain the distance d_{ij} between pairs of i and j branches. The distance is given by:

$$d_{ij} = \frac{1}{w_{ij}}$$

Having the adjacency matrix NxN been transformed into a distance D matrix, we can rank the links between nodes using the nearest neighbor method. Considering a given node n_i, it is set at a node n_j if

$$d\{c_i, c_j\} = min\{d\{c_i, c_j\}\}$$

with the distance between nodes to be defined by $d\{c_i, c_j\} = min\{d_{pq}\}$ com $p \in c_i$ e $q \in c_j$. The process continues until all nodes are connected by $N-1$ links. The MST obtained is one that minimizes the total distance between nodes.

3.2 Results: from 2010 to 2013

Figure 2 shows the industry-product matrix, the adjacency matrix and the MST for 2013. In order to enhance the analysis of the industries, Gross Value Added (GVA) [4] was also considered when defining the size of the nodes.

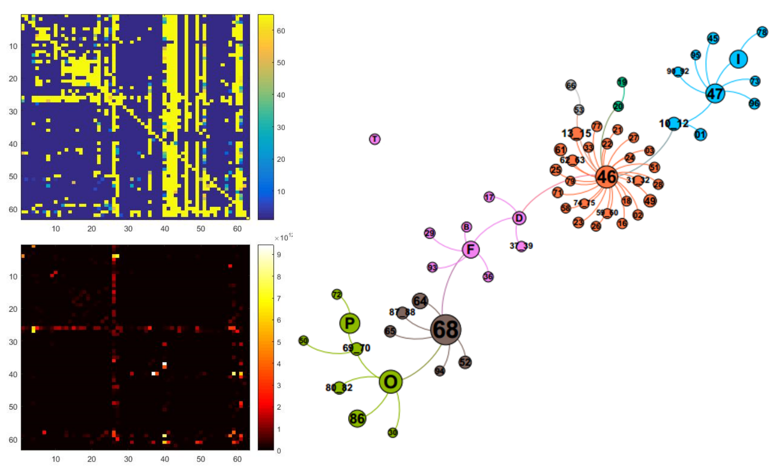

Figure 2: Matrix industry-product, adjacency matrix and MST for 2013 A65

When comparing to 2010 (Figure 3) we conclude that the wholesale trade (46) and construction (F) industries were those that showed a greater reduction in their weight in the Portuguese economy, presenting both a lower GVA and less industries connected to them. On the other hand, the industries of retail trade (47) and real estate development (68) increased the number of industries connected to them. This development suggests that the industries most adversely affected by the decrease in aggregate demand were also those with larger reduction in their connections to other industries of the economy. One possible explanation could be that the firms in these industries greatly reduced their production while maintaining the diversity of products. The other possible explanation is the reduction of the varieties of assets produced (specialization). By observing the production structure (distribution by asset produced) we find

[4] GVA = Production - Intermediate Consumption. This indicator serves as proxy for the weight of the industry in the GDP. Some industries with significant production values may have a reduced value added (e.g. Manufacture of refined petroleum products).

that, while the construction industry reduced its relevance through a significant reduction of output, the wholesale trade maintained its core production and cut the output of less relevant products.

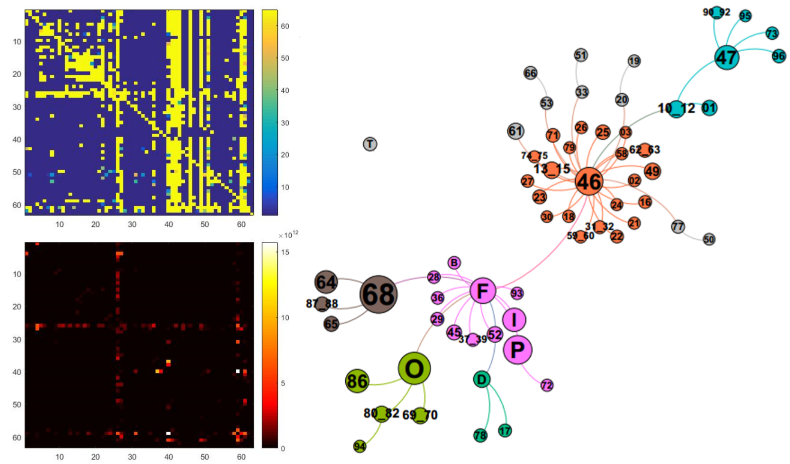

Figure 3: Matrix Industry-Product, adjacency matrix and MST for 2010 A65

Figures 6 and 7 (see Appendix) are representations of partial graphs for the years 2010 and 2013. Given that, except for the industry of the activities of households as employers of domestic staff (T) [5], all industries share at least one product [6], it is necessary to filter out the existing connections that are less meaningful. The criteria used was to consider only $w_{ij} > \frac{1}{L_W}$, where L_W is the threshold distance that ensures the connectivity of the network in case of breakdown in 65 industries, is the distance between the postal activities (53) and financial auxiliaries (66).

Consistently with the representation of the MST, it is possible to observe a reduction in the number of connections between the branches of the wholesale cluster (red) and a strengthening of the real estate branches (blue) and retail trade (green).

3.3 Results: from 1995 to 2010

The evolution of the Portuguese branches of activity can also be analyzed for the period 1995 to 2010. As stated above, data is only available with breakdown of 38 branches and 38 products. By comparison between Figures 4 and 5, it can be seen that a lower degree of disintegration does not lead to significantly different results. Given that the 38 branches the branch G includes trade activities and wholesale and retail trade and repair of vehicles, the MST to 38 branches has a higher concentration of nodes around this branch. Similarly, the branches of real estate and financial activities have the codes L and K, respectively.

[5]This branch includes households employing domestic staff and has as its only asset produced the domestic services.

[6]When considering 65 branches, there are on average 1,950 connections. For breakdown in 38 branches there are 650 connections.

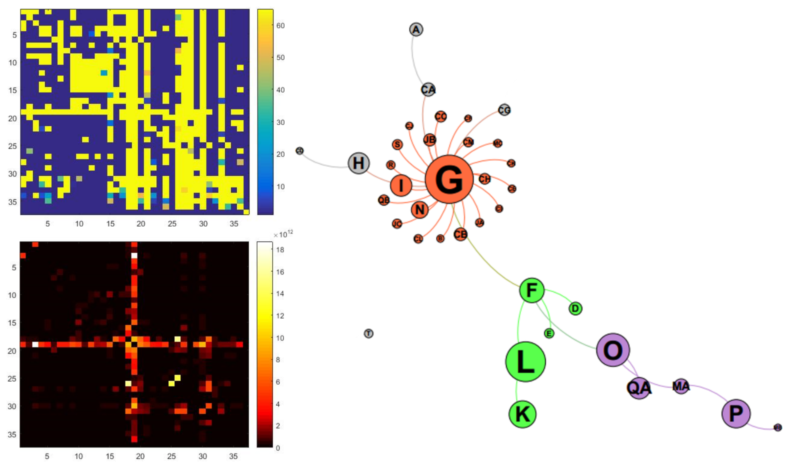

Figure 4: Matrix Industry-Product, adjacency matrix and MST for 2010 A38

When compared to 1995 (Figure 5), one can observe a reduction in the importance of trade industry (G), with a smaller number of industries connected to it and the reduction of its weight in the economy. It is also noticeable the increasing importance of the transport industry (H) and its connection to petroleum products (CD). Likewise, the public administration (O) also strengthened its relative importance, forming a new group with health branches (QA), education (P) and R&D (MB).

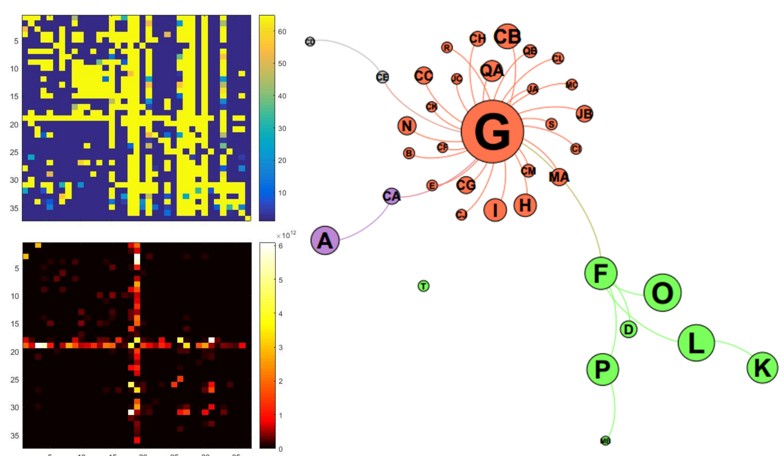

Figure 5: Matrix Industry-Product, adjacency matrix and MST for 1995 A38

The 38 industries, and their respective links, are also shown for this period in Figures 8 and 9 (see Appendix). The lesser degree link is among the branches of R&D and education. When compared to 1995, in 2010 trade industry had less economically significant links and lost some of its centrality. It is also worth mentioning the formation of a small group of education industries and R&D. It is also important to note that the link between construction (F), real estate (L) and financial activities (K), which includes real estate investment funds, remains through the period.

4 Topological Coefficients

In order to improve the graph analysis of the structural transformation of Portuguese economy, some topological coefficients should be introduced. As in Araújo and Ferreira (2016)[3], we considered six topological coefficients, the first three set to the node level and the other to the network level :

1. the average degree (k) of the network measured by the average number of connections that join each network element;

2. betweenness centrality (B) measured as the fraction of paths connecting every pair of nodes and which contain the node of interest (i);

3. clustering coefficient (C), which measures the average probability that two nodes to a neighbor in common are interconnected

$$C = \frac{E(v_i)}{v_i(v_i - 1)}$$

where$E(v_i)$ is the neighborhood size (v_i) i node and the neighborhood node i consists of all nodes directly connected to it;

4. the network diameter (D) which measures the distance between the two most distant nodes in the network;

5. network density (d) between 0 and 1, which is the ratio of net compared to the number of possible connections

$$d = \frac{L}{N(N - 1)}$$

where L is the number of connections N the the number of nodes;

6. the average path length (l_G) between all pairs of graph G_w given by

$$l_G = \frac{\sum g_{ij}}{N(N - 1)}$$

where g_{ij} is the minimum distance between nodes i and j.

Since, for many years, all industries (other than the industry T) produce more than one product and therefore have links to all other industries, calculating network coefficients would not bring significant value added if it applied to original graphs. Thus, we decided to compute the coefficients for the underlying networks of Figures 6, 7, 8 and 9. One of the vulnerabilities associated with the calculation of the coefficients for the filtered graph (instead of the original) is that they will be influenced by the value the threshold distance, i.e., an increase in the threshold will lead, all other things being equal, a reduction in the number of links in the graph and, for example, a reduction in mean degree.

4.1 Results: from 2010 to 2013

Table 1 contains the data of the network coefficients for the years 2010-2013.

	L	k	B	C	D	d	l_G
2010	703	22.32	19.82	0.78	4	0.36	1.66
2011	592	18.79	21.84	0.75	3	0.30	1.73
2012	522	16.57	23.05	0.72	3	0.27	1.77
2013	523	16.60	23.16	0.72	3	0.27	1.74

Table 1: Topological Coefficients 2010-2013

The table shows that increasing the threshold led to a progressive reduction of the number of links (L) of the graph analysis. With this, the density measured by d also decreased and the minimum distance D increased. The analysis of degree k coefficient, betweenness centrality B and C is complemented by the Table 3 (see Appendix) which contains the coefficients by. In addition to the general trend, in line with the reduction of the network links, one can also conclude that the branch 46 remained the branch with higher degree centrality k and betweeness B.

At the same time, the pharmaceutical industry (21), the manufacturing branches of computer equipment (26), electrical equipment (27) and machinery and equipment (28) as well as the rental activities (77) had a significant increase in its betweenness centrality B. On the other hand, the sectors related to the manufacture of transport equipment (30) and trade and repair of vehicles (45) reduced their degree coefficients and centrality.

4.2 Results from 1995 to 2010

Table 2 contains the data of the network coefficients for the years 1995-2010.

	L	k	B	C	D	d	l_G
1995	151	8.16	14.40	0.73	4	0.23	1.85
2000	130	7.03	14.87	0.70	4	0.20	1.87
2005	115	6.22	15.30	0.67	4	0.17	1.90
2010	74	4.00	18.35	0.74	4	0.11	2.08

Table 2: Topological Coefficients 1995-2010

As stated for the 2010-2013 period, it is noticeable a reduction in the number of connections and a reduced network density. In individual terms, (Table 4 in the Appendix), there has been an increase in the betweenness centrality B for the branches of petroleum products (CD), trade (G), consulting (MA) and utilities (O). In contrast, there has been a reduction of the same coefficient for the industry of administrative and support services (N).

5 Conclusion

In this paper, the industries of the Portuguese economy were analyzed through a network approach. The study covered two distinct periods: 2010-2013, which coincided with the sovereign debt crisis and the implementation of the Economic and Financial Adjustment Program in Portugal, and the previous period, 1995 to 2010. In order to evaluate the structure and evolution of the branches of activity in Portugal, we used data from the annual national accounts for the years covered.

The criteria used to assess the links between branches of activity was the simultaneity in production assets (products). Given the structure of the Portuguese economy, the analysis of industries via full network representation becomes impractical, since, except for one branch, they are all linked together. Therefore we used the minimal spanning trees and topological analysis coefficients for the branches of activity.

Between 2010 and 2013, despite the decline in their relative importance, possibly associated with the compression of aggregate demand, the industries linked to trade (retail, wholesale and vehicles) were defined as being central in the Portuguese economy both by MST analysis and the topological coefficients. It is also worth noting the reducing importance of construction, in contrast to real estate.

Compared to the previous period (1995-2010), there was a gradual increase in the importance of public administration, as in the manufacture of petroleum products, which in turn also deepened the connection to the transport activities.

One may, in short, conclude that the Portuguese economy suffered a progressive reconfiguration of some branches of economic activity, marked by the effect of the economic crisis in the recent past.

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Appendix

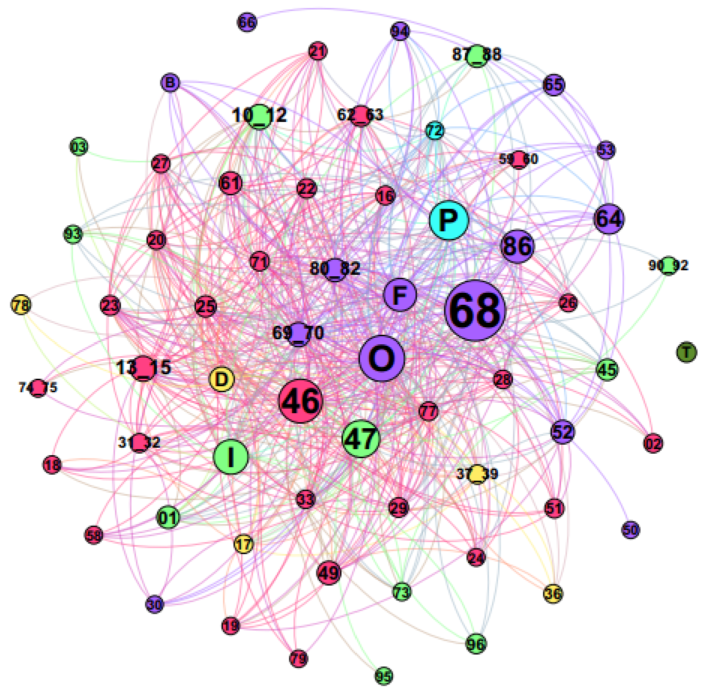

Figure 6: Network of 65 Industries in 2013

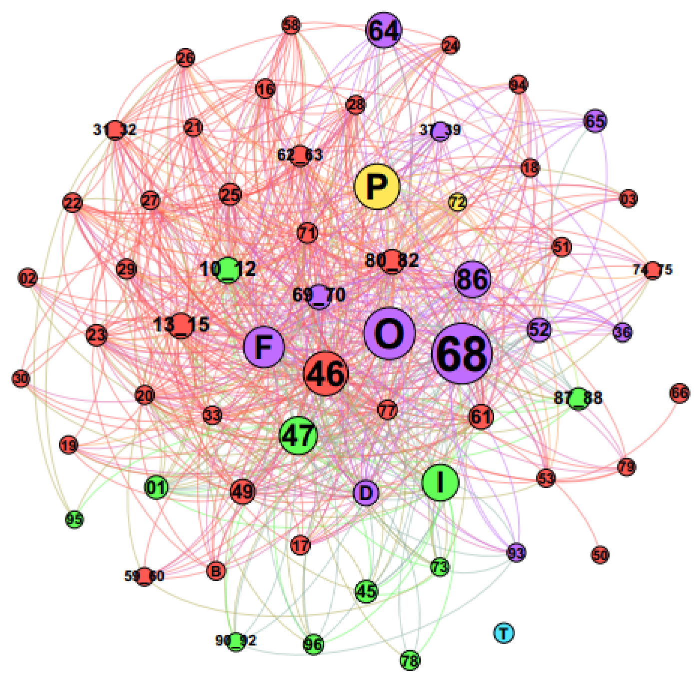

Figure 7: Network of 65 Industries in 2010

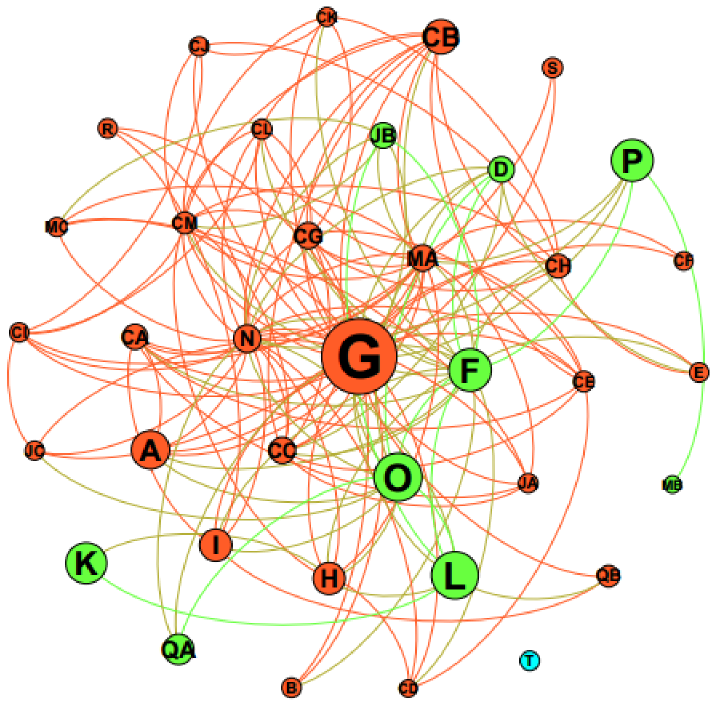

Figure 8: Network of 38 Industries in 1995

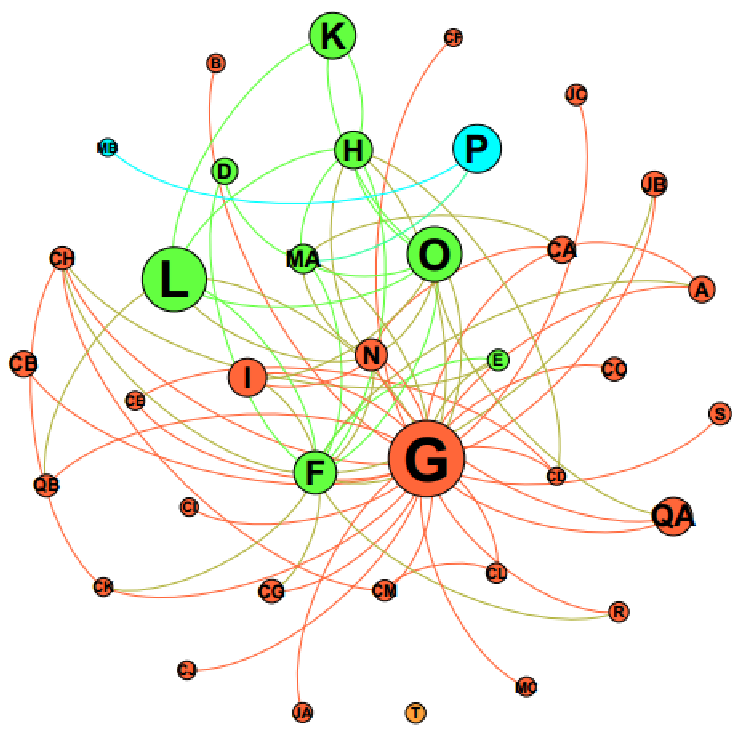

Figure 9: Network of 38 Industries in 2010

Name	A65	A38
Crop and animal production, hunting and related service activities	1	A
Forestry and logging	2	A
Fishing and aquaculture	3	A
Mining and quarrying	B	B
Manufacture of food products, beverages and tobacco	10_12	CA
Manufacture of textiles and wearing apparel	13_15	CB
Manufacture of wood and of products of wood and cork	16	CC
Manufacture of paper and paper products	17	CC
Printing and reproduction of recorded media	18	CC
Manufacture of coke and refined petroleum products	19	CD
Manufacture of chemicals and chemical products	20	CE
Manufacture of basic pharmaceutical products	21	CF
Manufacture of rubber and plastic products	22	CG
Manufacture of other non-metallic mineral products	23	CG
Manufacture of basic metals	24	CH
Manufacture of fabricated metal products	25	CH
Manufacture of computer, electronic and optical products	26	CI
Manufacture of electrical equipment	27	CJ
Manufacture of machinery and equipment n.e.c.	28	CK
Manufacture of motor vehicles, trailers and semi-trailers	29	CL
Manufacture of other transport equipment	30	CL
Manufacture of furniture	31_32	CM
Repair and installation of machinery and equipment	33	CM
Electricity, gas, steam and air conditioning supply	D	D
Water collection, treatment and supply	36	E
Sewerage; Waste collection, treatment and disposal activities	37_39	E
Construction of buildings, civil engineering and specialised construction activities	F	F
Wholesale and retail trade and repair of motor vehicles and motorcycles	45	G
Wholesale trade, except of motor vehicles and motorcycles	46	G
Retail trade, except of motor vehicles and motorcycles	47	G
Land transport and transport via pipelines	49	H
Water transport	50	H
Air transport	51	H
Warehousing and support activities for transportation	52	H
Postal and courier activities	53	H
Accommodation and food and beverage service activities	I	I
Publishing activities	58	JA
Motion picture, video and television programme production	59_60	JA
Telecommunications	61	JB
Computer programming, consultancy and related activities	62_63	JC
Financial service activities	64	K
Insurance, reinsurance and pension funding	65	K
Activities auxiliary to financial services and insurance activities	66	K
Real estate activities	68	L
Legal, accounting activities and consultancy activities	69_70	MA
Architectural and engineering activities; technical testing and analysis	71	MA
Scientific research and development	72	MB
Advertising and market research	73	MC
Other professional, scientific and technical activities	74_75	MC
Rental and leasing activities	77	N
Employment activities	78	N
Travel agency, tour operator reservation service and related activities	79	N
Security, investigation and office support activities	80_82	N
Public administration and defense	O	O
Education	P	P
Human health activities	86	QA
Social work activities	87_88	QB
Creative, arts, entertainment and cultural activities	90_92	R
Sports activities and amusement and recreation activities	93	R
Activities of membership organisations	94	S
Repair of computers and personal and household goods	95	S
Other personal service activities	96	S
Activities of households as employers of domestic personnel	T	T
Activities of extraterritorial organizations and bodies	U	U

Table 3: List of Industries of Annual National Accounts

	2010			2013		
Industry	***k***	***B***	***C***	***k***	***B***	***C***
1	13	0,282	0,949	17	0,353	0,941
2	5	0,183	0,8	7	0,029	0,952
3	3	0	1	6	0	1
B	8	0	1	10	0,04	0,978
10_12	25	17,007	0,68	34	15,986	0,713
13_15	27	15,209	0,644	33	14,073	0,722
16	13	4,714	0,705	23	5,668	0,806
17	12	2,122	0,742	12	0,886	0,848
18	7	0,345	0,857	10	0,41	0,911
19	8	0,674	0,75	9	0,29	0,861
20	21	7,547	0,71	32	12,211	0,722
21	13	0,26	0,936	26	3,266	0,855
22	21	11,055	0,643	24	4,992	0,815
23	18	2,811	0,81	29	5,307	0,808
24	9	0,517	0,833	15	0,501	0,905
25	28	21,29	0,577	34	13,483	0,724
26	15	1,742	0,8	18	4,74	0,863
27	17	2,21	0,809	28	4,581	0,807
28	16	3,232	0,742	30	6,688	0,775
29	18	5,228	0,732	22	3,327	0,818
30	8	0,16	0,929	7	0	1
31_32	18	7,134	0,673	29	17,336	0,717
33	20	13,577	0,605	28	9,843	0,751
D	33	54,051	0,485	27	16,493	0,695
36	7	0,544	0,762	10	0,466	0,822
37_39	17	7,371	0,654	22	4,929	0,753
F	49	182,111	0,357	53	110,942	0,438
45	12	2,929	0,697	11	0,624	0,855
46	52	261,713	0,32	56	184,088	0,4
47	38	134,793	0,364	44	88,834	0,442
49	16	5,884	0,733	25	7,397	0,757
50	1	0	0	1	0	0
51	8	0,77	0,679	14	0,98	0,846
52	14	7,861	0,637	26	20,001	0,64
53	7	60	0,714	10	60,067	0,756
I	21	21,832	0,581	30	21,957	0,653
58	7	0	1	18	1,122	0,922
59_60	9	1,087	0,833	9	0,168	0,944
61	18	6,081	0,719	29	7,866	0,754
62_63	21	9,543	0,686	33	14,344	0,708
64	12	2,777	0,712	16	2,429	0,808
65	8	0,619	0,821	8	0,174	0,929
66	1	0	0	1	0	0
68	30	52,075	0,471	41	63,335	0,495
69_70	45	184,902	0,37	49	81,751	0,481
71	30	27,547	0,549	44	53,441	0,527
72	24	16,276	0,598	32	19,913	0,673
73	8	1,752	0,607	14	2,668	0,747
74_75	3	0	1	10	0,067	0,956
77	35	49,268	0,467	52	149,222	0,442
78	4	0,067	0,833	4	0	1
79	5	0	1	8	0	1
80_82	40	84,315	0,438	47	65,379	0,51
O	41	123,621	0,384	49	88,877	0,475
P	30	27,816	0,568	39	36,709	0,606
86	20	11,311	0,647	33	17,885	0,657
87_88	10	1,409	0,8	13	1,604	0,846
90_92	2	0	1	7	0	1
93	8	0,671	0,857	11	0,866	0,873
94	9	0,612	0,861	14	0,344	0,945
95	2	0	1	4	0	1
96	6	0,091	0,933	9	0,045	0,972
T	0	0	0	0	0	0

Table 4: Individual Coefficients 2010-2013

		1995			2010	
Industry	***k***	***B***	***C***	***k***	***B***	***C***
A	6	0.17	0.93	3	0.25	0.67
B	3	0.00	1.00	1	0.00	0.00
CA	8	2.09	0.68	4	1.33	0.67
CB	10	1.77	0.80	1	0.00	0.00
CC	10	2.54	0.73	1	0.00	0.00
CD	5	0.54	0.80	3	0.75	0.67
CE	8	1.77	0.71	2	0.00	1.00
CF	2	0.00	1.00	1	0.00	0.00
CG	12	6.63	0.64	2	0.00	1.00
CH	8	2.87	0.68	5	2.17	0.60
CI	7	2.00	0.71	1	0.00	0.00
CJ	5	0.67	0.80	1	0.00	0.00
CK	6	0.50	0.87	3	0.00	1.00
CL	8	0.60	0.89	2	0.00	1.00
CM	14	11.99	0.56	3	0.50	0.67
D	7	1.53	0.76	2	0.00	1.00
E	4	0.33	0.83	3	0.00	1.00
F	22	58.02	0.35	15	61.95	0.26
G	33	218.61	0.22	31	449.06	0.08
H	9	20.32	0.61	8	15.71	0.61
I	7	3.17	0.57	4	0.00	1.00
JA	6	0.67	0.80	1	0.00	0.00
JB	7	1.37	0.76	2	0.00	1.00
JC	5	0.25	0.90	1	0.00	0.00
K	2	0.00	1.00	3	0.00	1.00
L	8	16.56	0.54	7	11.37	0.62
MA	21	45.84	0.37	8	78.23	0.46
MB	1	0.00	0.00	1	0.00	0.00
MC	5	0.25	0.90	1	0.00	0.00
N	26	89.64	0.29	9	7.31	0.58
O	11	7.99	0.54	9	16.38	0.58
P	5	34.00	0.60	2	34.00	0.00
QA	3	0.00	1.00	3	0.00	1.00
QB	3	0.31	0.67	2	0.00	1.00
R	3	0.00	1.00	2	0.00	1.00
S	2	0.00	1.00	1	0.00	0.00
T	0	0.00	0.00	0	0.00	0.00

Table 5: Individual Coefficients 1995-2010