Centrality in the World Network of Trade and Value Added: a comparison of European countries

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By means of network analysis, we assess the position of the EU members in the world trade networks (WTN) and its evolution over time. We focus on centrality indices considering both trade links generated by aggregate gross export flows as well as links generated by exchanges of intermediate goods and flows measuring domestic value added. We find that the EU bloc tends to shift position over time as a tight community within the WTN, because of the relevance of its internal links and because of the presence of regional production chains. We also observe that the position and centrality of its members changes in time: for example, Germany and Italy become closer together, while the UK becomes much less central. The communities formed through production links group together different countries in different sectors. We use the computed centrality measures to explain the export performance of the different countries.

JEL Classification: C02, F10, F14.

Keywords: Global value chains, Trade in value added, Network analysis.

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1. Introduction

The position of Europe and of individual European countries in world trade has been changing remarkably since the end of World War II and it kept changing recently.

In the first phase, that goes from the end of World War II to the first half of the 1970s, European countries regained international market shares to the United States, while China's trade dynamics was essentially null, and its export participation was mediated by Macao, Hong Kong and Taiwan. Germany's exports grew at a much faster pace than the ones of Italy, reaching a world trade share of 13%.

The second phase, running along the twenty years between the mid-seventies and the mid-nineties, is a phase of relative trade stability for Italy, Germany and the US. Their trade shares were around 4.7%, 10.3% and 11.8%, respectively. On the other hand, China started its remarkable export grow during these years.

The third phase marks the contraction of export shares for Italy, Germany and the US and the large expansion of Chinese shares, which now reach 14.1% of world exports.

[Figure 1 – Long-term trends in export market shares – about here]

In this paper we offer a view on the evolution of the Italian and European model of trade based on the analysis of the structure of Italian comparative advantages through the lenses of network analysis. To give account of role played by global value chains in influencing the production structure of countries, we compare the information on gross trade values, from the UN Comtrade database, and value added trade, from the WIOD database (Timmer *et al.,* 2015).

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2. New trade features and the evolution of the trade positions

A key feature of international trade patterns in the last decades is the development of international production chains stretching across different countries, where the various production phases and the creation of value added for a given final good is taking place in different locations. As a consequence of the growing relevance of trade in intermediate goods, directly related to the expansion of IFP and embodied in final goods, the observation of gross export values is less indicative of the actual comparative advantages of a country than in a context where only final goods are traded. This occurs because of double counting (some parts of goods can cross the border of a given country more than once) and because the domestic contribution to export can be overstated. This phenomenon has been studied extensively in the

recent trade literature in order to understand how the shift from trade in final goods to this `vertical trade' affected the trade patterns and specialization of countries (Deardorff, 2001; Hummels et al., 2001; Yi, 2003; Johnson and Noguera, 2012), and it led scholars to partially revise the traditional measures of trade flows across countries and the related indexes of comparative advantage (Deardorff, 2005; Baldone et al., 2007; Stehrer, 2012; Koopman et al., 2014).

The matter is not only a measurement issue. This international reorganization of production can allow countries to modify and improve their competitiveness. Higher competitiveness through IFP can be reached through cost and, therefore, price reduction (Deardorff, 2001); it can arise through technological improvements or factors' productivity enhancement (Grossman and Rossi-Hansberg, 2008; Halpern et al., 2011) and through the quality of intermediate inputs and components from abroad incorporated in a country's final product. Therefore, the reorganization of production by means of IFP could have helped Italy and other advanced countries to preserve their traditional comparative advantages (see Baldone et al., 2002). The literature of the 2010s emphasizes the crucial role of firms' productivity in its relation with the export status of firms (Castellani, Serti and Tomasi, 2010), together with their capacity to adapt to the changing world markets, and to benefit from the opportunities arising from the international fragmentation of production (IFP) and the creation of global value chains (GVCs).

But there can be also negative effects related to the adoption of IFP. In fact, a large gross export flow can generate a small effect on national income if the amount of domestic value added embodied in exports is trivial. In a context where IFP is widespread, in order to assess the specialization model for a country, it is not enough to consider the structure of its gross exports, but it is important also to understand in which sectors value added, and therefore income, is generated. A country may present a revealed comparative advantage in a sector using a measure based on gross trade, but that advantage might be originated by foreign imported inputs and produce a small effect on the domestic economy.

It is therefore useful to assess whether the structure of trade emerging from the traditional trade measures is confirmed by an analysis undertaken using only the domestic value added embodied in exports to measure comparative advantages. This can be done using recent datasets based on inter-country input-output tables and accounting decomposition methodologies developed originally by Koopman et al. (2014).

3. Network analysis of the Italian and European position

3.1 The role of network analysis

A useful way to assess the changing position of Italy in international markets is through the visual and topological representation of its position in the network of international trade flows. Italy, as every other country, is represented as a node of the network, connected through trade link to its trade partners. The position in the network does not depend exclusively on the characteristics of the country itself but also on the influence that the position of others exerces

The implication of this structural view is that the relation between country *i* and country *j* cannot be considered independently from the relation between *i* and *z*, and between *j* and *z*. This is very important when we want to understand Italy's position in the world markets, as even if the country's characteristics and specialization remained stable, the rest of the world changed dramatically the three phases depicted in Figure 1, inevitably affecting Italy's position. The application of Network Analysis (NA) can, therefore, nicely complement previous empirical evidence.

The network of trade links, in which Italy is involved directly or indirectly, can be examined in its binary version (just considering the partnership status of any pair of countries) or its weighted version (also considering export values). In both cases, network analysis provides several indicators to assess the importance of a node centrality, capturing different aspects of its position with respect to the structure of connections (Newman, 2012; Borgatti, 2005). In general, even if all indices share the same axiomatic configuration (Bloch, Jackson and Tebaldi, 2016), each of them, being constructed using different information on node's position, can provide different insights on the country's participation to international.

Centrality measures can be classified into four main groups (Jackson, 2010): a) degree centrality, that measures how much a node is connected to others (with strength centrality as a weighted version of degree centrality); b) closeness centrality, showing how easily a node can be reached by other nodes; c) betweenness centrality, describing how important a node is in terms of connecting other nodes; d) the fourth group of indexes, such as the eigenvector centrality measure, which associates node's centrality to the node neighbors' characteristics, directly referring to how important, central, influential or tightly clustered a node's neighbors are.[3] We compute these measures for Italy, in 1965, 1995 and 2011, to better understand the evolution of the position of the country and how this is connected to the changes occurred in its export market share.

3.2 The evolution of the Italian position in the World Trade Network

The network of world trade is represented in Figures 2a, 2b and 2c, displaying the structure of exchanges among countries over time. Countries are the nodes of the graph and trade flows are the links connecting nodes. Countries from the same continent share the same node's color. Following De Benedictis et al. (2014) and Zhou, Wu and Xu (2016), in order to sparsify the trade matrix and focus on the backbone of trade connectivity, only the two largest export flows are displayed (the out-degree of the nodes is fixed to two) to keep the figures readable, and the size of the dot representing each country is proportional to the number of incoming trade links of the country (the in-degree of the node).

[Figure 2a,2b and 2c (WTN 1965, 1995, 2011) about here]

As mentioned, a primary use of network analysis is to identify key-players by looking at the position they have in the system. The concept of centrality seeks to quantify graph theoretic ideas about an individual node's prominence within a network by summarizing structural relations among the nodes. A node with high degree centrality maintains numerous contacts

[3] For details on these measures of centrality, see De Benedictis et al., 2014. A general treatment of the issue can be found in Newman (2013).

with other network actors. Nodes have higher centrality to the extent they can gain access to or influence over others. A central node occupies a structural position (network location) that serves as a source or conduit for larger volumes of exchange with other nodes. In the visual representation of networks, central nodes are located at or near the center in network diagrams of topological space. In contrast, a peripheral country maintains few or no relations and thus is located spatially at the margins of a network diagram. The algorithm (e.g. Force-directed algorithm) used to draw Figures 2a, 2b and 2c follows this approach, and it places at the center of the figure the most connected countries, so that centrality in the figure is related to a central position in the world trade network in terms of overall linkages.

In Figure 2a we can see that the world trading system in 1965 was built around the USA and the UK. This last country was playing a key role in connecting Europe (blue nodes) and the USA to many developing countries. In the graph, Italy is still a relatively peripheral country, but it is strongly connected to the trading center of Europe through its strong links to Germany and France. The picture in 1995 (Figure 2b) is substantially different. The UK still plays the role of bridging different parts of the network, but it is much less central. Japan appears as a much more relevant player, and other Asian countries are more visible, but to a large extent, developing countries are still quite peripheral. One of the areas that changed the most is Europe: the effects of the process of European integration are clearly visible. Italy, together with Germany and France, forms a strong trading group at the core of Europe. Italy also plays the role of connecting this core to some more peripheral parts of Europe and North Africa.

The process of European integration continues to be visible in Figure 2c, where the trade ties between Italy and Germany are so strong to make the two countries overlap in the graph, and where very strong ties appear among all the main EU members. But in 2011 the network structure suggests a partition of the world trading system in two: on the one hand, a very connected European bloc, strongly tied to its geographic neighbors and to some parts of Africa. Italy is at this point more connected and more central than the UK, still working as bridge, but much more peripheral than it used to be in the past. The second bloc in the picture is built around the strong trade ties between USA and China. China was hardly visible in the network graph in 1995, while it has become much more central in 2011. Over this time period, Italy moves closer to the center of the network, but its evolution is always very closely connected to the rest of Europe.

To better assess Italy's position, it is useful to analyze the topological indices related to the position of the country in the network, in order to correctly interpret the visual impression gathered from Figures 2a-2b-2c.

Table 1 – Network indicators for Italy

		1965				1995				2011			
$\mathcal{N}(\mathcal{V},\mathcal{L})$		$\mathcal{N}_{1965}(134, 5293)$				$\mathcal{N}_{1995}(178, 15331)$				$\mathcal{N}_{2011}(182, 21451)$			
Density		0.30				0.48				0.65			
Zeros		12932 [0.70]				16353 [0.52]				11673 [0.35]			
Ego-network statistics - Italy		$\mathcal{L}$-in	$\mathcal{L}$-out	$\mathcal{W}$-in	$\mathcal{W}$-out	$\mathcal{L}$-in	$\mathcal{L}$-out	$\mathcal{W}$-in	$\mathcal{W}$-out	$\mathcal{L}$-in	$\mathcal{L}$-out	$\mathcal{W}$-in	$\mathcal{W}$-out
		1965				1995				2011			
1	Centrality												
1.1	degree	0.90	0.91	4.02	4.53	0.97	1.00	3.89	4.83	0.99	1.00	3.23	3.01
1.2	closeness	0.87	0.92	0.93	0.98	0.97	1	0.81	0.13	0.99	1.00	0.99	0.01
1.3	betweenness	0.47		0.06		0.88		0.17		0.99		0.10	
1.4	eigenvector	0.95		0.96		0.98		0.23		0.99		0.19	
2	Distance	1.14	1.09	245.50	239.75	1.03	1.00	921.83	232.55	1	0.99	1241.31	246.22
2.1	Italy → Germany	1	1	1.37	1.01	1	1	1.25	1.08	1	1	1.98	2.49
2.2	Italy → UK	1	2	2.78	2.94	1	1	2.89	2.25	1	1	5.36	4.37
2.3	Italy → United States	1	2	1.72	3.99	1	1	3.38	2.33	1	1	5.45	4.17
2.4	Italy → Japan	1	2	2.33	4.60	1	1	3.59	3.07	1	1	5.27	5.55
2.5	Italy → China	∞	4	∞	60.12	1	1	5.26	5.24	1	1	4.22	4.39
3.1	Hubness	0.98		0.23		0.99		0.30		0.99		0.17	
3.2	Authority	0.97		0.34		0.99		0.14		0.99		0.15	

Source: our elaboration on UN Comtrade database.

In Table 1, we see the effects of growing globalization in the WTN: over time the number of trade links among countries increased (from 5293 in 1965 to 21451 in 2011), increasing the value of density in the network (the ratio between the number of existing links and the number of possible links) and reducing the number of countries' pairs with zero trade among them (from 12932, that corresponds to 70% of the possible links - in square brackets -, in 1965, to 11673 [35%] in 2011). The position of Italy is assessed looking at different position indicators, which consider separately whenever possible in-coming and out-going links (import flows and export flows, respectively), and consider the simple presence of links (binary network perspective, or the extensive geographic margin), or their strength (the value of trade carried on each link, or the intensive margin). Looking at the binary centrality indicators, we see that Italy's position in the system becomes more central over time, as the number of links that the country has with the rest of the world grows, and they connect the country with the main world markets, as seen also in Figures 2. But considering the centrality indicators that take into account the strength of the links, the resulting trend is quite different. As the complexity of the network increases and the role of emerging countries grows since the late 1990s, the relative centrality of Italy tends to diminish. This is in line with the decline in market shares observed in Figure 1, but additional information can be obtained considering the global Italian position in the system. The main reason of concern for the position of Italy comes from the reduction of the eigenvector centrality, which computes the position of a country in the WTN with respect to the main players of the system. The reduction of this indicator suggests that the Italian geographic orientation of its trade flows did not adapt to the evolution of the world trading system, as a large part of its trade flows is connecting the country to relatively peripheral nodes.

This is confirmed by looking at the second set of indicators, measuring the topological distance between countries in terms of trade flows. Over time, Italy has become more "distant" from the

most relevant world markets and from the most relevant suppliers. We see that between 1965 and 1995, the relative distance from Germany, UK, USA and Japan decreased somewhat in terms of out-going links, in the period of expanding Italian exports, but it was increasing in terms of imports, as Italy's participation to the production chains of these countries was probably not very strong. Between 1995 and 2011, all distance indices with the main industrialized countries increase. The only country seeing a decline in distance for the overall period is China, but even in 2011 the Asian country was still far apart from Italy. The fact that Italy is no longer pointing mainly to the most relevant nodes of the system is also visible looking at the hubness index, that should be high for a country exporting to the most important markets on the network: for Italy this indicator goes from 0.30 to 0.17 between 1995 to 2011. The authority index, showing how relevant a market is for the most important exporters, is more stable in this period, but still quite low for an advanced country.

4. The international organization of production and sectorial trade structures

As mentioned above, in a world where the role of GVCs has been increasing rapidly, the involvement of a country in these international production processes can deeply affect its comparative advantages and its location in the WTN. Not only the extent of participation to GVCs can be relevant, but also the structure of the existing international production links and the position of a country along the GVC can determine its performance in international markets. In fact, for the same level of gross exports, countries can generate very different amounts of domestic value added (and therefore domestic income) according to the position they have in the production chain, and have different power in setting prices with respect to the final destination markets (Antràs et al., 2012; Baldwin and Lopez-Gonzales, 2015).

For these reasons, we want to examine more in details Italy's comparative advantages in two sectors of strong specialization considering the overall position of the country in the trading system, both in terms of gross exports and in terms of domestic value added content of export. The position of Italy in the global production network in these sectors can determine if a central position in gross trade is accompanied by a large amount of value added generated.

The sectors considered here are leather and footwear, and machinery. We chose these sectors as they are the two in which traditionally Italy holds the strongest comparative advantage (see Tab. 1 and 2). But these sectors are very different in terms of technological content, and the competition in world markets in these sectors evolved differently.

4.1 Trade structures in footwear and in machinery

Figures 3 and 4 show the network of world trade in the two sectors analyzed, similarly to what was done for aggregate trade in Figure 2. In a traditional, labor intensive sector like footwear (Fig. 3) we can observe the relevant role of many emerging and developing countries already in 1995. Italy appears as the second most connected market in this industry, by far the largest industrialized country in this network, confirming the "anomaly" of its specialization. Italy is closely linked to many European countries also in this sector, but it has a number of relevant ties to many small less developed countries as a relatively central player in both industries.

In 2011, the spectacular growth of China in footwear trade is evident, with the country reaching even more the central position of the network, connected in terms of gross exports to nearly every other country of the system, and outweighing most other countries. In this industry, Italy appears as the only country still competing with China for the most central position.

[Figure 3 (network in footwear, gross trade) about here]

The trade network in machinery (Fig. 4) shows even deeper changes in the trade structure. In 1995 the network is dominated by the large developed countries, with very close positions of the European group, and very close ties between the USA and Japan. Italy is part of this core group. Fifteen years later, China seems to have taken over the center of the network, while Japan and UK remain relatively central, but much less relevant, and European countries are no longer forming such a connected group. Italy's position in the European core of the network is preserved, as well as its ties with Germany.

[Figure 4 (network in machinery, gross trade) about here]

4.2 Global value chains and structure of exchanges of value added in footwear and machinery

In order to understand the role of GVCs in the deep changes observed in the examined network structures and in Italy's relative position, it is useful to start by considering the origin of the value added embodied in Italy's export in the two sectors. This can be done by computing the domestic and the foreign value added content of gross exports. The methodology used to assess value added at the sector level, taken from Wang et al. (2013), decomposes the final value of Italy's exports of a given sector *s* in the domestic part, originated in any domestic sector, and in the foreign parts, including both direct and indirect foreign value added from different countries. For Leather products and footwear, this decomposition is presented in Table 2.

Table 2. Origin of value added in Italian export of Leather Products and Footwear – DVA and FVA share of gross exports (%)

1995		2011	
Domestic VA share	**84.729**	**Domestic VA share**	**81.744**
Total FVA share	**15.271**	**Total FVA share**	**18.256**
Germany	2.128	Germany	1.666
France	1.636	China	1.520
United States	1.483	United States	1.465
United Kingdom	0.904	Russia	1.194
Australia	0.604	Brazil	1.173
Netherlands	0.579	France	0.979
Belgium	0.575	United Kingdom	0.720
Russia	0.550	Spain	0.710

Spain	0.490	Netherlands	0.512
Brazil	0.424	South Korea	0.386
Japan	0.406	Australia	0.357
India	0.393	Belgium	0.330
China	0.278	Turkey	0.314
Austria	0.237	India	0.306
South Korea	0.180	Japan	0.272
Sweden	0.175	Austria	0.262
Canada	0.165	Indonesia	0.224
Indonesia	0.145	Poland	0.197
Turkey	0.144	Ireland	0.169
Ireland	0.137	Canada	0.167
Taiwan	0.128	Mexico	0.165
Poland	0.121	Sweden	0.130
Mexico	0.104	Czech Republic	0.127
Denmark	0.090	Romania	0.126
Slovenia	0.080	Taiwan	0.116
Finland	0.072	Hungary	0.107
Luxembourg	0.066	Denmark	0.069
Portugal	0.064	Portugal	0.067
Czech Republic	0.060	Slovak Republic	0.066
Hungary	0.055	Finland	0.063
Romania	0.053	Slovenia	0.053
Greece	0.042	Luxembourg	0.043
Slovak Republic	0.027	Greece	0.042
Lithuania	0.023	Bulgaria	0.035
Bulgaria	0.022	Lithuania	0.015
Malta	0.011	Malta	0.007
Latvia	0.006	Estonia	0.006
Estonia	0.004	Latvia	0.005
Cyprus	0.003	Cyprus	0.002
Rest of the world	***2.603***	***Rest of the world***	***4.088***

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The increase of the share of foreign value added in Italian gross exports of leather products and footwear confirms that also in this sector there has been a reorganization of the production processes and the extent of international fragmentation of production has increased somewhat. Both in 1995 and 2011 Germany was the main supplier of FVA for this industry, and a number of advanced, high income countries appear as relevant suppliers still in 2011, even if with a generally smaller share, indicating that also in a very traditional and labor-intensive sector, the delocalization of production phases is not relying only on low cost locations. At the same time, the change of position of China, whose share of value added in Italian export in this sector increased by more than 5 times confirms the relevance of this country in the manufacture of traditional goods even for countries that maintain a strong RCA in this sector. Also the F share

of central and eastern countries members of the EU increased on average by more 50% in this period.

This shift toward foreign suppliers of inputs, especially in in emerging markets, means that because of the lower domestic value added share, in 2011 every euro of export in this sector was generating 3 cents less of income than in 1995. But in the same period, the higher FVA is associated with an increase of the RCA indices, and even if causality cannot be inferred from these simple observations, it is possible that this reorganization of production has allowed Italian firms in this sector to maintain a higher comparative advantage.

Table 3. Origin of foreign value added in Italian export of Machinery – DVA and FVA share of gross exports (%)

1995		2011	
Domestic VA share	**81.977**	**Domestic VA share**	**79.484**
Total FVA share	**18.023**	**Total FVA share**	**20.516**
Germany	3.783	Germany	3.198
France	2.236	China	1.535
United States	1.558	France	1.415
United Kingdom	1.198	Russia	1.316
Belgium	0.746	United States	1.220
Russia	0.687	Spain	0.950
Netherlands	0.682	United Kingdom	0.767
Spain	0.611	Netherlands	0.694
Japan	0.581	Belgium	0.494
Austria	0.436	Turkey	0.446
Sweden	0.370	Austria	0.425
Canada	0.338	Brazil	0.397
China	0.227	South Korea	0.397
Brazil	0.211	Japan	0.381
South Korea	0.163	Poland	0.344
Australia	0.162	India	0.282
Turkey	0.161	Sweden	0.270
Finland	0.141	Canada	0.252
Romania	0.122	Australia	0.217
Luxembourg	0.119	Czech Republic	0.216
Poland	0.118	Indonesia	0.169
India	0.118	Taiwan	0.154
Taiwan	0.117	Romania	0.148
Denmark	0.110	Ireland	0.131
Ireland	0.107	Hungary	0.131
Mexico	0.105	Mexico	0.129
Indonesia	0.096	Slovak Republic	0.118
Czech Republic	0.088	Finland	0.110

Slovenia	0.082	Denmark	0.097
Hungary	0.072	Slovenia	0.081
Portugal	0.063	Bulgaria	0.080
Greece	0.057	Portugal	0.069
Slovak Republic	0.051	Luxembourg	0.058
Bulgaria	0.032	Greece	0.048
Malta	0.019	Lithuania	0.009
Lithuania	0.005	Estonia	0.007
Latvia	0.003	Malta	0.006
Cyprus	0.002	Cyprus	0.006
Estonia	0.002	Latvia	0.005
Rest of the world	***2.246***	***Rest of the world***	***3.745***

Also in Machinery, the share of FVA has increased moderately, and also in this case the first partner for Italy is Germany. In this sector, the share of German value added embodied in Italian exports is larger and more stable in time, but here too we observe a sharp increase in the Chinese share. Similarly to what was observed for the footwear industry, in machinery the larger participation to global value chains, measured through the FVA content of export, is not associated with lower comparative advantages, but quite the contrary: also in this industry the RCA for Italy increases in the past decade.

To better understand the Italian position in the world market in these sectors, we can analyze not only the change in the share of domestic value added and the shift in the shares of foreign suppliers, but also the underlying structure of production in these industries at the world level, by considering in trade flows only the domestic contribution to the value of the goods exported. In fact, more than the overall change of the Italian value added content in exports (complementing the increase in FVA observed in Tables 4 and 5), what can be relevant in terms of market power and efficiency is the Italian position in the international production system, its connectivity and its centrality (Baldwin and Lopez-Gonzales, 2015). An analysis of the network of trade in value added at the aggregate level as been undertaken recently by Amador and Cabral (2016), but this technique has not been applied yet to individual sectors.

To understand how the Italian position in two industries of comparative advantage changed in the past decade, we consider the network formed by the exchange of domestic value added in footwear and in machinery, respectively, built applying again the decomposition of Wang et al. (2013) to the WIOD database. In this case, links between countries are given by the domestic value added content of exports from country *i* to country *k* of a given sector *s*, regardless of the domestic sector in country *i* where this value added was produced. Using this backward perspective and including all upstream domestic inputs, DVA in bilateral export of good *j* embodies the underlying domestic production structure and it includes the overall contribution of domestic factors of production to the export of industry *j*. Therefore, it measures the domestic factors content of exports from a given sector. Unfortunately, in this networks our nodes are only 40, as this is the countries' coverage available in the WIOD database, but they cover more than 85% of world GDP and even larger share of world trade.

Looking at the picture of the trade network built using these links, we observe remarkable differences from the network of gross exports. In the footwear industry, again there is an important growth of China as a supplier of value added, but the difference between Figure 3 and 5 is striking. In terms of value added, the relevance of China in the network is much smaller than in the case of gross exports. Italy's position in the network of value added trade did not almost change. The decline in market shares and in centrality in gross export appears due to the reorganization of production at the international level, while the position in terms of value added centrality is much more stable. Still, the overall structure of the value added network in footwear changed remarkably over time. While in 1995, Italy was the clear center of the network, the 2011 structure displays two main hubs, closely connected to each other. In fact, Italy itself contributed to the rise of centrality of China. As shown in Table 4, the share of Chinese value added in Italy's footwear exports increased by more than five times in this period.

[Figures 5 and 6 (network in footwear and machinery, value added) about here]

The difference between Figures 4 and 6 is even more remarkable. In the machinery sector, in terms of value added, China still in 2011 is a quite peripheral node, even if more connected than in 1995. It is also possible to observe that while Germany maintained the think links with the most relevant nodes of the network, in 2011 there is a large increase in the link between Germany and China.

In this sector, the center of the network of value added exchanges remains the Germany-Italy pair, showing an increased relevance of both countries and even closer ties between the two. In spite of the small reduction in the share of exported value added in this sector (see Tables 2 and 5), Italy is still one of the main nodes of the system. But its position, far away from the non-European main nodes of this network, in 2011 just like in 1995, might create some difficulties as the center of system shifts in coming years.

5. Concluding remarks

6. References

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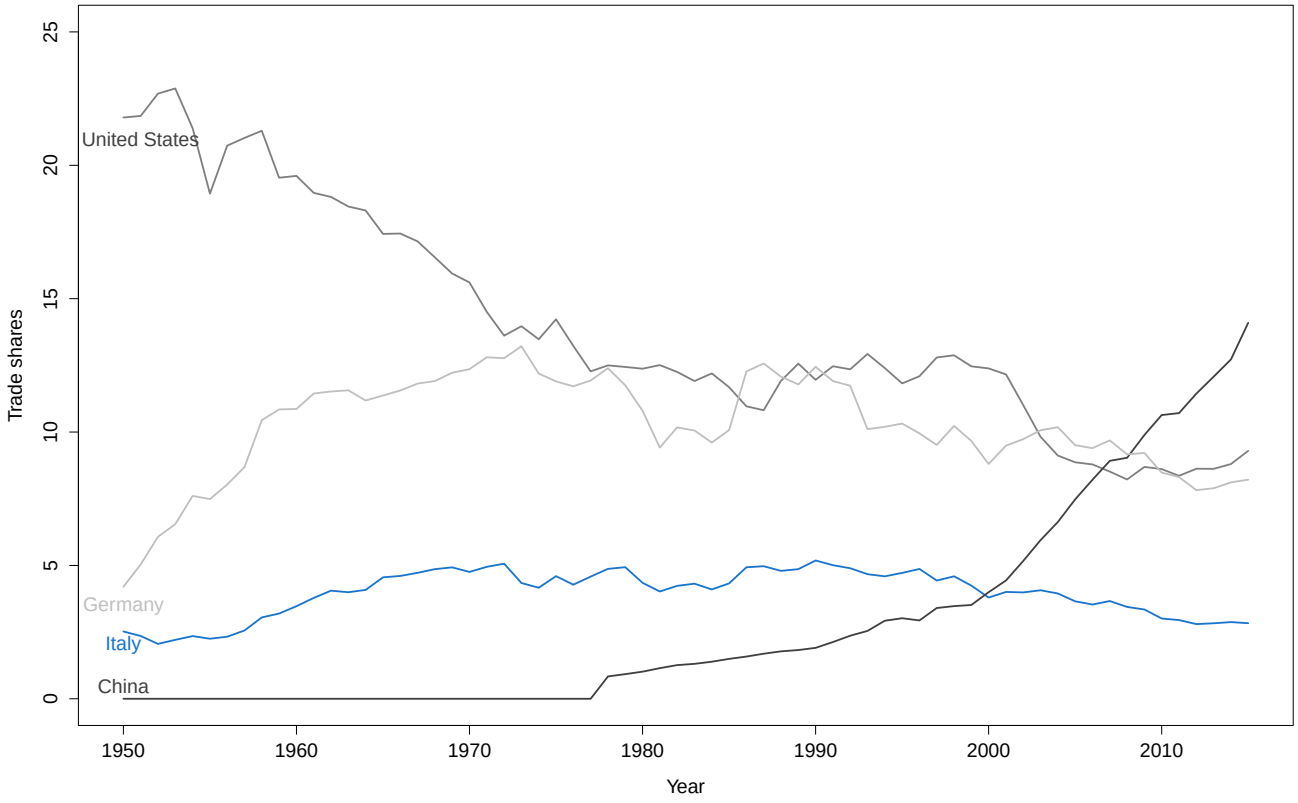
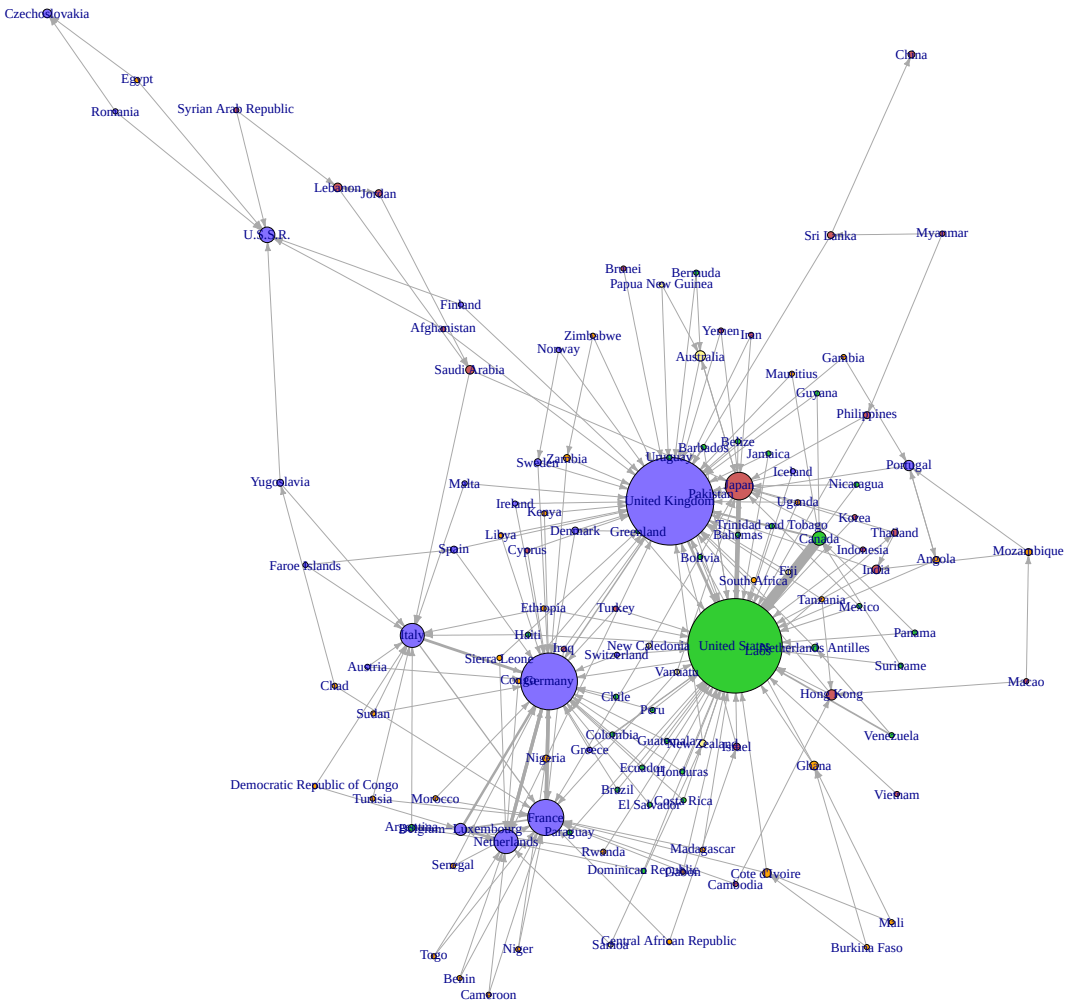
Figure 1 – Long-term trends in export market shares



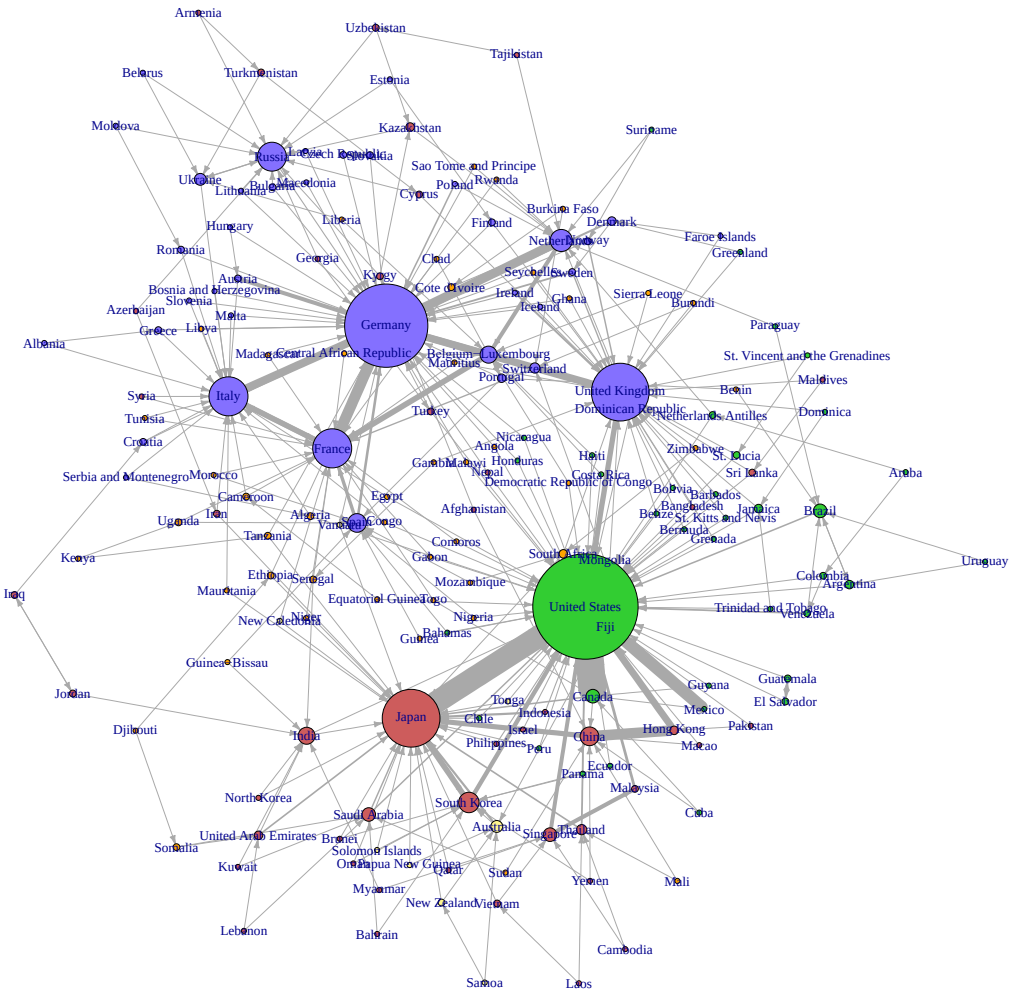
Source: our elaboration on IMF Directions of Trade Statistics

Figure 2a – The world trade network in 1965



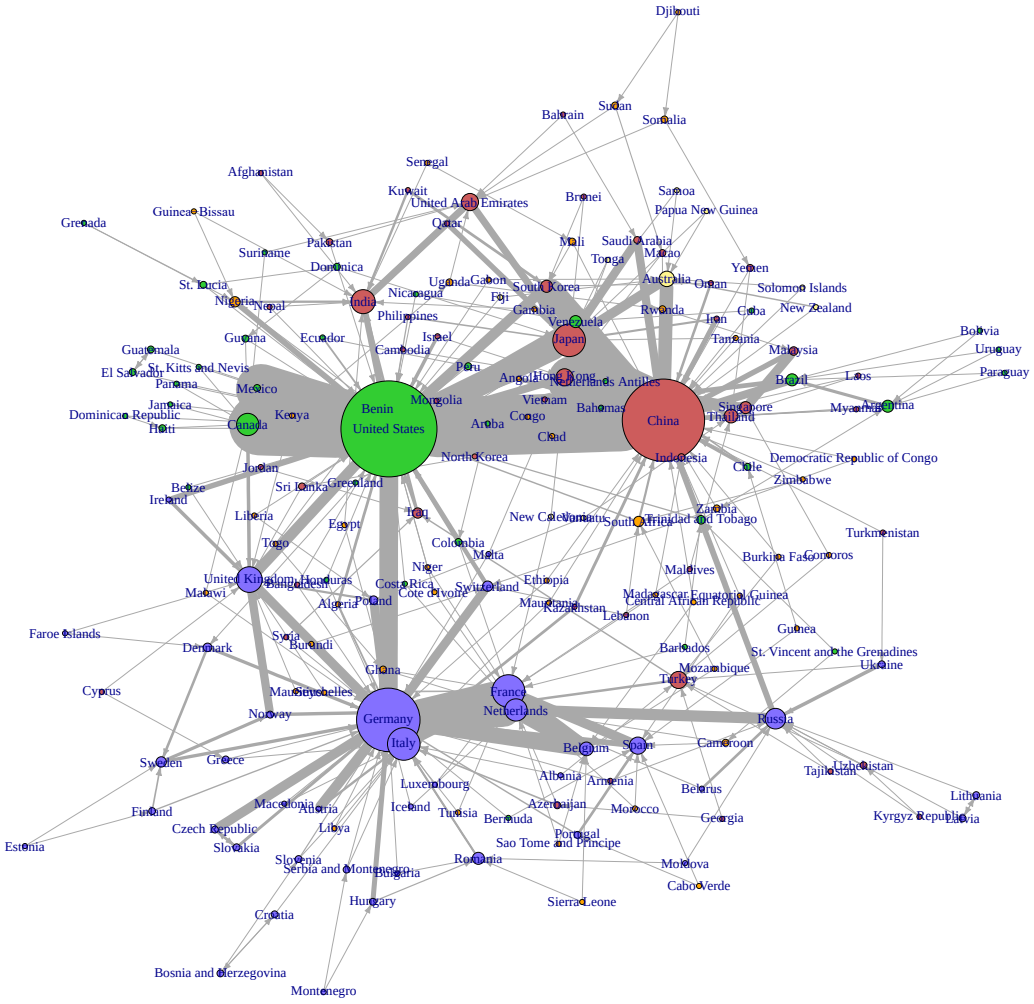
Source: our elaboration on BACI-Comtrade database

Figure 2b - The world trade network in 1995



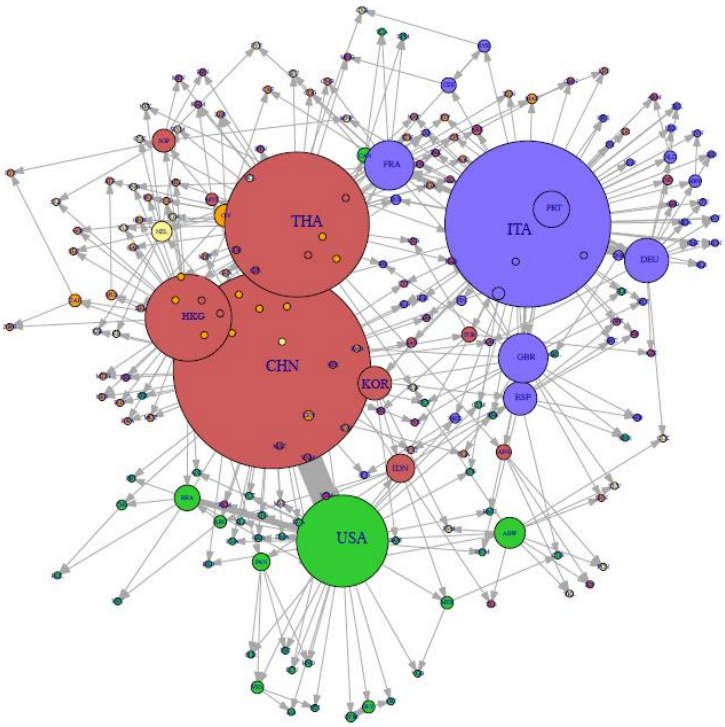
Source: our elaboration on BACI-Comtrade database

Figure 2c - The world trade network in 2011

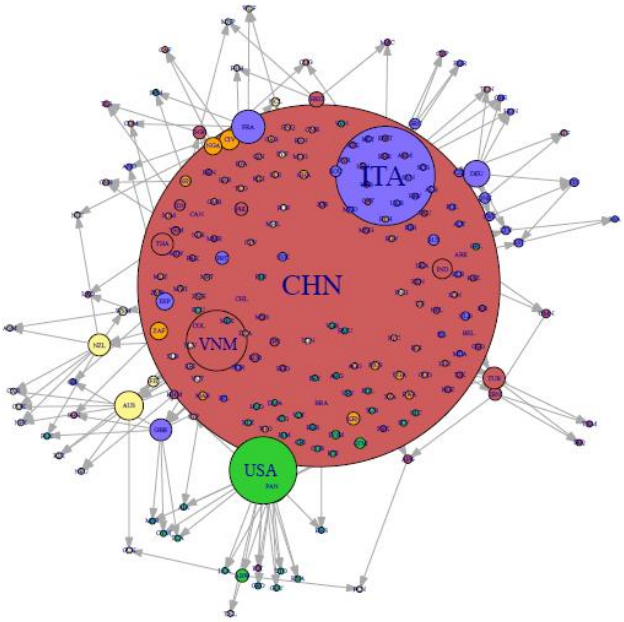


Source: our elaboration on BACI-Comtrade database

Figure 3 – Network of trade in footwear (HS 64) in 1995 and 2011 (gross trade)

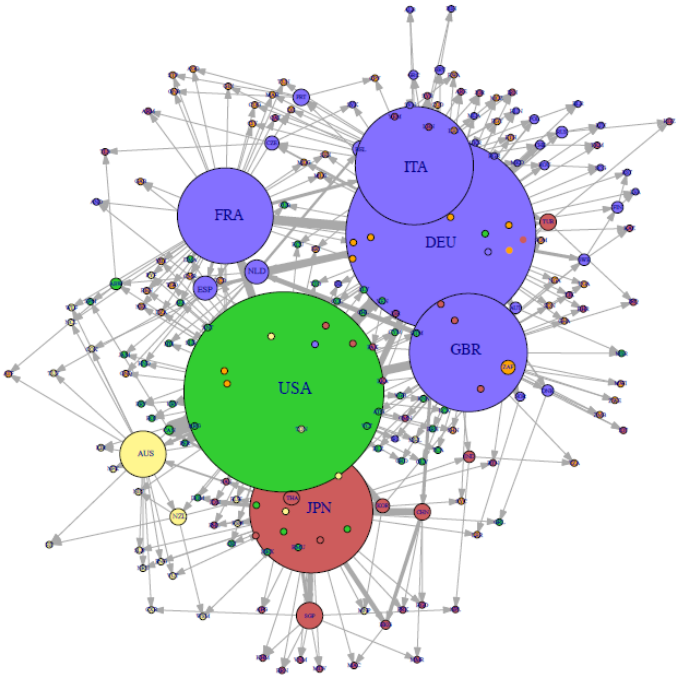


Trade network in 1995

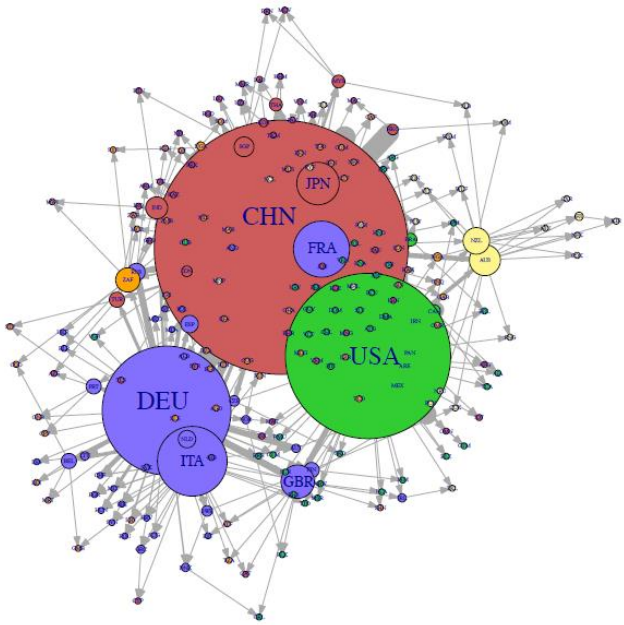


Trade network in 2011 - Source: our elaboration on BACI Comtrade database

Figure 4- Network of trade in machinery (HS84) in 1995 and 2011 (gross trade)



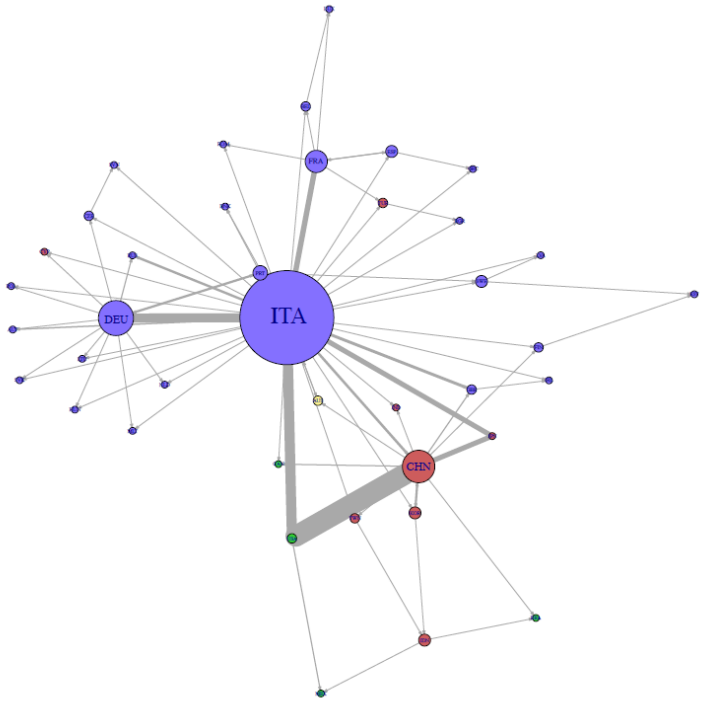
Trade network in 1995



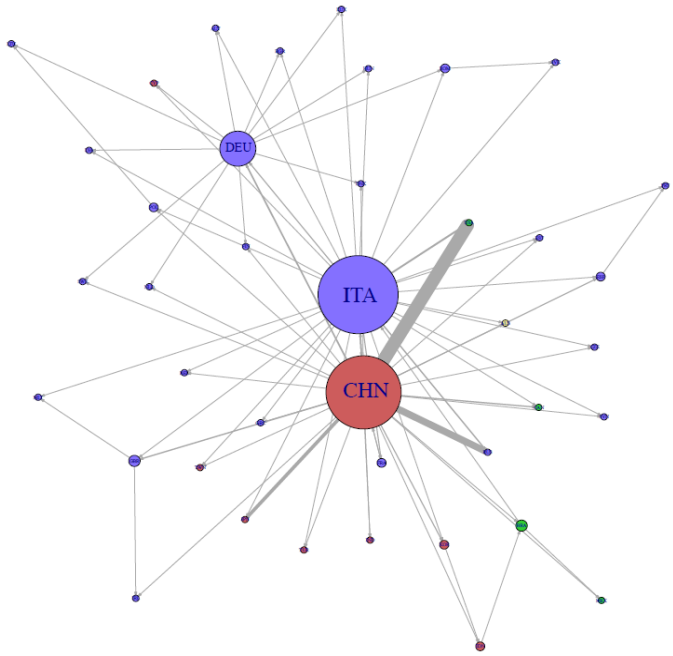
Trade network in 2011

Source: our elaboration on BACI Comtrade database

Figure 5 – Network of exported value added in footwear

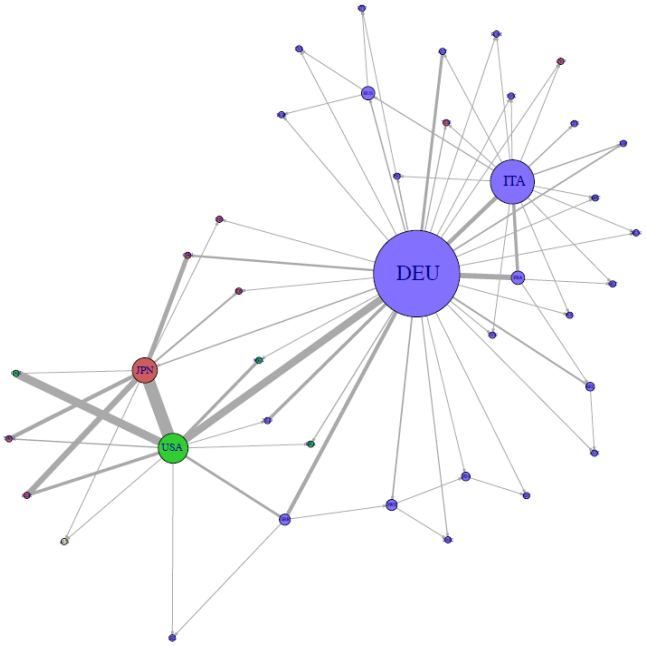


Network in 1995

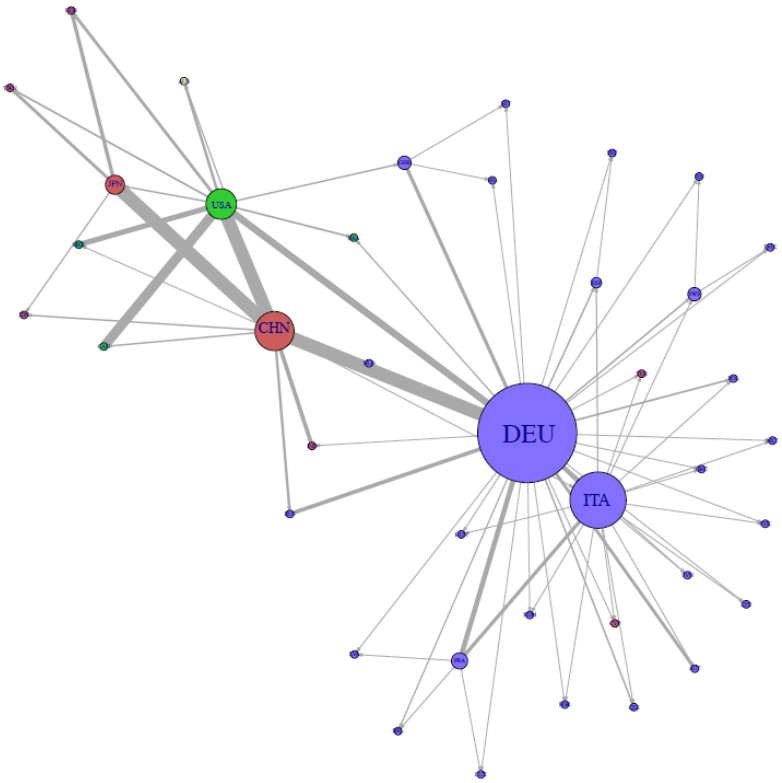


Network in 2011

Source: our elaboration on WIOD database
Figure 6 – Network of exported value added in machinery



Network in 1995



Network in 2011
Source: our elaboration on WIOD database