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# WORKING PAPERS

## **Changing Patterns of International Integration: Germany and Italy in the Countries of EU Enlargement**

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### **Abstract:**

This paper provides insights of the relative performance of German and Italian outsourcing and/or offshoring undertaken in the new members of EU in the period 1998-2006. Recent empirical evidence (Danninger, Joutz 2007 – IMF) shows that dominant factors explaining the increase in German market shares are trade relationships with fast growing countries and regionalized production in the export sector. According to the empirical evidence available for Italy (Di Maio, Tamagni 2006), the productivity/income content of trade specialization has decreased in the last decade. After an in-depth analysis of bilateral trade flows by final goods and intermediate goods categories, trade data are linked to the firm-level productivity analysis of Italian and German presence in the new member states of European Union. The domestic value added content and the imported intermediates content of exports from both countries to new members are disentangled following Hummels, Ishii and Yi (2001), whereas a sample of 38270 firms, located in new member states but owned by residents in old members, allows not only to measure relative firm-level productivity, but also to control for pure ownership effect, vertical versus horizontal FDI strategy and corporate governance characteristics. Data come from different sources: Eurostat-ComExt for trade, national statistics offices for input output tables, AMADEUS for firm-level data.

## **1. Introduction**

The recovery of Germany's market share has begun in 2000 and as Danninger and Youtz (2007) have shown, reasons are most to be found in a regionalized production which involves offshoring of labor-intensive production stages and in an increasing world demand for capital goods especially in fast growing countries. These two factors together, according to them, account for 60% of the differential growth rates with respect to other industrialized countries. Only a marginal part can be attributed to increased cost competitiveness due to policies aimed at wage moderation because of the appreciation of the euro. The export specialization in capital intensive sectors is instead partly explained by Sinn (2006), who links weak domestic growth with export boom through labour market rigidities. Lower wages of new competitors on the world market define a new equilibrium but rigidities at home prevent from the adjustment, so the economy replaces resources and factors to capital intensive sectors and invests capital abroad. A fraction of labour-intensive activity could have remained at home, but rigidities conduct to both unemployment and too much imported intermediates content because of the shifting from labour to imported materials.

The economic literature for Italy, instead, has introduced the idea of an Italian anomaly, according to which the country has a specialization pattern in traditional products where the income content is decreasing in last years. For example Di Maio and Tamagni (2006) conduct the analysis using a PRODY index which weighs (in a sophisticated and elegant way) traditional Revealed Comparative Advantages (RCA) with the income per capita of countries according to their relative specialization. It means that if Italy specializes in traditional sectors such as clothing and food its PRODY measure will be lowered by income per capita of emerging economies.

What we show here is that value added content of Italian exports measured according Hummels, Ishii and Yi (2001) is comparable to German value added content even if with specialization in different sectors. Different relative performances of Germany and Italy are instead evident in regional outsourcing/offshoring from the decomposition of trade in intermediates and final goods.

From here departs an analysis on a sample of subsidiaries located in new members and of their respective parent companies in Italy and Germany, verifying first if it actually is a case for a pure ownership effect following a strategy similar to that of Bloom, Sadun and Van Reenen (2007). Then the availability of several ownership characteristics allows to control for variables which span from arm's length of control to economic activities of the parent company and of other controlled subsidiaries. The latter variables, in particular, are useful in determining the vertical or the horizontal choice of FDI.

## 2. Construction of the sample

A sample of 38270 firms has been collected from Amadeus – Bureau van Dijk database in three stages. First we selected 38270 firms located in new members that are subsidiaries of firms located in EU15, with a minimum participation of 10%. Then we have drawn a subsample of Italian and German subsidiaries from the initial sample, going back to the global ultimate owner (GUO) defined as the owner we can reach through the control chain setting as reference a control participation of 25.01%. A third step has been to identify German and Italian parent firms (backward) and number of other subsidiaries controlled by subsample firms (which are subsidiaries themselves), in order to discriminate among firms belonging to a group or not.

As reported in Table 1, where MNEs are classified by parent country, German and Italian presence covers 52% of the sample. Subsample firms are in every economic activity, as Table 2 shows by NACE 2-digit sectors, with a preeminence of Germany in the services.

[Tables 1 and 2 about here]

Another interesting characteristic is reported in the same Table 2, when we calculate first the simple mean of size proxied by employees and fixed assets, then the weighted average of the whole subsample for Germany and Italy. German sample firms are bigger compared to Italian ones in terms of both measures but especially in capital proxied by fixed assets. After reporting simple descriptive statistics for numerical variables in Table 3, we give an idea of what is the ownership type of firms contained in the subsample, where we use the definition of Global Ultimate Owner, in Table 4 and 5. Germany and Italy in the sample have both a more than pronounced presence (greater than 90%) of firms which are controlled, up the ownership chain, by individuals or families. Germany however has a 7.6% of Industrial Companies as GUO whereas Italy only 1.6%. German presence in the sample sees also different because other categories of ultimate ownership are represented (Foundation/Research Institute, Employees/Managers, Private Equity firms). Among variables of Table 3 the latter two indicate how much sample firms are integrated in a production network with a consistent number of them having both a backward and a forward ownership linkage. More than 400 Italian subsidiaries control at least another subsidiary whereas about 700 German subsidiaries have a control participation at least in another firm.

In the sample we can control for the activity (NACE 4-digit sector) of both the ultimate owner (GUO) and their subsidiaries to check if they are vertically or horizontally linked by a FDI strategy.

Another variable of interest reports the secondary economic activities (again by NACE detailed code) in which every firm is involved, in order to measure the extent of multiproduct activity.

[Tables 3, 4 and 5 about here]

### **3. Trade and EU enlargement**

Long before the accession, first of ten new members in 2004 in the European Union and then of the other two in 2007<sup>1</sup>, trade of goods had begun to increase following the gradual trade liberalization of Europe Agreements of '90s. At the date of accession what remained to be adopted was the common commercial policy towards other world partners, allowing trade barriers to decrease on average and accepting commercial treaties stipulated before by old members. The average protection had decreased and this could also give us a clue for the explanation of a renewed expansion occurred in intra-EU27 trade, as Graph 1 shows us, for new and old members were ready to be further integrated in a world wider production sharing network.

[Graph 1 about here]

Among old member countries, some benefited more in terms of improved economic integration. From Graph 2 to Graph 6 we report trade flows of four European major countries (France, Germany, Italy and United Kingdom) with New Member States across the period of the enlargement, decomposing them according to BEC<sup>2</sup> main categories. Exports and imports have been weighted by national GDP, in order to give an idea of the relative openness of every country respect to the NMs. The weighing by the same GDP figure of both inflows and outflows do not alter directions of trade balances.

[Graphs 2 to 6 about here]

Decomposing by BEC main categories, which can be easily linked to the System of National Accounts, is useful because they collect products according to an end-user criterion and so they distinguish among final goods (Consumption Goods and Capital Goods) and intermediates (Total Intermediates), but also among goods for consumers (Consumption Goods) and for producers by

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<sup>1</sup> Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovakia and Slovenia on 1st May 2004; Bulgaria and Romania on 1st January 2007.

<sup>2</sup> See Appendix A: Broad Economic Categories (BEC) is an end-user classification compiled by UN.

stage of production (Capital Goods, Primary Intermediates, Parts and Components, Semifinished Goods).

In 1999 New Member States as a whole were net importers from all the reported countries in Capital Goods, Parts and Components and Semifinished Goods, whereas in the Consumption Goods category they were net exporters to Germany and net importers from the other three countries. From the beginning, anyway, trade of would-be members with Germany had been substantive in four categories out of five in 1999, with the exception of Primary Intermediates.

At the end of the considered period, in 2005, some of the trade balances for individual BEC categories have reversed: France has become net importer of Consumption Goods, Primary Intermediates and Parts and Components; Italy has lost his relative surplus in Capital and Consumption goods; UK has become net importer in all five categories. Germany is the only to that maintained his relative position in all categories from 2000 on, being a net importer of Consumption Goods and Parts and Components, with two-way flows substantially increasing and revealing a fast integration pattern that seems to be initiated in a previous period. Looking at intermediates trade as a first clue of production sharing, even if far behind Germany in absolute terms, Italy was the second among major European countries as regards the openness with New Member States before the enlargement and confirms its position thereafter.

In Graphs 7 and 8 we plot trade balances of Italy and Germany in 1999-2006 distinguishing between final goods and intermediates. If Germany clearly shows a sudden increase in exports for both categories after the date of the enlargement in 2004, with even final goods balance recovering in that year from a decreasing trend, Italian trade with the same countries is increasing in terms of intermediates but decreasing in terms of final goods.

[Graphs 7 and 8 about here]

These graphs alone cannot explain if the difference in balances hides a different strategy in production sharing. For example, intermediates leaving Germany and Italy can be assembled (or anyway reaching a final stage of production) in the New Members and then be sold in another country or coming back at home for another stage of production, as could be the case for Germany and its “intra-industry” trade in Parts and Components observed in Graph 5, where the country has become a net importer since 2000. What we can state at this first step of the analysis is a remarkable growth of NMs exports to the four big countries in capital and consumption goods (Graphs 2 and 3) matched with growing openness of trade aimed at production sharing (Graphs 5 and 6), especially for two of them which seems to have a different strategy (Graphs 7 and 8).

To proceed further and trying to catch the changing production sharing patterns which involve Germany, Italy and New Member States, we use the traditional RCA (Revealed Comparative Advantage) index<sup>3</sup> and apply it to the same BEC categories. Table 6 to 13 first report and then decompose RCAs for Italian and German exports that are pairwise compared with RCAs of New Members in Italy and Germany. After a comparison of the three aggregate categories, subsequent tables repeat the operation for intermediates distinguished by stage of production. Table 14 and 15, instead, report the RCAs for exports of New Members confronting the world.

The decomposition is repeated for every BEC-SNA category. The first column of every table report the market share of the exporting country relative to the importing country, calculated on total exports from world to New Members. Then for every BEC-SNA category we have first the share of the exported category on the total exports from the departing country, in order to weigh how much that sector account among the other sectors within flows. Afterwards we report for every category the market share at sectoral level as a ratio on world flows in the importing country. Finally, tables report for every category the Revealed Comparative Advantage calculated as the country share of sectoral export,  $X_{cs}/X_{ws}$ , normalized by a weighted sum of export shares in all sectors  $X_c/X_w$ .

First of all, as we can see in the second column of Table 6 and Table 10, if Italy has a somehow stable market share between 8-9% in the enlargement countries, German share has declined probably due to the openness of New Members to other partners given that, as previously shown in terms of flows, the trend has been rising. As regards Italy, in Table 6 against a stability of the sectoral shares on total exports of capital goods, primary intermediates and parts and components, declining shares are evident for consumption goods and rising shares are to be registered for semifinished goods. This latter category is also the only one to record rising shares in market shares for NMs reaching a 10.46% The share of Germany, even if declining in the last years, is still remarkable. Table 10 shows that the most declining sectoral share for Germany is that for consumption goods which has dropped from 29% to 20%, whereas in Table 12 we can see that market share of parts and components has been stable and the relative sectoral share has steadily grown . Among intermediates, the same Table 12 with the column of RCAs indicates a specialization of German export to NMs in both parts and components and semifinished goods among intermediates, in capital goods among final goods. Italy is reducing the weight of its exports in terms of consumption goods but RCAs are still above the unity. Italian RCAs are however

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<sup>3</sup> See Appendix B

increasing in semifinished goods and the country seems to specialize more and more in this category which is even now the most represented among the total of exports with a 34%.

[Tables from 6 to 13 about here]

The total exports of NMs in Italy have rapidly risen: given an initial market share of 4.24%, in 2005 it reached 6.28%. In Germany NMs retain 10.32% of total exports after having reached a maximum of 12.54% in 2003. The startling growth anyway has happened with parts and components both in Germany and in Italy, with a specialization of these countries in preparation of the enlargement clearly devoted to this category of intermediates as confirmed even by Table 14 and 15, which analyze RCAs for NMs facing the world. The world market share of NMs has almost reached 3%, on the whole pulled by the 3.68% of the parts and components.

[Tables 14 and 15 about here]

#### **4. Vertical specialization and trade with New Member States**

There is a massive empirical evidence that international trade has grown and is still growing at dramatic rates in the last decades and the main characteristic that differentiate this last wave of economic integration seems to be the “slicing up” of the value chain using the definition of Krugman (1995). Verticality in trade, then, implies multiple border crossing and trade flows can be inflated by intermediates traveling around the world. Following Hummels, Ishii and Yi (2001), we adopt a VS (vertical specialization) measure through an intensive use of Italian and German Input-Output tables which contain import tables. Italian IO tables for the period 1999-2004 are retrieved by ISTAT and reports tables at a NACE 2-digit disaggregation, whereas German IO tables for the same period is retrieved by DESTATIS, whose tables are at a NACE 3-digit disaggregation<sup>4</sup>.

After having obtained the total imported intermediate shares calculated on total production for every sector and vertical shares according to the origin of intermediates (agricultural products, energy and extractive intermediates, manufacturing intermediates, services), we have eventually disentangled the exports to New Member States between domestic and foreign value added contents, as our objective was. As in Hummels, Ishii and Yi (2001), here imported intermediates content and foreign value added are synonyms. The imported intermediates constitute value created

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<sup>4</sup> We preferred to use national statistics office for Input Output tables for both countries because the ones reported by EUROSTAT were less complete and less updated.



abroad through foreign production. Once intermediates are purchased from abroad they can be incorporated in other intermediates and continue to circulate in the importing country, from a producer to another, with a final step in the hands of a domestic consumer or in the hands of a foreigner. It can cross different borders and change form till the last production stage. Using Input Output tables which contain also the import table, it is possible then to identify the final demand of domestic goods where a part of the imported intermediates is incorporated and the foreign value added share that is attached to exports.

As we see in Graphs 9 and 10, where we plot exports and imported intermediate content by NACE 2-digit manufacturing sectors, the increase in trade flows from Italy and Germany towards new member states can be corrected using the IO method and still the increase remain considerable as in aggregate results from Graphs 11 and 12. Both Italy and Germany have seen an increase of the exported domestic valued added, but also a less increasing imported intermediates content. The difference among them is the domestic value added content of Graph 13.

[Graphs 11 to 13 about here]

This is first evidence, according to us, that goes against the “Italian anomaly” hypothesis (Di Maio and Tamagni, 2006), according to which Italy should be specialized in low-income-content sectors.

Vertical shares identified through import IO tables can be also decomposed by economic activities of provenance as we have done in Graph 14 and 15 by the same 2-digit sectors of Graphs 9 and 10<sup>5</sup>. We identify four main sectors: agriculture, energy and extractive, manufacturing and services. The relative use of them within a sector gives a measure of how every sector is relying on foreign vertical specialization, especially if we look at manufacturing to which the BEC-SNA categories of the previous analysis belong. Obviously it is not possible here to distinguish imported intermediates for their origin because they refer to the relative international integration of a sector in a network of world production sharing.

[Graphs 14 and 15]

Italy and Germany show however different patterns of integration, if we consider the tendency through time but also the level of shares by sector. Graphs show a tendency line and a R-squared intended to give a measure of the fitting. For example Italy shows an increasing reliance on foreign

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<sup>5</sup> To avoid problems in across-country comparison, German IO tables are converted in NACE 2-digit through a weighted mean using as weights NACE 3-digit production by year

intermediates for Clothing, revealing an outsourcing/offshoring strategy for which 16% of exported value has been produced abroad and the share is increasing. The same for some of the traditional sectors as Food and beverages, Textiles, Leather and footwear.

Germany shows a very different pattern, with higher vertical shares in the traditional sectors of Italy (meaning that here there's a minor creation of value) but an increasing integration in international production sharing for almost every technology-intensive sector<sup>6</sup>.

## **5. First conclusions and further research**

Among major countries of European Union Italy and Germany have opened more towards the countries of enlargement following a previous trend. But where bilateral trade flows show a first empirical evidence for an integration of Germany in production sharing networks with new members through intra-industry trade of intermediates, Italy sells semifinished goods but registers a minor comparative advantage in consumer goods.

After adopting a decomposition of exports in domestic and foreign value added content, we see that both Germany and Italy have an increasing and substantive domestic content of value added exported in new member states, opposing the thesis of a low income content for Italian specialization pattern. It is true however that Germany exports more value added but it also import more foreign value added through intermediates as an analysis of calculated vertical shares (Hummels, Ishii and Yi, 2001) shows, in particular for industries considered high-tech or medium high-tech, where there is an increase reliance on imported manufacturing products employed in production processes. Italy, instead, integrates less than Germany and chooses traditional sectors to rely on more intermediates coming from abroad as again a plot of vertical shares by industry reports. Despite these facts Italian intra-firm trade accounts on average for around 40% of exports and more than 60% for imports as ISTAT-FATS tables reported for 2005.

The fact that Italy is not able to regionalize more its exports could be due to a weakness other than the income content of traditional sectors, but anyway related to these latter. First of all a link between ownership characteristics, corporate governance and FDI strategy (vertical or horizontal) is necessary.

Successful firms within traditional sectors have a hold-up problem that most of firms in medium- and high-tech sectors don't have. If a firm producing machines decides to move abroad a stage of production (category of parts and components), the manager knows that there is a certain protection

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<sup>6</sup> Most of the sectors which show an increasing tendency belong to what OECD calls hightech or medium-hightech industries.

given by a registered patent, whereas if a firm produces clothes or jewellery and decides to go abroad (category of semifinished goods), technology can easily be appropriated.

And what's the interaction with size? As preliminary evidence shows, Italian firms are smaller than German ones. There are different minimum efficiency scales for different sectors of activities. Could it be that Italian MNEs are actually big for their business but not if compared to capital-intensive production of German MNEs? A comparison here for size persistency at home and size dynamics abroad will be useful.

**Table 1: Sample of MNE by parent country, source Amadeus**

Country	Frequency	%	Cumulative
Germany	10614	27.735	27.735
Italy	9322	24.359	52.093
Austria	3191	8.338	60.431
France	3160	8.257	68.688
Netherlands	2457	6.420	75.108
Greece	2203	5.756	80.865
United Kingdom	2074	5.419	86.284
Sweden	1211	3.164	89.449
Belgium	1152	3.010	92.459
Finland	952	2.488	94.946
Spain	728	1.902	96.849
Denmark	623	1.628	98.477
Luxembourg	305	0.797	99.274
Ireland	149	0.389	99.663
Portugal	129	0.337	100.000
<b>Total</b>	<b>38270</b>	<b>100.000</b>	

**Table 2: Subsample of German and Italian MNEs by NACE 2-digit sectors,**

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NACE 2-digit	Description	Germany				Italy			
		Freq.	%	Average size (employees)	Average size (fixed assets th. euro)	Freq.	%	Average size (employees)	Average size (fixed assets th. euro)
1	Agriculture, hunting and related activities	78	0.748	29	1736	27	0.310	48	468
2	Forestry, logging and related activities	3	0.029		1388	3	0.030		86
5	Fishing	1	0.010						
10	Mining of coal and lignite; extraction of peat	6	0.058	76	1756	1	0.010		
11	Extraction of crude petroleum and natural gas	5	0.048	4	23	2	0.020	32	323
13	Mining of metal ores	2	0.019			3	0.030	23	226
14	Other mining and quarrying	39	0.374	74	3716	28	0.320	13	377
15	Manufacture of food products and beverages	356	3.414	64	2041	209	2.420	29	1029
16	Tobacco	7	0.067	261	47557	5	0.060	1039	43173
17	Manufacture of textiles	118	1.132	145	1373	223	2.580	100	1067
18	Manufacture of wearing apparel; dressing and dyeing of fur	189	1.813	169	665	457	5.290	100	354
19	Tanning and dressing of leather; manufacture of luggage, handbags, saddlery, harness and footwear	46	0.441	138	1193	356	4.120	116	368
20	Manufacture of wood and of products of wood and cork, exc. furniture	210	2.014	56	2594	300	3.470	34	294
21	Manufacture of pulp, paper and paper products	42	0.403	101	3065	41	0.470	58	3908
22	Publishing, printing and reproduction of recorded media	164	1.573	60	1498	38	0.440	31	680
23	Manufacture of coke, refined petroleum products and nuclear fuel	2	0.019			2	0.020	662	290286
24	Manufacture of chemicals and chemical products	95	0.911	118	9092	55	0.640	73	2725
25	Manufacture of rubber and plastic products	185	1.774	136	6154	121	1.400	48	1761
26	Manufacture of other non-metallic mineral products	165	1.582	177	13781	125	1.450	48	3266
27	Manufacture of basic metals	33	0.316	303	10553	36	0.420	133	2055
28	Manufacture of fabricated metal products, except machinery and	304	2.916	65	1074	267	3.090	29	622

	equipment								
29	Manufacture of machinery and equipment n.e.c.	196	1.880	117	2915	110	1.270	111	2381
30	Manufacture of office machinery and computers	17	0.163	11	84	10	0.120	44	1298
31	Manufacture of electrical machinery and apparatus n.e.c.	134	1.285	467	6158	87	1.010	98	717
32	Manufacture of radio, television and communication equipment and apparatus	43	0.412	198	5890	19	0.220	92	875
33	Manufacture of medical, precision and optical instruments, watches and clocks	91	0.873	102	1937	38	0.440	113	2440
34	Manufacture of motor vehicles, trailers and semi-trailers	86	0.825	983	87950	50	0.580	324	16511
35	Manufacture of other transport equipment	27	0.259	323	2055	12	0.140	19	36
36	Manufacture of furniture; manufacturing n.e.c.	177	1.698	105	805	241	2.790	65	809
37	Recycling	30	0.288	26	393	20	0.230	22	1695
40	Electricity, gas, steam and hot water supply	80	0.767	513	96523	18	0.210	150	58379
41	Collection, purification and distribution of water	6	0.058	149	19057	0	0.000		0
45	Construction	587	5.630	45	656	541	6.260	16	1001
50	Sale, maintenance and repair of motor vehicles and motorcycles; retail sale of automotive fuel	420	4.028	24	653	195	2.260	18	811
51	Wholesale trade and commission trade, except of motor vehicles and motorcycles	2,226	21.348	40	1420	1,669	19.310	12	691
52	Retail trade, except of motor vehicles and motorcycles; repair of personal and household goods	1,030	9.878	46	1285	575	6.650	9	70
55	Hotels and restaurants	355	3.405	18	356	378	4.370	8	110
60	Land transport; transport via pipelines	466	4.469	16	306	216	2.500	12	140
61	Water transport	7	0.067	37	644	1	0.010		0
62	Air transport	13	0.125	8	614	1	0.010		8
63	Supporting and auxiliary transport activities; activities of travel agencies	185	1.774	69	24008	93	1.080	12	264

64	Post and telecommunications	68	0.652	391	83848	30	0.350	16	153
65	Financial intermediation, except insurance and pension funding	38	0.364	58	59921	20	0.230	32	13274
67	Activities auxiliary to financial intermediation	84	0.806	33	219	16	0.190	89	3440
70	Real estate activities	376	3.606	9	2757	678	7.840	3	717
71	Renting of machinery and equipment without operator and of personal and household goods	45	0.432	26	1386	44	0.510	4	173
72	Computer and related activities	296	2.839	47	467	119	1.380	15	100
73	Research and development	24	0.230	18	93	4	0.050	251	9241
74	Other business activities	918	8.804	17	685	951	11.000	9	98
75	Public administration and defence; compulsory social security	1	0.010	20	7028	1	0.010	23	18056
80	Education	21	0.201	6	11	12	0.140	2	6
85	Health and social work	92	0.882	21	440	23	0.270	7	41
90	Sewage and refuse disposal, sanitation and similar activities	56	0.537	117	1726	23	0.270	41	1084
92	Recreational, cultural and sporting activities	99	0.949	13	72	75	0.870	14	93
93	Other service activities	83	0.796	27	84	74	0.860	15	44
<b>Total</b>	<b>TOTAL</b>	<b>10,427</b>	<b>100.000</b>			<b>8,644</b>	<b>100.000</b>		
	<b>Average size weighted by number of firms</b>			<b>140</b>	<b>8280</b>			<b>69</b>	<b>1858</b>

**Table 3: Descriptive statistics of some variables from the subsample, last available year**

<b>Variable</b>	<b>Germany</b>			<b>Italy</b>		
	<b>Obs</b>	<b>Mean (th. Euro)</b>	<b>Std. Dev.</b>	<b>Obs</b>	<b>Mean (th. Euro)</b>	<b>Std. Dev.</b>
fixed assets 2006	7444	4160.898	61926.35	7154	883.7911	12396.21
intangible fixed assets 2006	7375	646.4974	26095.93	7145	46.56725	1641.981
employees 2006	5648	74.25938	390.5182	5117	34.49502	124.6689
operating revenues 2006	6289	11267.7	130172.4	5468	2242.751	36074.75
profit per period 2006	7400	676.0541	11808.19	7148	89.06683	1298.55
costs of employees	5620	706.0767	6348.92	5087	159.3933	970.9429
value added 2006	6203	2661.071	13963.45	5410	705.3125	5940.139



**Table 4: German subsample by ownership type**

<b>Ownership type</b>	<b>Germany</b>		
	<b>Freq.</b>	<b>%</b>	<b>Cumulative</b>
Individual(s) or family(ies)	6,814	90.65	90.65
Industrial company	571	7.60	98.24
State, Public authority	46	0.61	98.86
Bank	31	0.41	99.27
Foundation/Research Institute	21	0.28	99.55
Financial company	15	0.20	99.75
Insurance company	12	0.16	99.91
Employees/Managers	3	0.04	99.95
Mutual & Pension fund/Trust/Nominee	2	0.03	99.97
Private Equity firms	2	0.03	100.00
<b>Total</b>	<b>7,517</b>	<b>100.00</b>	

**Table 5: Italian subsample by ownership type**

<b>Ownership type</b>	<b>Italy</b>		
	<b>Freq.</b>	<b>%</b>	<b>Cumulative</b>
Individual(s) or family(ies)	7154	97.27	97.27
Industrial company	118	1.60	98.87
Bank	47	0.64	99.51
Insurance company	14	0.19	99.70
Financial company	13	0.18	99.88
State, Public authority	7	0.10	99.97
Mutual & Pension fund/Trust/Nominee	2	0.03	100.00
<b>Total</b>	<b>7355</b>	<b>100.00</b>	

**Table 6: Italian Revealed Comparative Advantages (RCA) in New Member States**

	Italian market share in NMs	Capital goods			Consumption goods			Intermediate goods		
		Italian sectoral share on total exports	Italian market share at sectoral level	<i>Revealed Comparative Advantage</i>	Italian sectoral share on total exports	Italian market share at sectoral level	<i>Revealed Comparative Advantage</i>	Italian sectoral share on total exports	Italian market share at sectoral level	<i>Revealed Comparative Advantage</i>
		$(X_c/X_w)*100$	$X_{cs}/X_{ws}*100$	$(X_{cs}/X_{ws})/(X_c/X_w)$	$X_{cs}/X_c*100$	$X_{cs}/X_{ws}*100$	$RCA=(X_{cs}/X_{ws})/(X_c/X_w)$	$X_{cs}/X_c*100$	$X_{cs}/X_{ws}*100$	$(X_{cs}/X_{ws})/(X_c/X_w)$
<b>1998</b>	8.4294	18.50294	7.3863	0.8763	28.6162	11.9222	<b>1.414365</b>	52.8808	8.5213	<b>1.0109</b>
<b>1999</b>	8.4735	17.67294	7.0913	0.8369	28.4858	11.5174	<b>1.359215</b>	53.8413	7.2110	0.8510
<b>2000</b>	8.1150	17.06312	6.7591	0.8329	27.8284	12.0388	<b>1.483524</b>	55.1085	7.4450	0.9174
<b>2001</b>	8.8522	17.93563	7.5065	0.8480	27.9403	12.5992	<b>1.423284</b>	54.1241	7.0088	0.7918
<b>2002</b>	8.4694	17.72288	6.8226	0.8056	28.1925	11.6696	<b>1.377857</b>	54.0847	7.6415	0.9022
<b>2003</b>	8.5665	17.7025	6.7663	0.7899	26.8656	11.3113	<b>1.320419</b>	55.4319	7.4643	0.8713
<b>2004</b>	7.5749	18.19509	6.2530	0.8255	24.8927	9.2199	<b>1.21717</b>	56.9122	7.7486	<b>1.0229</b>
<b>2005</b>	8.8427	18.27684	7.5373	0.8524	24.3429	10.2932	<b>1.164034</b>	57.3803	6.9823	0.7896

**Table 7: New Members' Revealed Comparative Advantage (RCA) in Italy**

	NMs market share in Italy	Capital goods			Consumption goods			Intermediate goods		
		NMs sectoral share on total exports	NMs market share at sectoral level	<i>Revealed Comparative Advantage</i>	NMs sectoral share on total exports	NMs market share at sectoral level	<i>Revealed Comparative Advantage</i>	NMs sectoral share on total exports	NMs market share at sectoral level	<i>Revealed Comparative Advantage</i>
		$(X_c/X_w)*100$	$X_{cs}/X_{ws}*100$	$(X_{cs}/X_{ws})/(X_c/X_w)$	$X_{cs}/X_c*100$	$X_{cs}/X_{ws}*100$	$RCA=(X_{cs}/X_{ws})/(X_c/X_w)$	$X_{cs}/X_c*100$	$X_{cs}/X_{ws}*100$	$(X_{cs}/X_{ws})/(X_c/X_w)$
<b>1998</b>	4.2486	6.7307	2.0013	0.4711	42.9685	6.6015	<b>1.5538</b>	50.3009	3.6810	0.8664
<b>1999</b>	4.3425	7.9165	2.1945	0.5053	43.2804	6.6083	<b>1.5218</b>	48.8031	3.7916	0.8731
<b>2000</b>	4.4902	7.4929	2.1696	0.4832	41.6671	7.2812	<b>1.6216</b>	50.8400	3.8825	0.8647
<b>2001</b>	5.1330	7.3344	2.5191	0.4908	44.5375	8.2605	<b>1.6093</b>	48.1281	4.3053	0.8388
<b>2002</b>	5.4709	9.2132	3.3971	0.6209	43.2241	8.0329	<b>1.4683</b>	47.5627	4.6696	0.8535
<b>2003</b>	5.7267	8.3121	3.5089	0.6127	43.6747	8.0726	<b>1.4097</b>	48.0131	4.9585	0.8659
<b>2004</b>	5.8651	10.3265	4.4587	0.7602	42.2741	8.1818	<b>1.3950</b>	47.3994	4.9544	0.8447

2005	6.2884	10.8136	5.2625	0.8369	40.9158	8.6423	1.3743	48.2705	5.2969	0.8423
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**Table 8: Italian Revealed Comparative Advantages (RCA) in New Member States, intermediates by stage of production**

	Italian market share in NMs (Xc/Xw)*100	Intermediates by stage of production								
		Primary			Parts and components			Semifinished goods		
		Italian sectoral share on total exports	Italian market share at sectoral level	<i>Revealed Comparative Advantage</i>	Italian sectoral share on total exports	Italian market share at sectoral level	<i>Revealed Comparative Advantage</i>	Italian sectoral share on total exports	Italian market share at sectoral level	<i>Revealed Comparative Advantage</i>
		Xcs/Xc*100	Xcs/Xws*100	(Xcs/Xws)/(Xc/Xw)	Xcs/Xc*100	Xcs/Xws*100	(Xcs/Xws)/(Xc/Xw)	Xcs/Xc*100	Xcs/Xws*100	(Xcs/Xws)/(Xc/Xw)
1998	8.4294	0.7836	0.7132	0.0846	17.7581	8.1644	0.9686	34.3392	8.4587	1.0035
1999	8.4735	0.7371	0.7061	0.0833	18.9875	8.4300	0.9949	34.1167	8.6690	1.0231
2000	8.1150	0.7280	0.5353	0.0660	18.1165	7.4732	0.9209	36.2640	8.8914	1.0957
2001	8.8522	0.6570	0.5788	0.0654	17.1342	7.7472	0.8752	36.3328	9.7245	1.0985
2002	8.4694	0.8325	0.7611	0.0899	16.7668	7.5026	0.8858	36.4854	9.3141	1.0997
2003	8.5665	0.7932	0.7753	0.0905	18.5112	8.2400	0.9619	36.1275	9.3011	1.0858
2004	7.5749	0.6609	0.5623	0.0742	18.6243	7.1667	0.9461	37.6269	8.5967	1.1349
2005	8.8427	0.7511	0.6301	0.0713	17.7811	8.4127	0.9514	38.8481	10.4634	1.1833

**Table 9: New Members' Revealed Comparative Advantages (RCA) in Italy, intermediates by stage of production**

	NMs market share in Italy (Xc/Xw)*100	Intermediates by stage of production								
		Primary			Parts and components			Semifinished goods		
		NMs sectoral share on total exports	NMs market share at sectoral level	<i>Revealed Comparative Advantage</i>	NMs sectoral share on total exports	NMs market share at sectoral level	<i>Revealed Comparative Advantage</i>	NMs sectoral share on total exports	NMs market share at sectoral level	<i>Revealed Comparative Advantage</i>
		Xcs/Xc*100	Xcs/Xws*100	(Xcs/Xws)/(Xc/Xw)	Xcs/Xc*100	Xcs/Xws*100	(Xcs/Xws)/(Xc/Xw)	Xcs/Xc*100	Xcs/Xws*100	(Xcs/Xws)/(Xc/Xw)
1998	4.2486	6.4432	2.6645	0.6271	9.0753	2.8409	0.6687	34.7823	4.3195	1.0167
1999	4.3425	6.0089	2.5602	0.5896	10.2885	3.3019	0.7604	32.5057	4.3877	1.0104
2000	4.4902	5.6315	1.9298	0.4298	10.3903	3.4988	0.7792	34.8181	4.8312	1.0760
2001	5.1330	5.1396	2.1865	0.4260	10.1164	3.9521	0.7700	32.8721	5.2440	1.0216
2002	5.4709	4.8165	2.3368	0.4271	11.1863	4.8733	0.8908	31.5599	5.4143	0.9897
2003	5.7267	4.2507	2.1397	0.3736	13.2480	6.1404	1.0722	30.5145	5.5091	0.9620

2004	5.8651	4.3875	2.1265	0.3626	13.3063	6.6410	1.1323	29.7055	5.4007	0.9208
2005	6.2884	4.5286	1.9984	0.3178	14.4423	8.0000	1.2722	29.2997	5.8115	0.9242

Table 10: German Revealed Comparative Advantages (RCA) in New Members

	German market share in NMs	Capital goods			Consumption goods			Intermediate goods		
		German sectoral share on total exports	German market share at sectoral level	Revealed Comparative Advantage	German sectoral share on total exports	German market share at sectoral level	Revealed Comparative Advantage	German sectoral share on total exports	German market share at sectoral level	Revealed Comparative Advantage
		(Xc/Xw)*100	Xcs/Xcs*100	(Xcs/Xws)/(Xc/Xw)	Xcs/Xc*100	Xcs/Xws*100	RCA=(Xcs/Xws)/(Xc/Xw)	Xcs/Xc*100	Xcs/Xws*100	(Xcs/Xws)/(Xc/Xw)
1998	28.1029	20.2871	31.7594	1.1301	20.9547	29.1059	1.0357	58.7582	26.7128	0.9505
1999	28.0282	19.0570	30.0697	1.0728	20.7184	27.7084	0.9886	60.2246	27.5458	0.9828
2000	26.2684	19.2350	28.9792	1.1032	19.6311	27.4906	1.0465	61.1339	25.1683	0.9581
2001	26.5315	19.6916	29.5674	1.1144	20.4594	27.6513	1.0422	59.8489	25.3253	0.9545
2002	25.1942	19.5947	27.1678	1.0783	20.4592	25.1919	0.9999	59.9461	24.6106	0.9768
2003	26.0706	19.7831	28.0746	1.0769	19.3624	24.8099	0.9516	60.8545	25.8884	0.9930
2004	24.1051	20.3169	27.5042	1.1410	17.0528	20.0995	0.8338	62.6303	24.4517	1.0144

Table 11: New Members' Revealed Comparative Advantages (RCA) in Germany, intermediates by stage of production

	NMs market share in Germany	Capital goods			Consumption goods			Intermediate goods		
		NMs sectoral share on total exports	NMs market share at sectoral level	Revealed Comparative Advantage	NMs sectoral share on total exports	NMs market share at sectoral level	Revealed Comparative Advantage	NMs sectoral share on total exports	NMs market share at sectoral level	Revealed Comparative Advantage
		(Xc/Xw)*100	Xcs/Xcs*100	(Xcs/Xws)/(Xc/Xw)	Xcs/Xc*100	Xcs/Xws*100	RCA=(Xcs/Xws)/(Xc/Xw)	Xcs/Xc*100	Xcs/Xws*100	(Xcs/Xws)/(Xc/Xw)
1998	8.4229	9.3444	4.7935	0.5691	32.8474	9.4170	1.1180	57.8082	8.9836	1.0666
1999	9.0908	11.0192	5.8845	0.6473	32.5734	10.1965	1.1216	56.4075	9.5075	1.0458
2000	9.5994	11.5828	6.2696	0.6531	30.3821	11.3570	1.1831	58.0351	9.8453	1.0256
2001	10.0117	11.9831	6.9707	0.6963	30.1659	11.5185	1.1505	57.8510	10.2384	1.0227
2002	11.0736	13.2124	8.9862	0.8115	29.8731	11.9506	1.0792	56.9144	11.2468	1.0156
2003	12.5446	13.3818	10.6706	0.8506	29.0550	13.2935	1.0597	57.5632	12.7020	1.0125

2004	11.0146	13.8964	9.3443	0.8484	26.9219	11.3550	1.0309	59.1817	11.3358	1.0292
2005	10.3267	12.8470	8.0817	0.7826	24.6042	10.2934	0.9968	62.5487	10.9663	1.0619

**Table 12: German Revealed Comparative Advantages (RCA) in New Members, intermediates by stage of production**

	German market share in NMs (Xc/Xw)*100	Intermediates by stage of production								
		Primary			Parts and components			Semifinished goods		
		German sectoral share on total exports	German market share at sectoral level	Revealed Comparative Advantage	German sectoral share on total exports	German market share at sectoral level	Revealed Comparative Advantage	German sectoral share on total exports	German market share at sectoral level	Revealed Comparative Advantage
		Xcs/Xc*100	Xcs/Xws*100	(Xcs/Xws)/(Xc/Xw)	Xcs/Xc*100	Xcs/Xws*100	(Xcs/Xws)/(Xc/Xw)	Xcs/Xc*100	Xcs/Xws*100	(Xcs/Xws)/(Xc/Xw)
1998	28.1029	1.0589	3.2132	0.1143	22.7001	34.7945	1.2381	34.9992	28.7428	1.0228
1999	28.0282	0.9661	3.0609	0.1092	24.1233	35.4266	1.2640	35.1352	29.5308	1.0536
2000	26.2684	1.0440	2.4848	0.0946	25.5204	34.0774	1.2973	34.5695	27.4368	1.0445
2001	26.5315	1.0180	2.6881	0.1013	24.7907	33.5955	1.2662	34.0402	27.3068	1.0292
2002	25.1942	0.9665	2.6285	0.1043	24.7063	32.8866	1.3053	34.2733	26.0271	1.0331
2003	26.0706	0.8363	2.4877	0.0954	26.0134	35.2400	1.3517	34.0049	26.6431	1.0220
2004	24.1051	1.0003	2.7083	0.1124	27.8398	34.0909	1.4143	33.7901	24.5673	1.0192

**Table 13: New Members' Revealed Comparative Advantages (RCA) in Germany, intermediates by stage of production**

	NMs market share in Germany (Xc/Xw)*100	Intermediates by stage of production								
		Primary			Parts and components			Semifinished goods		
		NMs sectoral share on total exports	NMs market share at sectoral level	Revealed Comparative Advantage	NMs sectoral share on total exports	NMs market share at sectoral level	Revealed Comparative Advantage	NMs sectoral share on total exports	NMs market share at sectoral level	Revealed Comparative Advantage
		Xcs/Xc*100	Xcs/Xws*100	(Xcs/Xws)/(Xc/Xw)	Xcs/Xc*100	Xcs/Xws*100	(Xcs/Xws)/(Xc/Xw)	Xcs/Xc*100	Xcs/Xws*100	(Xcs/Xws)/(Xc/Xw)
1998	8.4229	3.0226	3.1453	0.3734	25.1613	11.7070	1.3899	29.6243	8.9106	1.0579
1999	9.0908	2.8750	3.2584	0.3584	26.3839	12.5697	1.3827	27.1485	9.1979	1.0118
2000	9.5994	3.0638	2.7658	0.2881	27.4458	13.2593	1.3813	27.5256	10.1308	1.0554
2001	10.0117	2.7987	2.8039	0.2801	28.7753	14.2208	1.4204	26.2770	9.9960	0.9984
2002	11.0736	2.6716	2.9900	0.2700	29.2846	16.1427	1.4578	24.9582	10.6075	0.9579
2003	12.5446	2.4639	2.9391	0.2343	30.3784	18.6673	1.4881	24.7209	11.9647	0.9538

2004	11.0146	2.9554	3.0824	0.2798	31.4362	17.4511	1.5844	24.7901	10.0749	0.9147
2005	10.3267	3.3861	2.7867	0.2699	34.2587	18.1588	1.7584	24.9039	9.5710	0.9268

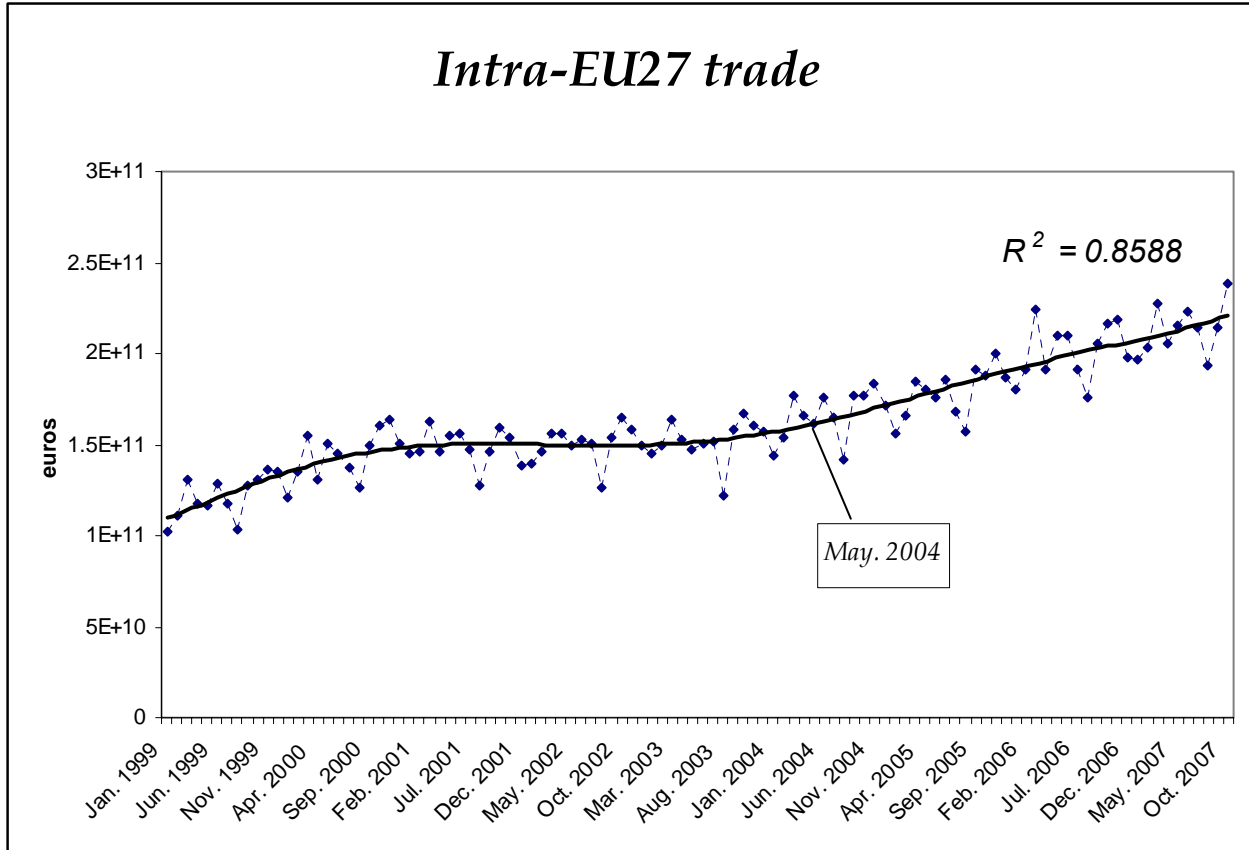
Table 14: New Members' Revealed Comparative Advantages (RCA) vs world

	World market share for NMs (Xc/Xw)*100	Capital goods			Consumption goods			Intermediate goods		
		Sectoral share on total exports	Market share at sectoral level	Revealed Comparative Advantage	Sectoral share on total exports	Market share at sectoral level	Revealed Comparative Advantage	Sectoral share on total exports	Market share at sectoral level	Revealed Comparative Advantage
		Xcs/Xc*100	Xcs/Xws*100	(Xcs/Xws)/(Xc/Xw)	Xcs/Xc*100	Xcs/Xws*100	RCA=(Xcs/Xws)/(Xc/Xw)	Xcs/Xc*100	Xcs/Xws*100	(Xcs/Xws)/(Xc/Xw)
1998	1.7319	9.3338	0.9022	0.5209	30.4101	0.6504	0.3755	60.2561	1.9365	1.1181
1999	2.2350	12.4103	1.5654	0.7004	32.0544	1.1241	0.5029	55.5353	2.3069	1.0322
2000	1.9260	12.5618	1.4010	0.7274	31.8332	1.0737	0.5575	55.6050	1.9449	1.0098
2001	2.2556	13.1341	1.7218	0.7633	30.1028	1.2246	0.5429	56.7631	2.3716	1.0514
2002	2.3852	13.1303	1.8637	0.7814	31.0644	1.2425	0.5209	55.8054	2.4883	1.0432
2003	2.3261	14.2537	2.0205	0.8686	30.4271	1.3207	0.5678	55.3192	2.3911	1.0280
2004	2.5273	14.7943	2.2278	0.8815	29.3076	1.5573	0.6162	55.8981	2.6033	1.0301
2005	2.9812	15.4217	2.7730	0.9302	28.2326	1.9860	0.6662	56.3457	3.0919	1.0371

Table 15: New Members' Revealed Comparative Advantages (RCA) vs world, intermediates by stage of production

	World market share for NMs (Xc/Xw)*100	Intermediates by stage of production								
		Primary			Parts and components			Semifinished goods		
		Sectoral share on total exports	Market share at sectoral level	Revealed Comparative Advantage	Sectoral share on total exports	Market share at sectoral level	Revealed Comparative Advantage	Sectoral share on total exports	Market share at sectoral level	Revealed Comparative Advantage
Xcs/Xc*100	Xcs/Xws*100	(Xcs/Xws)/(Xc/Xw)	Xcs/Xc*100	Xcs/Xws*100	(Xcs/Xws)/(Xc/Xw)	Xcs/Xc*100	Xcs/Xws*100	(Xcs/Xws)/(Xc/Xw)		
1998	1.7319	6.5081	1.4373	0.8299	12.8604	1.1446	0.6608	40.8875	2.6633	1.5377
1999	2.2350	4.5989	1.2043	0.5389	18.0635	2.0148	0.9015	32.8729	2.9118	1.3028
2000	1.9260	4.5772	0.8535	0.4431	19.4704	1.8537	0.9624	31.5574	2.4801	1.2877
2001	2.2556	4.1691	0.9534	0.4227	20.8454	2.4425	1.0829	31.7485	2.8792	1.2765
2002	2.3852	3.9923	1.0194	0.4274	21.1355	2.6154	1.0965	30.6776	2.9414	1.2332
2003	2.3261	3.8347	0.9125	0.3923	21.6458	2.6791	1.1518	29.8387	2.7493	1.1819
2004	2.5273	3.5095	0.8995	0.3559	22.7356	3.1006	1.2269	29.6531	2.8964	1.1461
2005	2.9812	3.7216	1.0431	0.3499	22.5257	3.6800	1.2344	30.0984	3.5266	1.1830

Graph 1: Intra-EU27 imports, monthly flows and tendency line, Eurostat-ComExt data

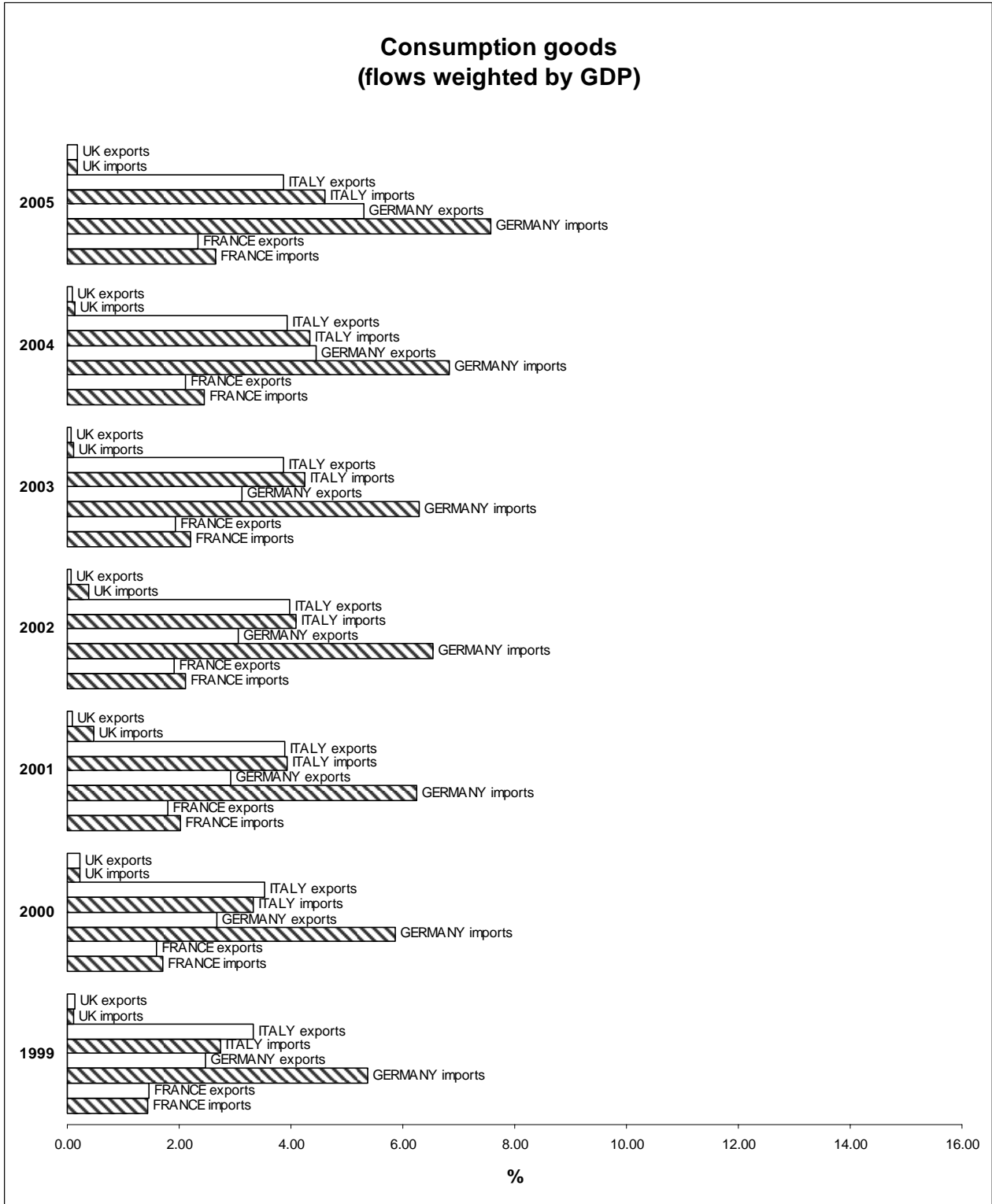


**Graph 2: Trade of capital goods with NMs weighted by GDP, elaboration on Eurostat-ComExt data**

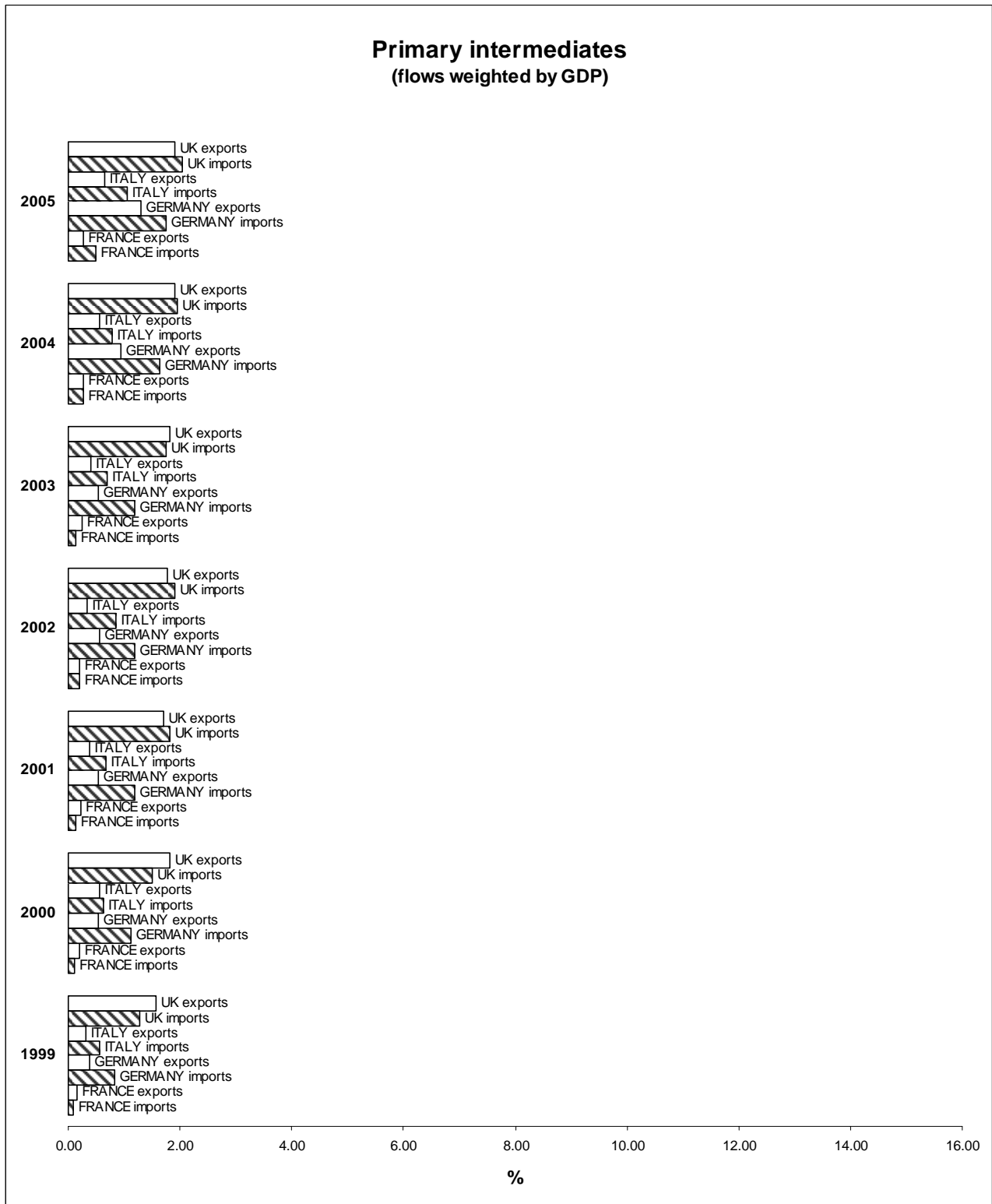




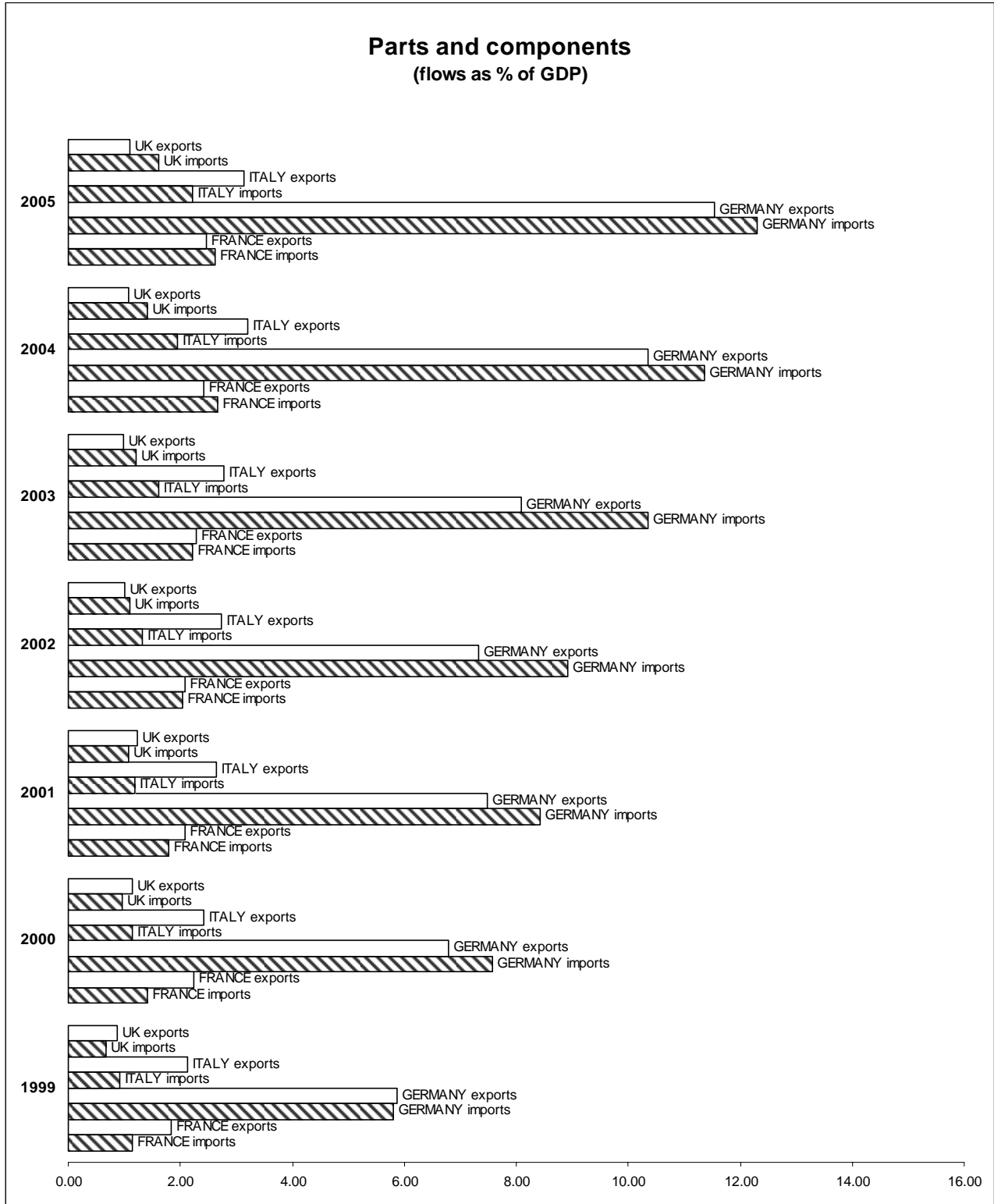
**Graph 3: Trade of consumption goods with NMs weighted by GDP, elaboration on Eurostat-ComExt data**



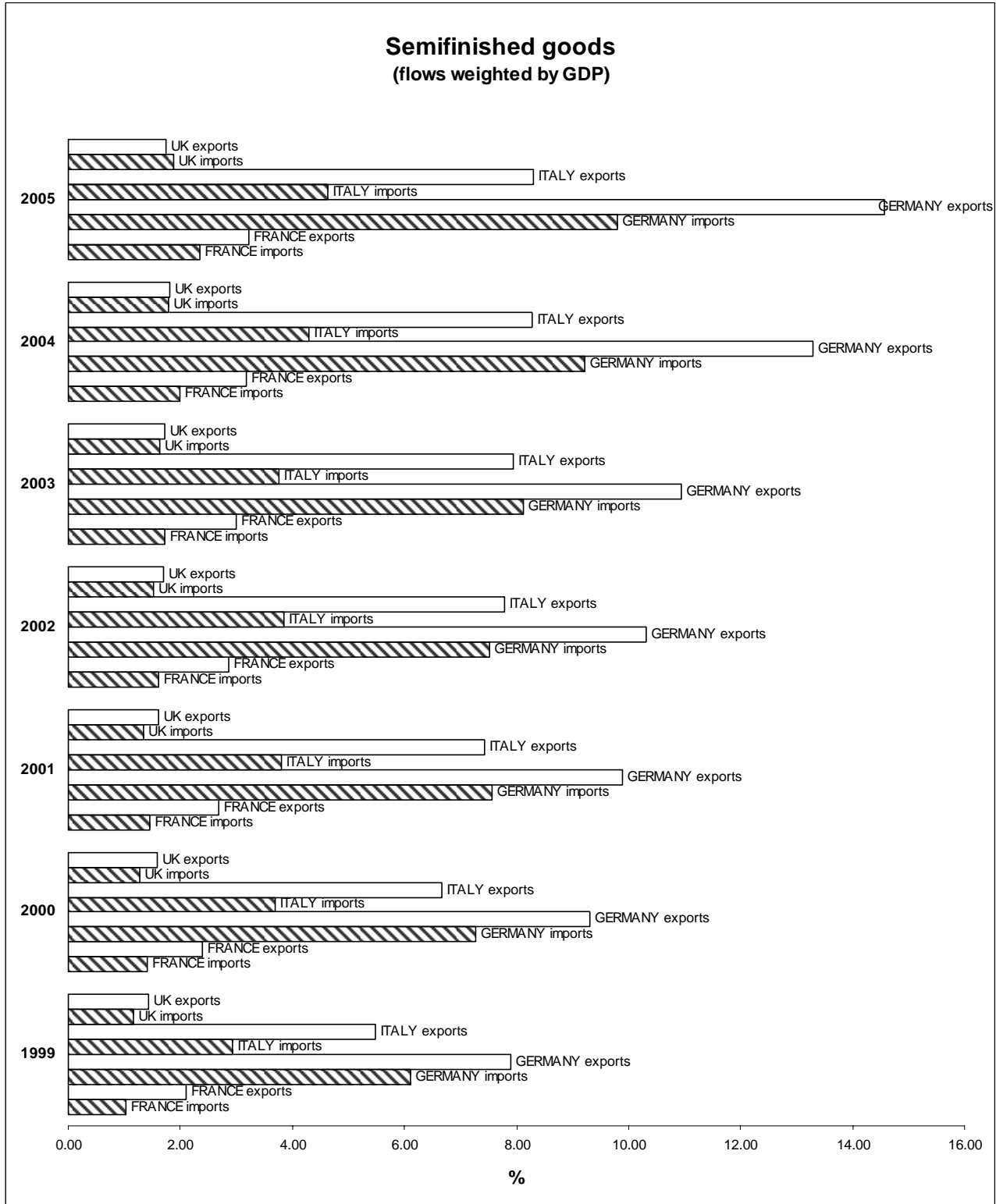
**Graph 4: Trade of primary intermediates with NMs weighted by GDP, elaboration on Eurostat-ComExt data**



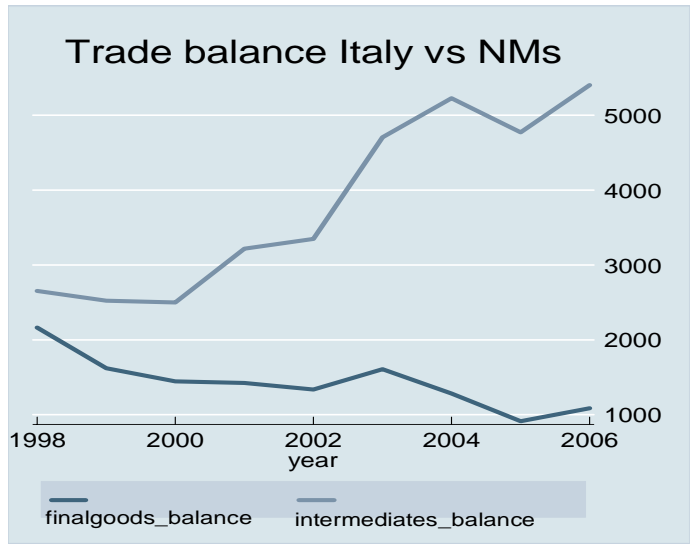
**Graph 5: Trade of parts and components with NMs weighted by GDP, elaboration on Eurostat-ComExt data**



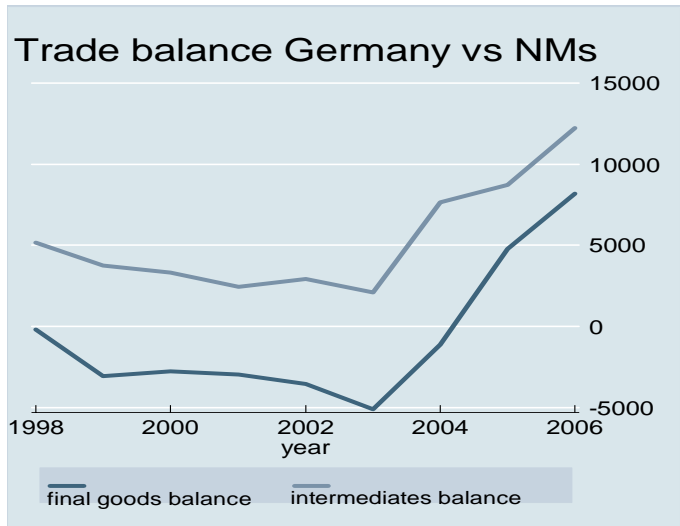
**Graph 6: Trade of semifinished goods with NMs weighted by GDP, elaboration on Eurostat-ComExt data**



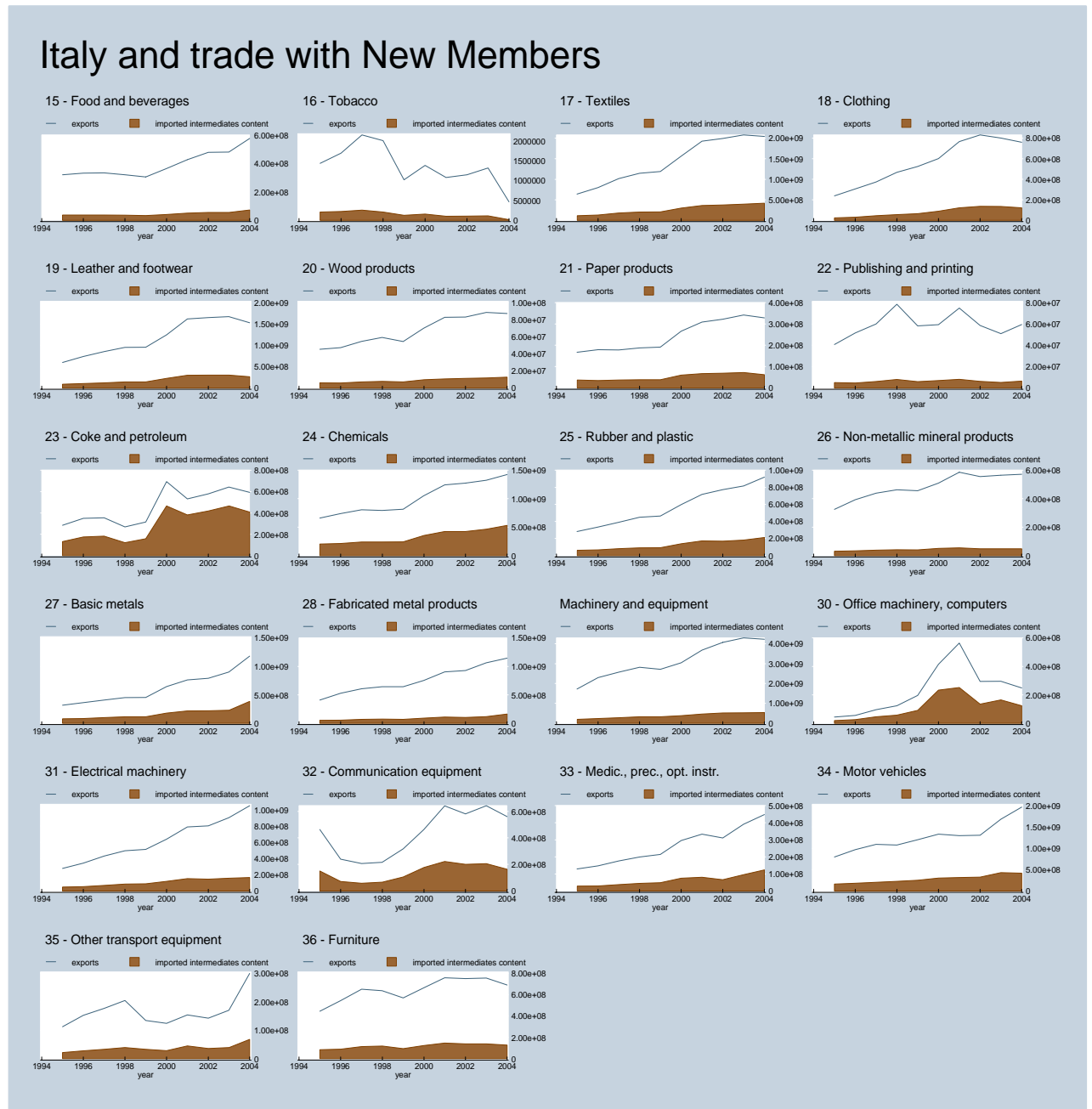
**Graph 7: Italian trade balance with NMs**



**Graph 8: German trade balance with NMs**

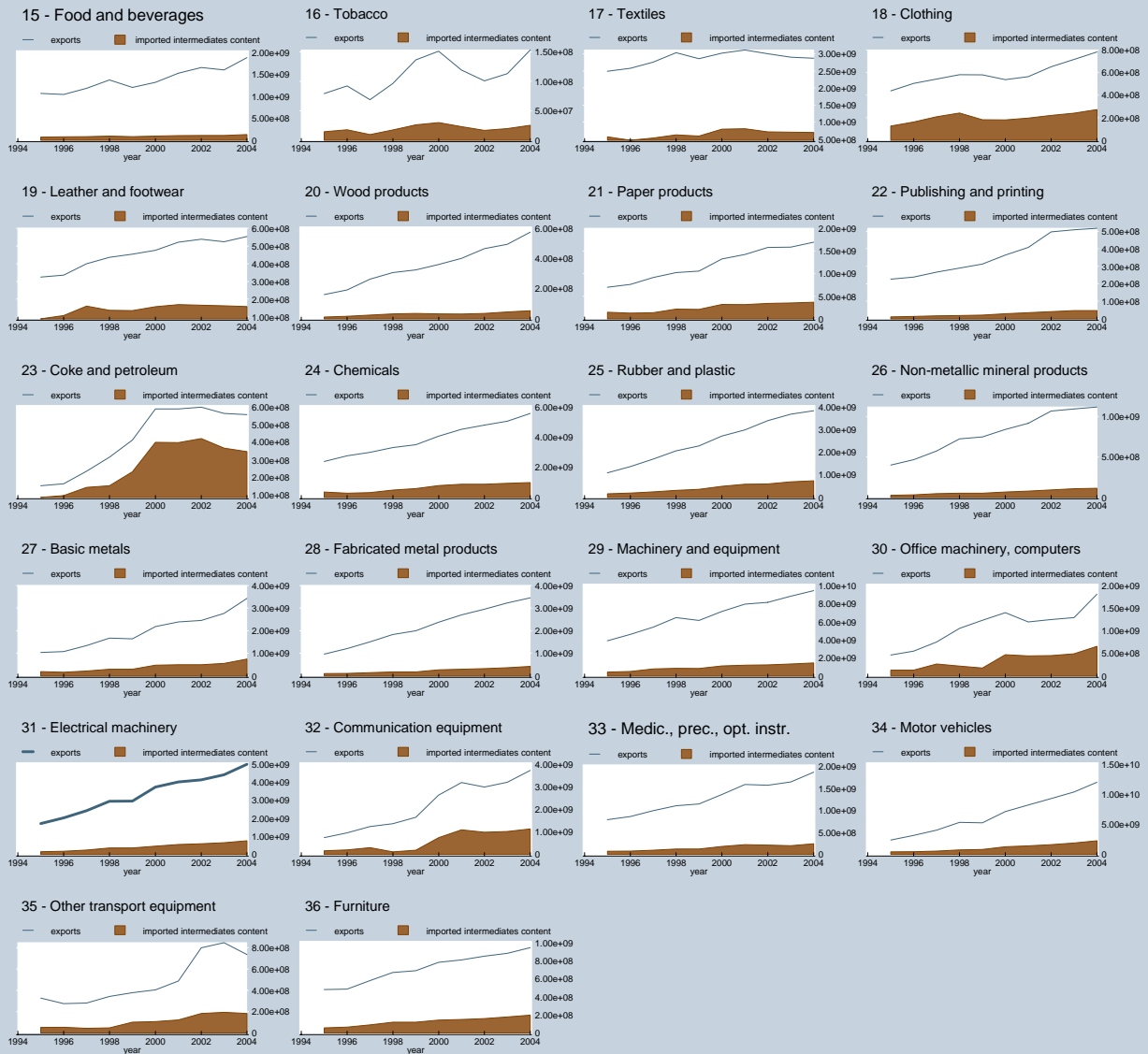


**Graph 9: Export and imported intermediates content for Italy calculated using vertical shares, elaboration on ComExt data and Input-Output tables**



**Graph 10 Export and imported intermediates content for Germany calculated using vertical shares, elaboration on ComExt data and Input-Output tables**

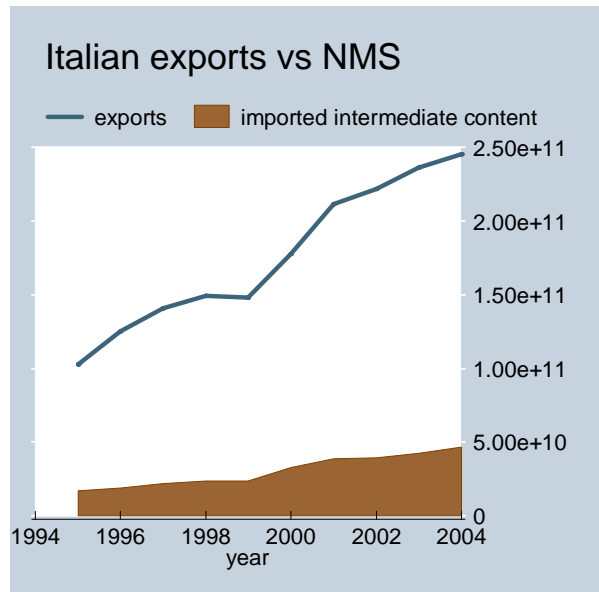
## Germany and trade with New Members



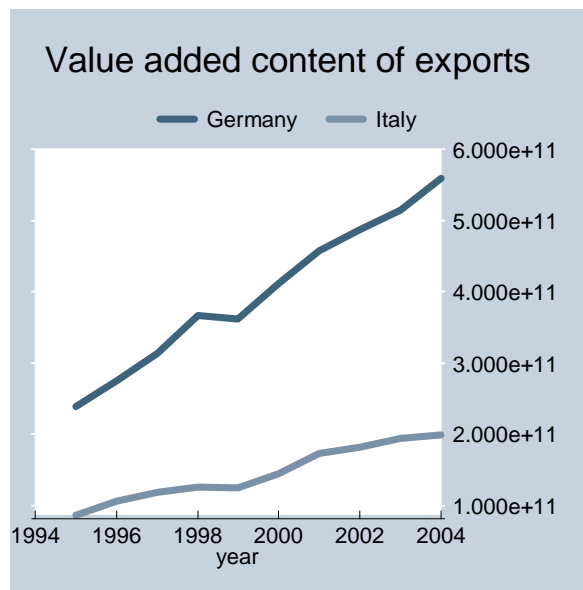
**Graph 12: Aggregating sectors for Germany**



**Graph 11: Aggregating sectors for Italy**

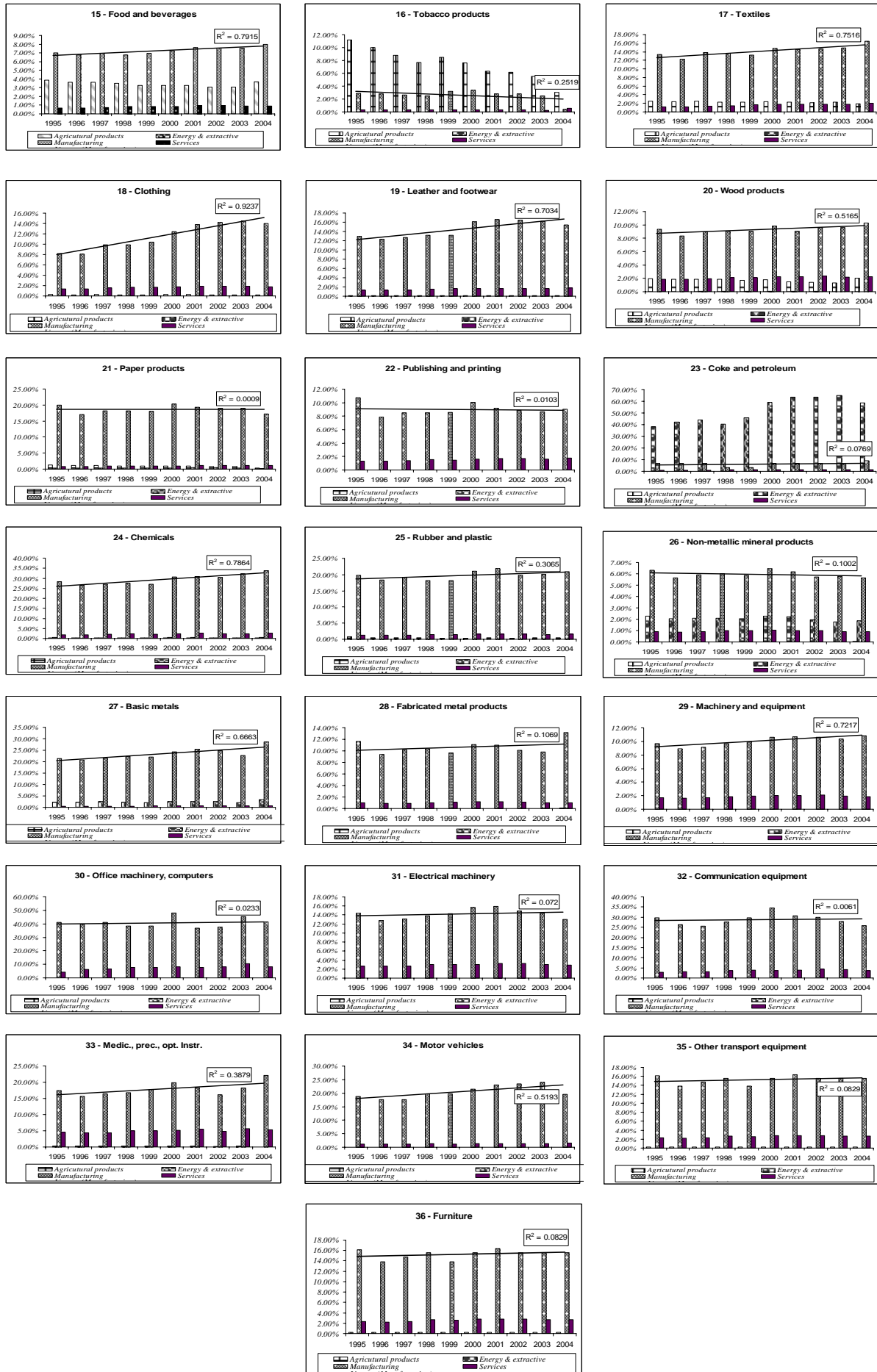


**Graph 13: Domestic value added exported**

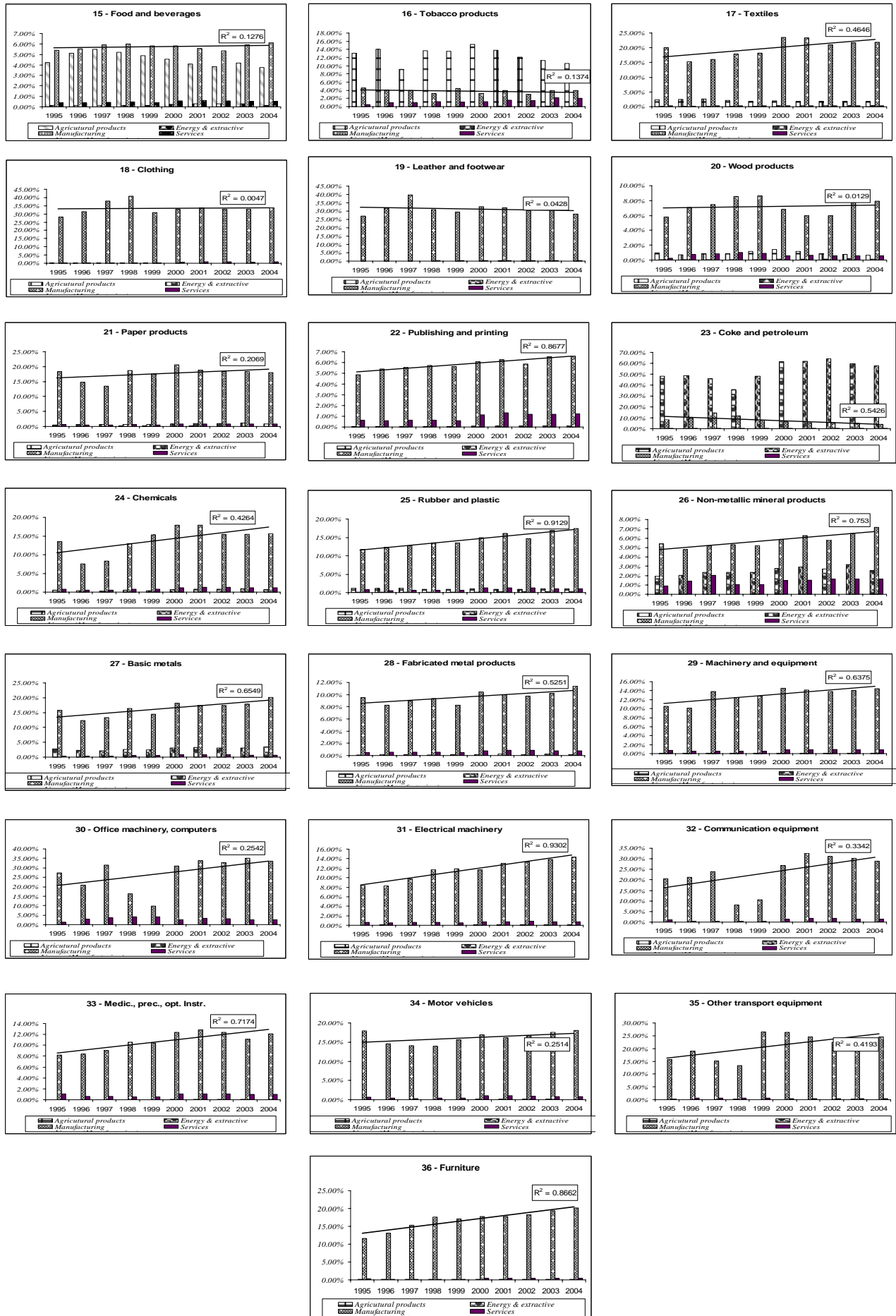




**Graph 14: Decomposing Italian vertical shares by main sectors of provenance for NACE 2-digit industries, elaboration on Input Output tables for imported intermediates**



**Graph 15 : Decomposing German vertical shares by main sectors of provenance for NACE 2-digit industries, elaboration on Input Output tables for imported intermediates**



## Appendix A

### Correspondence of Broad Economic Categories (BEC) classification of trade flows with the basic classes of goods used in the national accounts (SNA)

<b>Basic classes SNA</b>	<b>Broad economic categories (BEC)</b>
Capital goods	41. Capital goods (exc. transport) 521. Transport equipment, other, industrial
Consumption goods	112. Food and beverages, primary, mainly for household consumption 122. Food and beverages, processed, mainly for household consumption 51. Transport equipment, passenger motor cars 522. Transport equipment, other, non industrial 61. Consumer goods, durable 62. Consumer goods, semi-durable 63. Consumer goods, non-durable
Primary (intermediates)	111. Food and beverages, primary, mainly for industry 21. Industrial supplies, primary 31. Fuels and lubricants, primary
Parts and components (intermediates)	42. Capital goods, parts and accessories 53. Transport equipment, parts and accessories
Semifinished goods (intermediates)	121. Food and beverages, processed, mainly for industry 22. Industrial supplies, processed 322. Fuels and lubricants, processed, other

Fonte: UN<sup>7</sup>

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<sup>7</sup> EUROSTAT - ComExt database do not contain a complete track of 321- Motor spirit, which is excluded from our data. We also exclude from basic classes the Broad Category "Goods not elsewhere specified", which includes military equipment, postal packages and special transactions. Passenger motor cars (51. BEC) can have a dual use (consumption goods or capital goods), but we include it only in the Consumption goods category following a prevalence criterion.

## Appendix B

### BALASSA INDEX CALCULATION

The traditional Balassa Index (RCA) is a sectoral export measure in terms of share of world exports (De Benedictis and Tamberi 2001):

$$BI = \frac{\frac{X_{cs}}{X_c}}{\frac{X_{ws}}{X_w}}$$

where  $c$  is the country,  $s$  the sector,  $w$  is the world.

It can also be interpreted as the country share of sectoral export,  $X_{cs}/X_{ws}$ , normalized by a weighted sum of export shares in all sectors which is equivalent to  $X_c/X_w$ .

What we do in some cases (i.e. Italy and Germany vs. New Members) is to identify a more restricted market (i.e. New Members) and calculate the revealed comparative advantage of single partners (i.e. Italy and Germany).

As De Benedictis and Tamberi (2001) point out, the traditional index used as a cardinal measure suffer of distribution asymmetry and variability of the mean value across time.

First, the demarcation is not symmetric and the relative weight of sectors above one is excessive if compared to those below one. The second point is the different variability of the numerator and denominator across time. As a matter of fact, in the long time the BI have a compositional effect because the relative export share of the country ( $X_c/X_w$ ) in the world can structurally change in the given period. But what we are trying to measure is the evolution of the relative share and eliminating this compositional effect (for example fixing the mean as Proudman and Redding, 1998) we risk to rule out important information. In order to take into account both the structural change of trade given by the relative country share and the change of trade by category of goods, we decided to report in time series: country  $c$  share in the market, sector  $s$  share on country  $c$ 's total exports, country  $c$ 's share of sector  $s$  within the considered market.

## Appendix C

### VERTICAL SHARES AND NATIONAL VALUE ADDED CONTENT OF EXPORTS: AN INPUT-OUTPUT MODEL

In Hummels, Ishii and Yi (2001) a tentative to measure domestic value added content of exports has been made, disentangling from trade flows the imported intermediates content (or “foreign value added content”) and the “domestic value added content”, which is composed by a direct component, relative to the production of the exported product, and an indirect component, relative to the production of intermediates.

An input-output model can be drawn (Zhi Wang, 2007; Chen et al. 2005) for which imported intermediate inputs pass the border of a country and participate to several stages of production before being exported within a product or being sold to a final consumer:

$$\left\{ \begin{array}{l} A^D X + Y^D = X \\ A^M X + Y^M = M \\ (A^D + A^M)' X + \hat{V} X = X \\ uA^D + uA^M + V = u \end{array} \right. \quad \begin{array}{l} (1) \\ (2) \\ (3) \\ (4) \end{array}$$

where:

$A^D = [a^D_{ij}]$  is an  $(n \times n)$  matrix of domestic input coefficients for domestic products

$A^M = [a^M_{ij}]$  is an  $(n \times n)$  matrix of imported inputs for domestic products

$Y^D$  is an  $(n \times 1)$  vector of final demands for domestic products;

$Y^M$  is an  $(n \times 1)$  vector of final demands for imported goods;

$X$  is an  $(n \times 1)$  vector of output;

$M$  is an  $n \times 1$  vector of imports;

$V = [v_j]$  is a  $(1 \times n)$  vector of each sector  $j$ 's ratio of value added to output;

$\hat{V}$  is an  $(n \times n)$  diagonal matrix with  $v_j$  as its diagonal elements;

$u$  is a  $(1 \times n)$  unity vector

It is important to note that in this contest we do not refer to the national value added content as the one incorporated by a single productive activity within a single sector. One thing is the direct component of domestic value added, which is the difference between output and all intermediates, and another thing is the indirect component of domestic value added, given by a geometric series: the production of intermediates minus the intermediates necessary to produce them, etc.

Only at the moment of exiting in form of an export we measure how much value has been created into the country of origin and how much “foreign value added” is incorporated in terms of imported intermediates.

First of all the domestic production is, from (1)

$$X = \hat{A}_v (I - A^D)^{-1} Y \quad (5)$$

Substituting equation (5) into equation (2) for X, yields:

$$M = A^M (I - A^D)^{-1} Y^D + Y^M \quad (6)$$

Suppose that there is an incremental increase in exports of  $\Delta E$ . For the moment we assume that no other change in domestic final demand has happened ( $\Delta Y^D = \Delta E$ ), so that the incremental increase in output induced by this change is given by

$$\frac{\partial X}{\partial E} = \hat{A}_v (I - A^D)^{-1} \quad (7)$$

following equation (5), because exports are a component of aggregate income.

If we define an incremental value added due to the output change as:

$$dV = \hat{A}_v dX \Rightarrow \frac{\partial V}{\partial E} = \hat{A}_v (I - A^D)^{-1} \quad (8)$$

with  $V = \{v_j\}$  is a  $(n \times 1)$  vector value added for a sector.

Defining  $B_V = \{b^V_j\}$  as the “domestic value added” generated by one unit of exports, we have:

$$\frac{\partial V}{\partial E} = B_V = A_v (I - A^D)^{-1} \quad (9)$$

A process of creating value added, even if indirect, can be traced throughout the economy not stopping at the sector production but reaching every intermediates stage before up the production chain.

Total domestic value added induced by exports is equal to the sum of direct domestic value added and all indirect domestic value added. The process can be easily expressed mathematically:

$$B_V = A_V + A_V A^D + A_V A^D A^D + A_V A^D A^D A^D + \dots = A_V (I + A^D + A^{D^2} + A^{D^3} + \dots) \quad (10)$$

It can be shown that the power series of matrix  $A^D$  is convergent and the inverse matrix  $(I - A^D)^{-1}$  exists. Thus we have

$$B_V = A_V (I - A^D)^{-1} \quad (11)$$

