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**Competition among Cohesion and Accession Countries:  
Comparative Analysis of Specialization  
Within the EU Market**

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July 2004

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**Summary:** European integration brings about major impulses for structural change. Analyzing the new competitive structure of countries and industries within the enlarged European Union is a great challenge for economic research. Focusing on the four cohesion countries, Spain, Portugal, Ireland and Greece, this paper presents the key shifts in sectoral developments and changing RCA indicators in exports to the EU15. Comparing the results with the according indicators for selected accession countries indicates that there is intense competition among the cohesion and the accession countries as suppliers for the EU15 market. Poland and the Czech Republic are competitors mainly of Portugal and Greece in lower and middle quality goods; in some of these product groups also Hungary is a potential competitor. In addition, Hungary faces competition from Spain and Ireland in some higher quality goods. Analyzing industries according to OECD taxonomy reveals that there is intense market participation of cohesion and accession countries in labour and resource intensive industries. However, most cohesion and accession countries have a strong comparative disadvantage on the EU15 market in science-based industries. In scale intensive industries accession countries are gaining competitive power and thus increasingly competing with cohesion countries.

**Zusammenfassung:** Europäische Integration und Strukturwandel sind eng miteinander verbunden. Die Analyse der neuen Wettbewerbsstrukturen in der erweiterten Europäischen Union ist eine große Herausforderung. Dieses Arbeitspapier untersucht die Veränderungen der sektoralen RCAs der Exporte zur EU15 der vier Kohäsionsländer, Spanien, Portugal, Irland und Griechenland. Ein Vergleich der Ergebnisse mit den entsprechenden Indikatoren für ausgewählte osteuropäische Beitrittsländer zeigt, dass die Kohäsions- und die Beitrittsländer als Anbieter auf dem EU15-Markt grundsätzlich im starken Wettbewerb zueinander stehen. Polen und die Tschechische Republik sind Konkurrenten von Portugal und Griechenland bei Gütern niedriger bis mittlerer Qualität; bei manchen dieser Produktgüter besteht auch Konkurrenz zu Ungarn. Zudem steht Ungarn bei manchen Gütern von hoher Qualität im Wettbewerb zu Spanien und Irland. Die Analyse von Industrien anhand einer OECD Einteilung zeigt, dass Kohäsions- und Beitrittsländer vor allem in arbeits- und ressourcenintensiven Industrien stark am Wettbewerb teilnehmen. Allerdings haben die meisten Kohäsions- und Beitrittsländer bei forschungsintensiven Industrien starke komparative Nachteile auf dem EU15 Markt. In skalenintensiven Industrien sind die Beitrittsländer immer mehr wettbewerbsfähig, und konkurrieren daher zunehmend mit den Kohäsionsländern.



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# 1. Introduction

EU enlargement creates a wider single market, which stimulates structural adjustment and economic specialization. This implies an increasing interest in analysing foreign trade patterns, in particular export specialization, within the EU market. Special focus is placed on intra-EU trade of the four cohesion countries, Spain, Portugal, Ireland and Greece, when dealing with EU eastern enlargement. As far as the state of development is concerned, it seems likely that accession will in the first place compete with the less developed EU15 countries, namely the cohesion countries. A comparison with the EU15 export specialization patterns of accession countries such as Hungary, Poland and the Czech Republic – representing almost 2/3 of their foreign trade –, allows us to identify the competitive position of these countries as suppliers for the EU15 market, as well as to identify whether trade patterns converge within the EU25. However, other aspects – including economic geography – also are likely to play a role.

The main idea behind the analysis of convergence in trade patterns is that similarity in production and trade structures among EU25 countries will ease the integration process. From a macroeconomic point of view, one may state that when integration extends far beyond trade, as is the case in the European Union, convergence in production and trade structures will help smooth the integration process. The more similar countries are in terms of sectoral specialization, the more likely it is that they will face symmetric shocks and an increase in business cycle co-movements. Correlation in business cycles is even more important if countries aim to have a common monetary policy, as is relevant for countries eager to join the Eurozone. Efficient specialization should spur growth and economic catching-up in accession countries, which in turn could reinforce convergence of economic specialization. Thus, long term real convergence in the production and trade structures within the EU25 could be achieved. Furthermore, from a theoretical point of view, similar countries integrate more easily, because they are likely to show very similar diversification patterns, thus achieving factor price equalization through trade. Trade in products can, at least to some extent, replace trade in production factors and lead to convergence in factor prices. Thus, incentives to factor mobility, especially to migration, will be reduced. This is extremely important in the European context, since there are many concerns about potential migration flows within the EU25.<sup>1</sup>

There is a long tradition of analysing structural change in the economic literature both for the OECD and the EU15 countries.<sup>2</sup> The EU eastern enlargement, however, presents a new challenge for research on structural change to which this paper contributes. The remainder of it is organised as follows. Section 2 gives an overview on different industrial taxonomies, as analytical categories are needed for the analysis of industrial specialization. Section 3 analyses intra-EU trade flows of four cohesion countries, namely Spain, Ireland, Portugal and Greece. An overview on the respective EU-trade structures of selected accession countries is given in the annexes. Section 4 then paints a picture of competitiveness of cohesion and accession countries as suppliers of goods on the EU15 market. Finally, chapter 5 draws conclusions and points towards future research.

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<sup>1</sup> For further explanation see also De Benedictis and Tajoli (2003).

<sup>2</sup> See e.g. Dalum and Villumsen (1996) and Laursen (1998).

## 2. Taxonomy: Analytical Sector Classification

Analysing trends in the composition of foreign trade in manufacturing and making sectoral comparisons among countries requires an appropriate classification of products and industries. One can for instance rely on a traditional method; alternatively new refined approaches could be applied.

### 2.1. Traditional Taxonomy

Traditionally, products were classified according to their ratio of research and development (R&D) expenditure to sales or turnover and classified as either “low”, “middle” or “high” technology products. More sophisticated analysis further distinguished between “medium-low” and “medium-high” technologies (Fontegn  et al. 1999). This taxonomy is especially interesting from a Schumpeterian point of view, however, national differences in R&D intensity of product groups make international comparisons rather demanding and difficult. Although sectoral distribution of R&D intensity is rather similar between accession countries and EU15 countries, R&D levels are very different. Furthermore, it is not reasonable to assume that most innovation in accession countries comes from R&D. This is not only the case in Poland, as proven by Dyker and Kubelias (2000). There are other factors such as investment and FDI, which play an even more important role in adopting new technologies than R&D expenditure. We will therefore use a different system of taxonomy for the underlying analysis, which is used by the OECD and is widely consistent with Pavitt’s taxonomy on the dynamics of technological change and industrial competition.

### 2.2. Pavitt Taxonomy

A major step towards a theoretically based taxonomy was founded by Pavitt (1984). Later developed taxonomies build on his fundamentals; therefore his taxonomy is introduced briefly in this analysis. In accordance with the Schumpeterian view, the basic unit is the innovating firm. Pavitt’s taxonomy of sources of innovation in different sectors can be described as follows. He identifies four categories of firms:<sup>3</sup>

1. *Supplier dominated firms:*

Their main source of innovation is new machinery coming from suppliers of equipment and material. The firms itself makes only a minor contribution to its process or product innovation. Such firms can be found mainly in traditional sectors of manufacturing. They are generally small and have weak R&D capabilities. Technological trajectories are mostly defined in terms of cutting costs.

2. *Science-based firms:*

R&D activities and linkages among firms, universities and science institutes are the key external sources of innovation within this group. Science-based firms also transfer technology to production intensive firms e.g. in the electronics or the automobile industry. The main internal sources of technology are R&D and production engineering.

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<sup>3</sup> Following description is in the style of Pavitt (1984) and Laursen and Drejer (1997).

### 3. *Specialised equipment suppliers:*

Incremental innovations take place thanks to cooperation between capital goods suppliers and industrial users. Usually, they are small firms, which are producers of production equipment and control instruments. The main internal source of technology is primarily development. External sources are science-based and scale-intensive firms as users.

### 4. *Scale-intensive firms:*

Large dimensions of production allow for experience and innovation. Their technological trajectory is described by increasing large-scale fabrication and assembly production. Internal sources of technology are production engineering and R&D departments. External sources are mainly interactive learning with specialised suppliers, but also inputs from science-based firms.

There are of course technological linkages among the different categories of firms, which can go beyond transactions involving the purchase and sale of goods embodying technology. These might include flows of information and skills, as well as technological diversification into the main product areas of suppliers and customers. Building upon this taxonomy the OECD developed its own.

## 2.3. OECD Taxonomy

This approach (OECD 1987) distinguishes five groups of products on the basis of the primary factors affecting the competitive process in each economic activity. It was originally used for ISIC classification; here the converted version for NACE rev. 1.1 is presented. Table 1 summarizes the taxonomy:

**Table 1: OECD Taxonomy**

Grouping	Major factor affecting competitiveness	Examples
Labour-intensive	Labour costs	Textiles, leather
Resource-intensive	Access to abundant natural resources	Food, wood, refined petroleum
Scale-intensive	Length of production runs	Motor vehicles, steel
Differentiated goods	Tailoring product to highly varied demand characteristics	Electrical machinery and equipment
Science-based	Rapid application of scientific advance	Office machinery and computing, Pharmaceuticals

*Source: OECD 1987, p: 272.*

The main advantage of the approach adopted here is that it provides a link between the way product groups are defined and the main types of economic benefits which flow from trade.<sup>4</sup>

- Trade in labour- and resource-intensive products bring the allocation of resources within industries more closely into line with international patterns of factor endowments.
- Trade in scale-intensive products allows firms to increase plant size and lengthen production runs, while at the same time reducing costs.
- Trade in differentiated goods benefits consumers with large product variety without sacrificing the advantages of large-scale production.
- Trade in science-based products makes it likely to spread high fixed costs and risks of R&D over a larger market; this ensures the rapid diffusion of the benefits of new products and processes.

The group of differentiated goods mainly corresponds to the group of specialized suppliers of Pavitt's taxonomy. Furthermore, the groups scale-intensive and differentiated goods (or specialised suppliers) increasingly overlap in practice, so that one could aggregate these two groups under production intensive goods, as did Pavitt (1984). For the following empirical analysis we will use the OECD type of taxonomy. NACE 2-digit level product groups are divided into the five categories as follows:

**Table 2: Relocation of NACE 2-digit level products to taxonomy groups**

Groups	NACE 2-digit Classification
Labour-intensive	17, 18, 19, 28, 36
Resource-intensive	15, 16, 20, 23, 26, 27
Scale-intensive	21, 22, 27, 24, 25, 34, 35
Science-based	30, 33, 35
Differentiated goods	29, 31, 32

*Source: OECD (1987), Soós (2000), own modifications*

Two groups cannot be clearly relocated to one taxonomy group. Thus, basic metals (27) belong to both the resource- and scale intensive groups: While iron and steel production belong to the scale-intensive group, the production of non-ferrous metals is rather resource intensive. The manufacture of other transport equipment (35) is also situated between two groups: aircraft and spacecraft are clearly science-based, while shipbuilding and railways belong to the scale-intensive group. The following empirical analysis is based on the OECD taxonomy.

<sup>4</sup> Following description is according to OECD (1987) pp: 274 ff.

### 3. Empirical Analysis of Specialization Patterns of Manufacturing Exports in Cohesion Countries

In accordance with Borbély (2004), where the evolution of specialization patterns in exports of three accession countries, Hungary, Poland and the Czech Republic was dealt with, the subsequent analysis makes use of three different indicators, the *Trade Coverage Index*, the modified *Revealed Comparative Advantage Index* and the *Grubel-Lloyd Index of Intra-Industry Trade* to measure foreign trade performance - at a disaggregated level - of the four cohesion countries, Spain, Greece, Ireland and Portugal: the focus is on trade with the EU15 countries. Data on exports and imports to the EU15 in the manufacturing sector are available for cohesion countries at a 3-digit-level.<sup>5</sup> Data is classified according to NACE rev.1.1. The list of variables can be found in the Annex.

#### 3.1. Trade Coverage Index

The Trade Coverage Index (TCI) reveals the ratio of exports (X) to imports (M).

$$TCI_i^t = \frac{X_i^t}{M_i^t}$$

where i can stand for either total manufacturing or for a certain product group.

In order to understand how strong the overall export-import ratio of respective countries is, we calculate the Trade Coverage Index for total manufacturing in different years. Table 3 shows the results.

**Table 3: TCI for total manufacturing**

TCI	1993	1994	1995	1996	1997	1998	1999	2000	2001
Spain	0.77	0.83	0.80	0.80	0.82	0.77	0.75	0.76	0.80
Ireland	1.48	1.52	1.64	1.86	1.80	1.75	1.64	1.59	1.76
Portugal	0.69	0.73	0.77	0.74	0.73	0.69	0.66	0.64	0.66
Greece	0.30	0.31	0.31	0.29	0.27	0.25	0.25	0.23	0.23

Source: COMEX, own calculations

Only one of the four cohesion countries' TCI exceeds unity, namely Ireland. At the beginning of the sample period it exported roughly 50% more than it imported from the EU15, at the end of the sample period (2001) this ratio had increased to roughly 75%. From this point of view Ireland is most comparable among the accession countries with Hungary, where exports exceed imports by roughly 55%. The other three cohesion countries clearly import more from the EU15, than they export. TCI is closest to one in Spain, where exports make up to 80% of imports. This figure is comparable to Poland, where TCI reaches 0.80 in the year 2001; however, in contrast to Spain, TCIs have risen sharply in the course of the 1990s. Portuguese TCIs are slightly lower than in Spain or

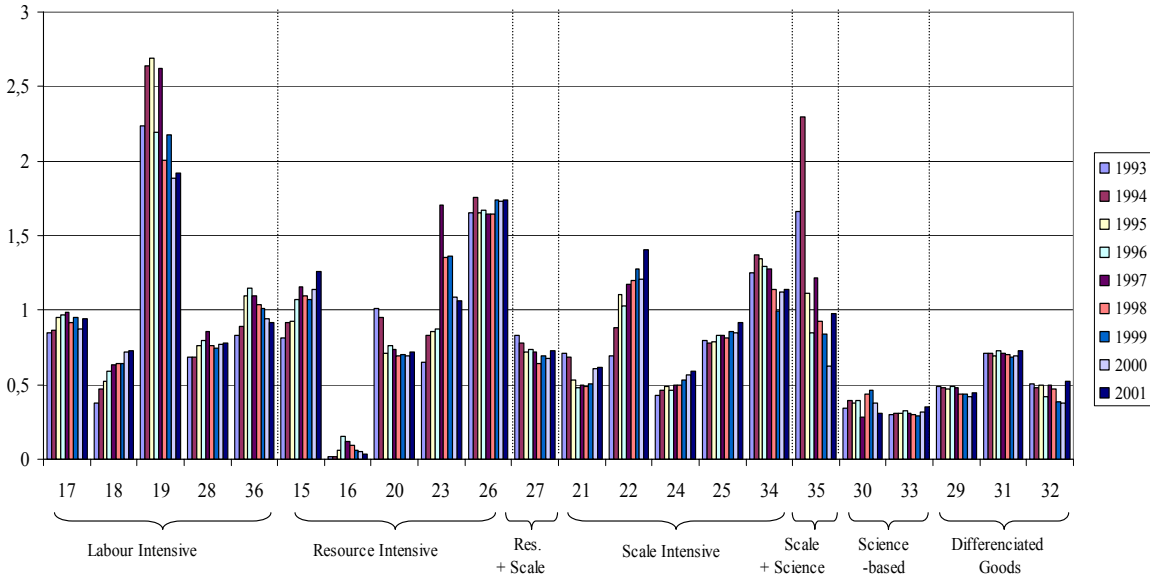
<sup>5</sup>Data is extracted from the COMEX database of the European Commission.

Poland, with no sign of an increase in the 1990s. Greece is not comparable to any other country considered in the analysis. The gap between imports and exports is tremendous. Exports make up only one fourth of imports and there is even a slight deterioration of the situation visible throughout the 1990s.

Let us turn to a more disaggregated view in manufacturing. The following figures, which contain NACE 2-digit level product categories, are based on the OECD taxonomy. The product groups are allocated from left to right in the following order: labour-intensive, resource intensive, scale intensive, science-based and differentiated goods. The two groups, 27 and 35, which belong to two OECD groups each, are shown separately between the respective product groups.

Figures 1-4 confirm the findings of total manufacturing. In Spain (figure 1) most of the manufacturing sectors show a TCI below one, indicating higher imports than exports. This is especially valid for science-based and differentiated goods, and for the end of the 1990s also for the scale-intensive + science-based product group, other transport equipment (35), where Spanish exports are losing against imports. TCIs still exceed unity in some labour, resource and scale intensive product groups, such as tanning and dressing of leather (19) – the highest TCI –, food products and beverages (15), non-metallic mineral products (26), publishing and printing (22), and motor vehicles and trailers (34).

**Figure 1: Spain – Trade Coverage Index, 1993-2001**

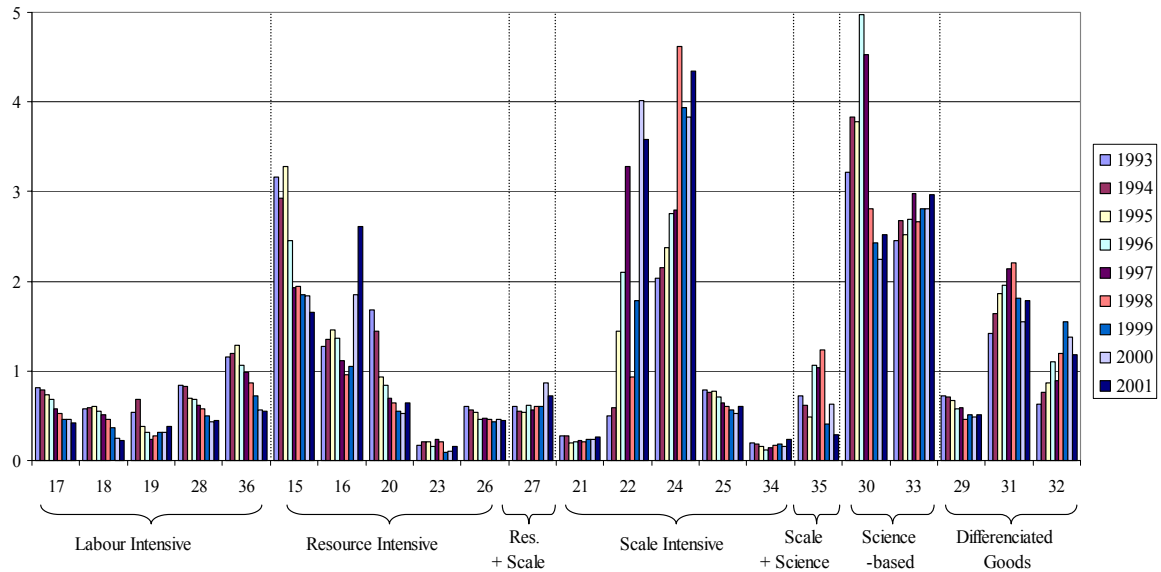


The rather high TCIs for total manufacturing in Ireland (figure 2) seem to be generated in only a few branches. At the end of the 1990s in more than half of the product groups imports exceed exports, thus, TCI is lower than one. Ireland has strongly specialized in the export of only a few products, mostly situated in the middle and the higher end of the technology ladder. Ireland obviously succeeds in the export of science-based products, such as office machinery and computers (30) and medical and optical instruments (33). In addition, it exports more than it imports in some differentiated, high technology products e.g. electrical machinery (31) and radio and television equipment (32). Also some products from the scale intensive groups generate positive net exports: publishing and printing (22) and chemicals and its products (24). On the other hand, the export import ratios are very low in many low technology product groups. In the second half of the 1990s Ireland had no

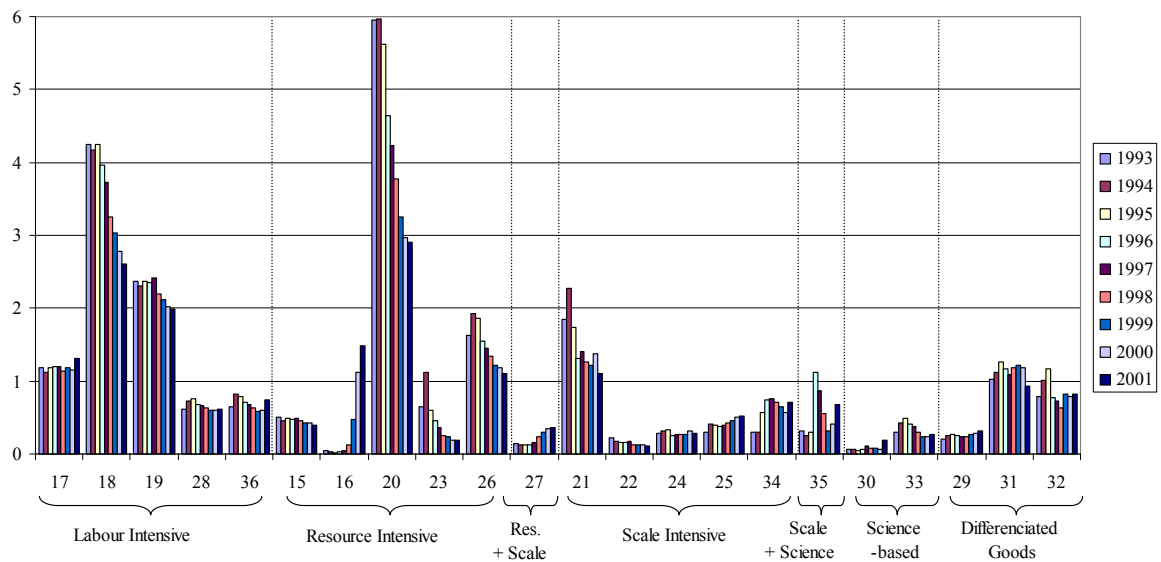


positive net exports in any of the labour intensive sectors, and also TCIs are rapidly declining in the resource-intensive production such as in food products and beverages (15). To summarize, in most of the lower and lower-middle technology products TCIs are declining in Ireland, whereas TCIs are rising in many higher-middle and higher technology groups. Clearly, Ireland has moved away from an agriculture dominated economy towards an economy with a strong focus on exporting high technology products.

**Figure 2: Ireland – Trade Coverage Index, 1993-2001**



**Figure 3: Portugal – Trade Coverage Index, 1993-2001**



The figure for Portugal (figure 3) reveals a very different picture with a rather clear message. TCIs exceeding unity by far can mainly be found in labour and resource intensive product groups, that means, in low tech production. However, most of the strikingly high TCIs are declining. At the end of the 1990s, compared to the EU15, Portugal still excelled in the exportation of three products: cork (20), wearing apparel (18) and leather products (19). Furthermore, Portuguese exports are higher than imports in other non-metallic mineral products (26) and pulp and paper products (21), though with a declining tendency of TCIs in both groups. In most other groups TCIs are already lower than 1 at the end of the sample. Considering technology intensity, one might state that Portugal clearly tends to have positive net exports in lower and lower-middle technology product groups, whereas it imports more from the EU15 than it exports in higher-middle and high technology product categories.

**Figure 4: Greece – Trade Coverage Index, 1993-2001**

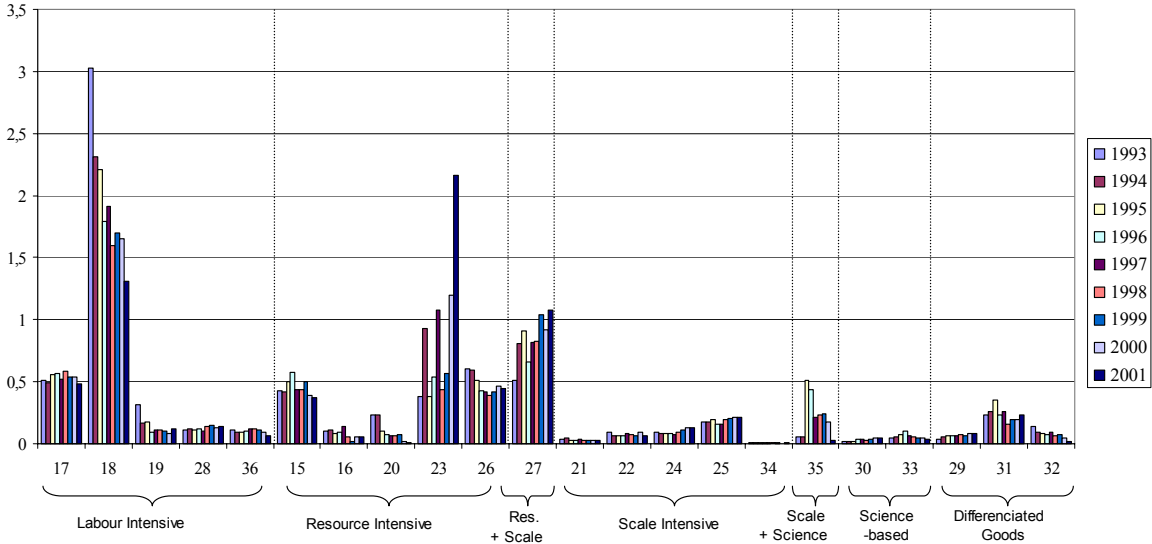


Figure 4 for Greece is rather easy to interpret. In most product groups TCIs do not even exceed the value of 0.5, meaning that imports are more than twice as high as exports. Only in two product groups did TCIs exceed unity by far: food and beverages (18) and coke and refined petroleum (23). Hereby it is striking, that in the latter product group and also in the manufacturing of basic metals (27), Greece exports tend to gain momentum over imports in the course of the 1990s, whereas net exports are shrinking in food and beverages. Thus, Greece’s exports exceed its imports only in very few labour intensive and resource intensive product categories.

The next step is to directly compare exports of cohesion countries with total intra-EU exports, to establish whether the cohesion countries have a comparative advantage or disadvantage in the exportation of the respective product group as compared to the EU15. Doing this we focus on the countries’ position as suppliers for the EU15 market.

### 3.2. Modified RCA-Balassa

Trade specialization in the sense of the revealed comparative advantage (RCA) normally reflects sectoral competitiveness.<sup>6</sup> The specialization indicator used here is a modification of the classical Revealed Comparative Advantage (RCA) index, invented by Balassa (1965). The modification reveals the relative comparative advantage of an industry within a country by comparing the share of that particular industry in the country's total exports to the share of that industry in total world exports at a certain point in time. Since we are interested in the question, whether a cohesion country has a comparative advantage as compared to the EU15, we take the respective cohesion countries' exports to the EU15 instead of total exports worldwide, and intra-EU15 exports instead of worldwide exports. RCA-Balassa for country *i* at time *t* is as follows:

$$RCA_i^t = \frac{\left( \frac{x_i}{\sum_k x_{ik}} \right)}{\left( \frac{x_j}{\sum_k x_{jk}} \right)}$$

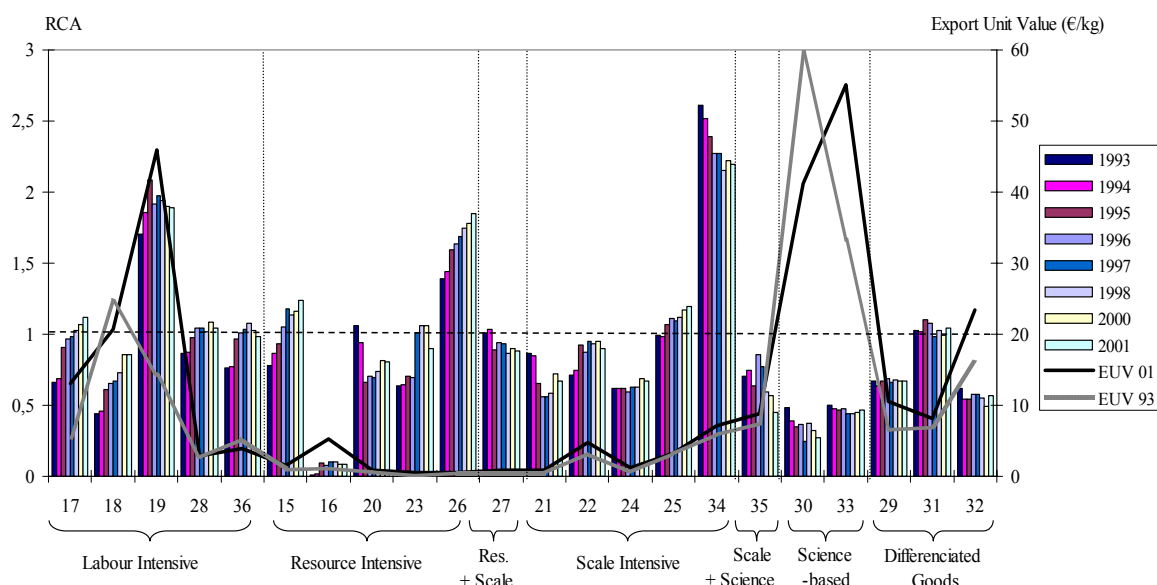
Where *k* stands for commodities in total, *j* stands for the EU15 and *i* for the cohesion country. RCA-Balassa has a minimum value of 0 and a maximum value of infinity. If  $RCA_i > 1$ , the cohesion country *i* has a comparative advantage in that commodity as compared to the EU15. If  $RCA_i < 1$ , there is a comparative disadvantage of the cohesion country *i*. *X* can stand for different variables, mostly used for exports, patents or value added. In this analysis it stands for exports.

Figures 5-8 show the RCA indexes for the four cohesion countries. The horizontal dotted line at 1 (on the left hand scale) indicates the boarder between comparative advantage and disadvantage. The vertical dotted lines indicate the border between the different product categories according to the OECD taxonomy. At the same time one should take a closer look at export unit values (EUV), whose development over time indicates the ability of a country to fetch adequate – if possible higher – prices in world markets. The black line on the right hand side scale shows the export unit values – expressed in €/kg – of the respective product group in the year 2001, the shaded line the export unit values for 1993.

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<sup>6</sup> The classical RCA-Balassa reveals a country's sectoral export-import relation divided by the export-import relation of its total economy.

**Figure 5: Spain – RCA in exports 1993-2001 and export unit values 1993 and 2001**

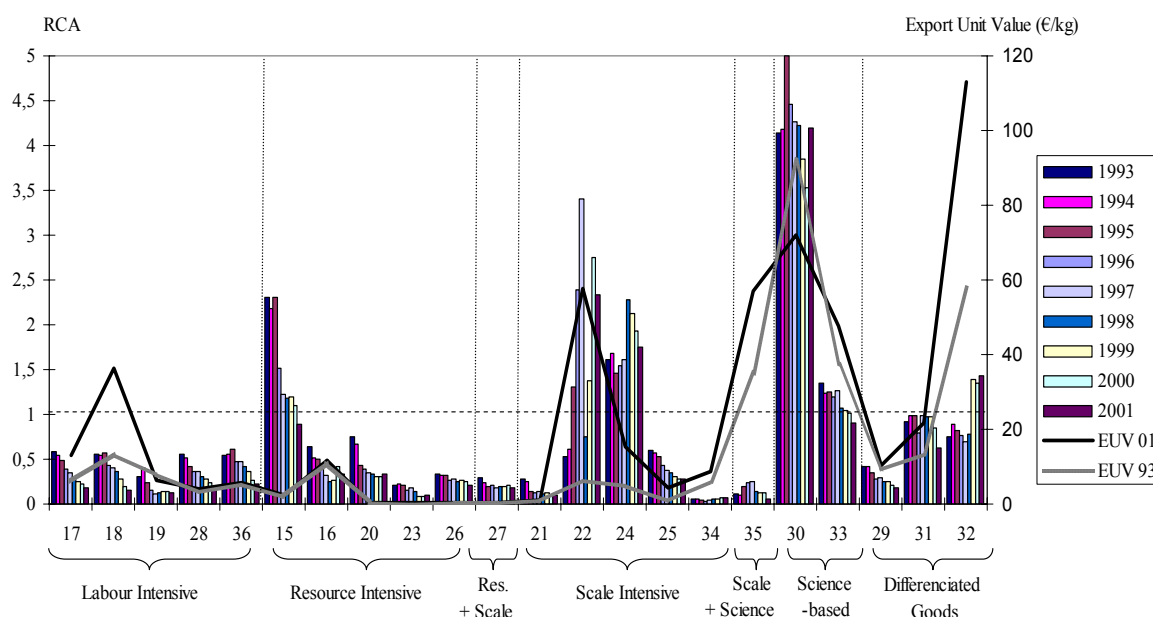


Spain (figure 5) has a comparative advantage to the EU15 in 8 out of 22 product groups in the year 2001. Although the number of product groups with RCA exceeding one has slightly increased since 1995, there does not seem to be much of a dynamic in the development of Spanish exports to the EU.<sup>7</sup> Exports are dominated by three lower and middle technology product groups: tanning and dressing of leather (19), non-metallic mineral products (26) and motor vehicles and trailers (34); the latter group is the most important manufacturing export industry, which makes up to 35% of total manufacturing exports. Each of these three product groups belong to a different OECD category, including labour intensive, resource intensive and scale-intensive production. The only high technology product, in which Spain seems to have a very slight comparative advantage is electrical machinery and apparatus (31). Thus, Spain clearly has specialized in the export of some middle and low technology product groups and has a strong comparative disadvantage in the export of science-based products.

Nevertheless, science-based products have the highest export unit values with one kg exports of office machinery and computers (30) being worth roughly 60 Euro in 1993 declining to only 40 Euro in 2001; the EUV of one kg of medical and optical instruments' exports is worth 35 Euro in 1993 rising to 55 Euro in 2001. One labour intensive sector also shows rather high figures: the value of 1 kg Spanish leather exports has risen sharply to 45 Euro in 2001. Most of the other product groups' export unit values were below 10 €/kg.

<sup>7</sup> This is in line with some empirical analyses that emphasize the fact that national export specialization within the OECD countries is rather sticky. Thus, the speed of convergence of export structures is low. See Dalum and Villumsen 1996.

**Figure 6: Ireland – RCA in exports 1993-2001 and export unit values 2001**



In contrast to Spain, Irish exports are dominated by science-based products; especially in the exportation of office machinery and computers (30) Ireland has a very strong comparative advantage compared to the EU15 (figure 6). In addition, the value of science-based exports is much higher than in Spain. 1 kg of office machinery and computers exported from Ireland to the EU15 is worth more than 70 Euro. However, its export unit value has declined from 90 €/kg in 1993. Also concerning trade volumes, office machinery and computers are the most important sector in Irish manufacturing exports to the EU15, as 46% of manufacturing exports belonged to this product group in the year 2001; followed by chemicals and chemical products (24), which make up roughly one fourth of exports to the EU15. Thus, the scale-intensive product group also plays an important role in Irish foreign trade. Not only in chemicals (24), but also in publishing and printing (22), Ireland has a strong comparative advantage. These product groups mostly belong to the higher-middle and high technology intensive classes. In the course of the 1990s, two product groups have experienced considerable changes. While in the first half of the 1990s, Irish food and beverages exports had RCAs exceeding unity, their importance decreased considerably toward the end of the sample period. On the contrary, exports in radio, TV and communication equipment (32) have achieved a comparative advantage on the EU15 market in the last years, impressively almost doubling export unit values from 60 €/kg in 1993 up to 110 €/kg in the year 2001. This may explain why the export of these products could gain ground in recent years.

**Figure 7: Portugal – RCA in exports 1993-2001 and export unit values 2001**

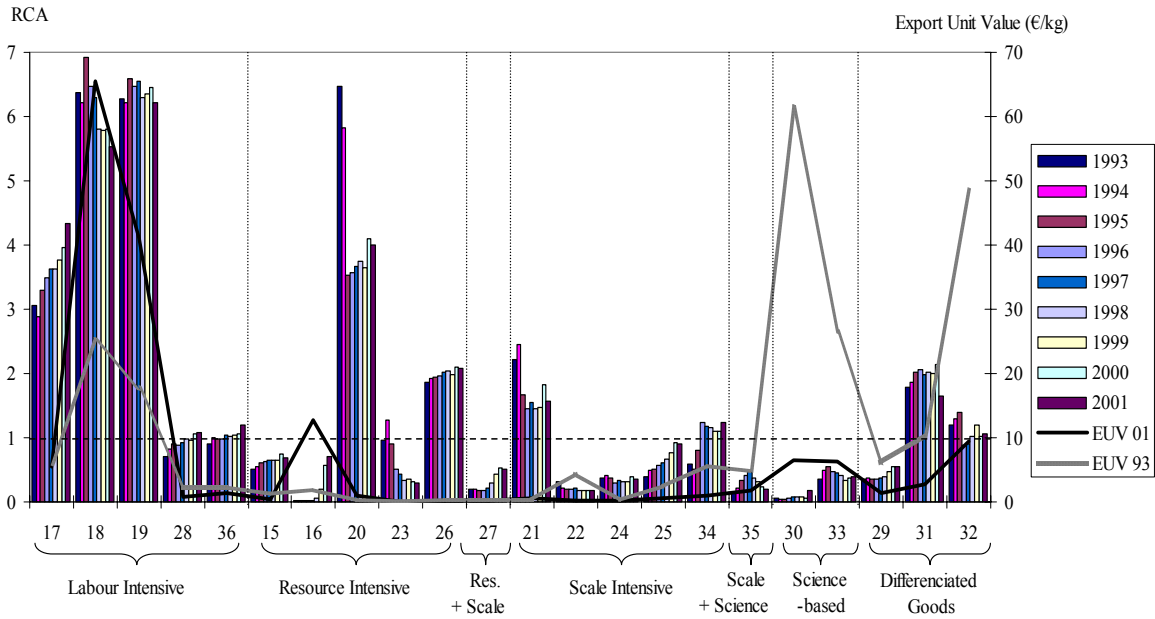
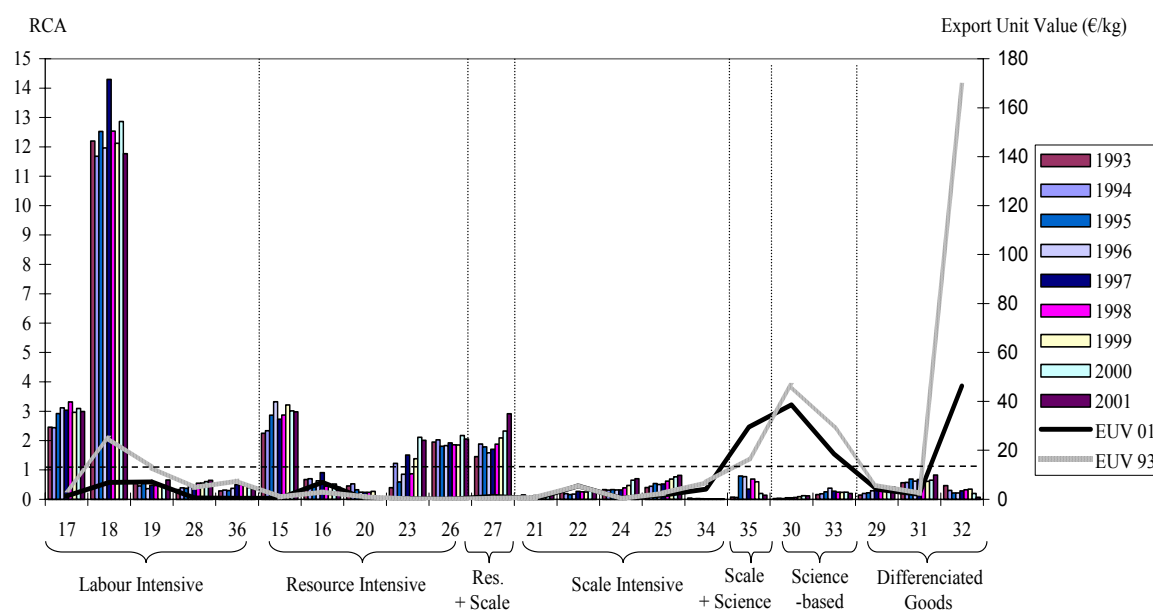


Figure 7 shows that Portuguese export patterns are dominated by sectors with a strong comparative advantage in mostly the low and lower-middle technology product groups. Most RCAs exceeding unity belong to labour intensive industries, such as textiles (17), wearing apparel (18) and leather products (19). These three industries make up more than one fourth of total Portuguese manufacturing exports to the EU15. In the resource intensive industries Portugal is also competitive on the EU15 market with wood and cork products (20) and non-metallic mineral products (26). In most of the scale intensive and science-based product groups there is a clear disadvantage in terms of exports. Some exceptions are pulp and paper products (21), motor vehicles (34) with an export share of 20% in the year 2001, and electrical machinery and apparatus (31).

However, export unit values have clearly risen in low technology intensive goods from 1993 to 2001, on the contrary, in high technology products, export unit values have sharply declined in the period 1993 to 2001. This may also indicate the increasing importance of low technology exports for the Portuguese economy. 1 kg of wearing apparel exports (18) are worth 65 Euro in 2001 rising from 25 €/kg in 1993, but export unit values of science-based products have declined from 30-60 €/kg in 1993 to merely 8 €/kg in 2001. Most other groups' export unit values remained below 15 €/kg throughout the 1990s.

**Figure 8: Greece – RCA in exports 1993-2001 and export unit values 2001**



The Greek situation is rather puzzling (figure 8). RCAs are dominated by a very high value of comparative advantage in wearing apparel (18), combined with a very low export unit value of 7 Euro, coming down from 25 €/kg in 1993. Compared to the Portuguese 65, the Irish 40 and the Spanish 20 €/kg in this product group, it appears that Greece is supplying the EU15 with low quality clothing. These exports are important for the Greek manufacturing industry, as it makes up to one fifth of manufacturing exports the EU15. There are, however, other labour and resource intensive goods, which enjoy a comparative advantage on the EU15 market. These are textiles (17), food and beverages (15), coke and refined petroleum (23), non-metallic mineral products (26), as well as the resource and scale intensive production of basic metals (27). It is striking that export unit values in all of these categories lay clearly below 10 €/kg. In product groups, where export unit values are considerable higher, such as in science-based and in differentiated goods, Greece has no comparative advantage on the EU15 market at all. Export unit values of radio, TV and communication equipments (32) are strikingly high in 1993 with 170 €/kg, sliding down to only 50 €/kg in 2001. Clearly, in the evolution of Greece's foreign trade to the EU15, it seems to be specialising in low tech industries and often in low quality products.

### 3.3. The Grubel-Lloyd Index of Intra-Industry Trade

According to the New Trade Theory, intra-industry trade is determined by country characteristics such as demand differences. The size of intra-industry trade indicates the extent of the economic integration of a country, also influencing the relative per capita income; with rising per capita income, the demand for differentiated goods will increase. Taking into consideration that a large part of foreign trade takes place within the same industries, we will now turn to analysing the ratio of intra-industry trade in cohesion countries. Again, we will only use that part of foreign trade of the cohesion countries, which is associated with the EU15. Thus, the index directly measures the extent of economic integration with the EU15. The Grubel-Lloyd Index (GLI) of Intra-Industry Trade (IIT) is calculated as follows:

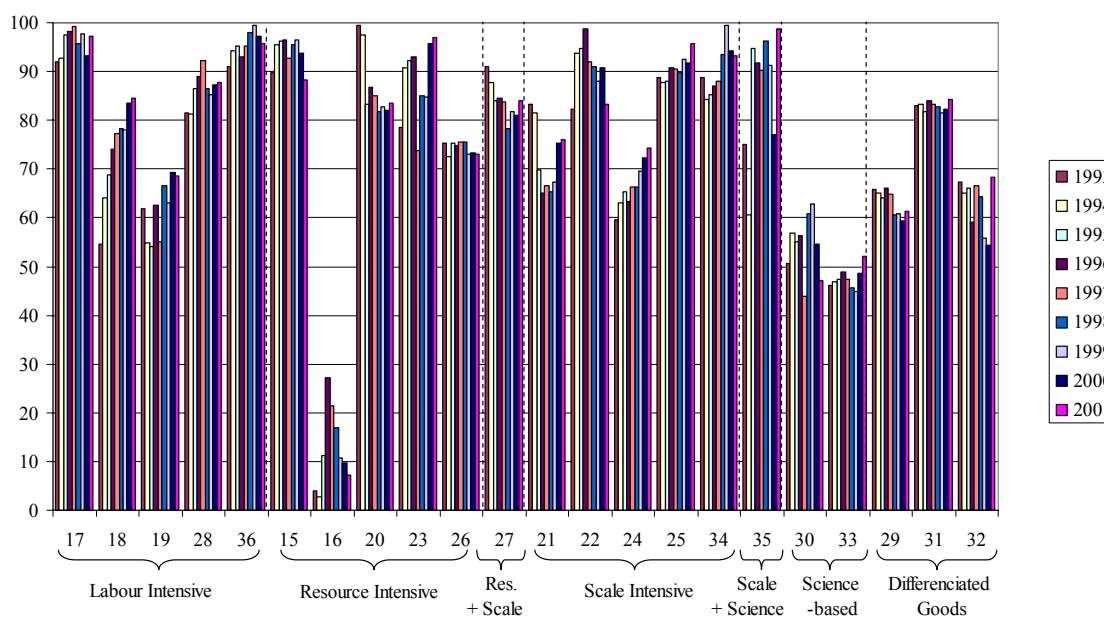
$$GLI_i = \frac{[(X_i + M_i) - |X_i - M_i|]}{(X_i + M_i)} * 100$$

$X$  stands for exports to the EU15,  $M$  for imports from the EU15. The index takes values between 0 and 100. The higher the value, the greater the extent of intra-industry trade the greater the degree of economic integration and the more one can expect countries to be subject to similar demand side shocks.

When analysing GLIs, one might also ask whether trade takes place with intermediate or with final goods. Unfortunately, at the 2-digit level it is barely possible to distinguish between those two types of goods.

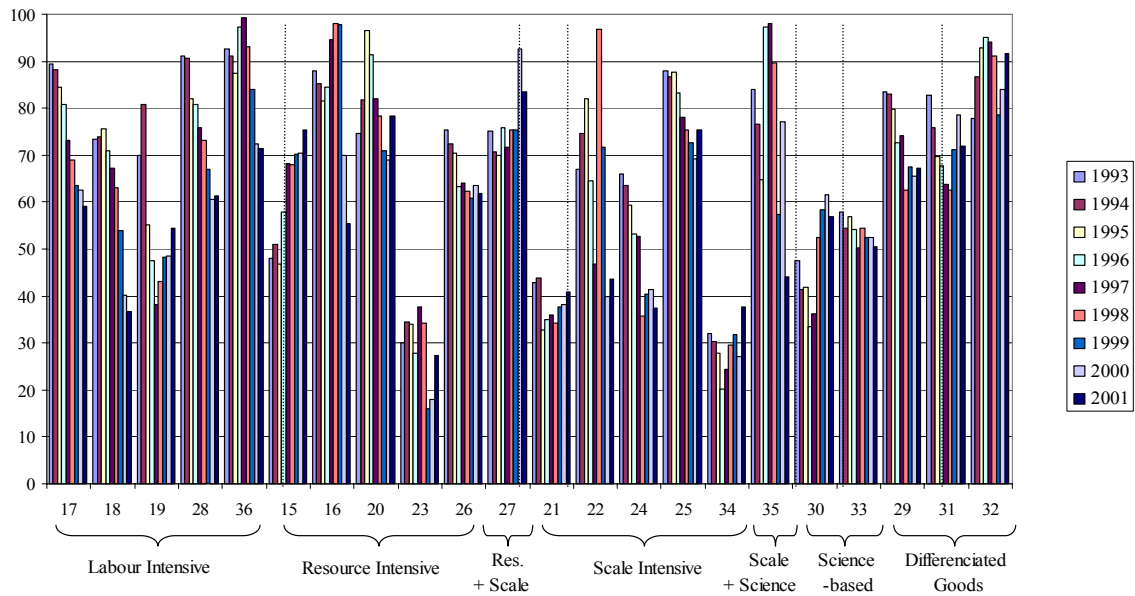
Spain is rather intensively integrated with the EU15 market (figure 9). With the major exception of tobacco (16), this is especially valid for resource and scale intensive product groups. On the contrary, integration is less intense in science-based and differentiated goods' foreign trade. Also in some labour intensive industries, integration is a little lower, however, with a tendency to rising GLIs throughout the 1990s.

**Figure 9: Spain – Grubel-Lloyd Index for IIT, 1993-2001**





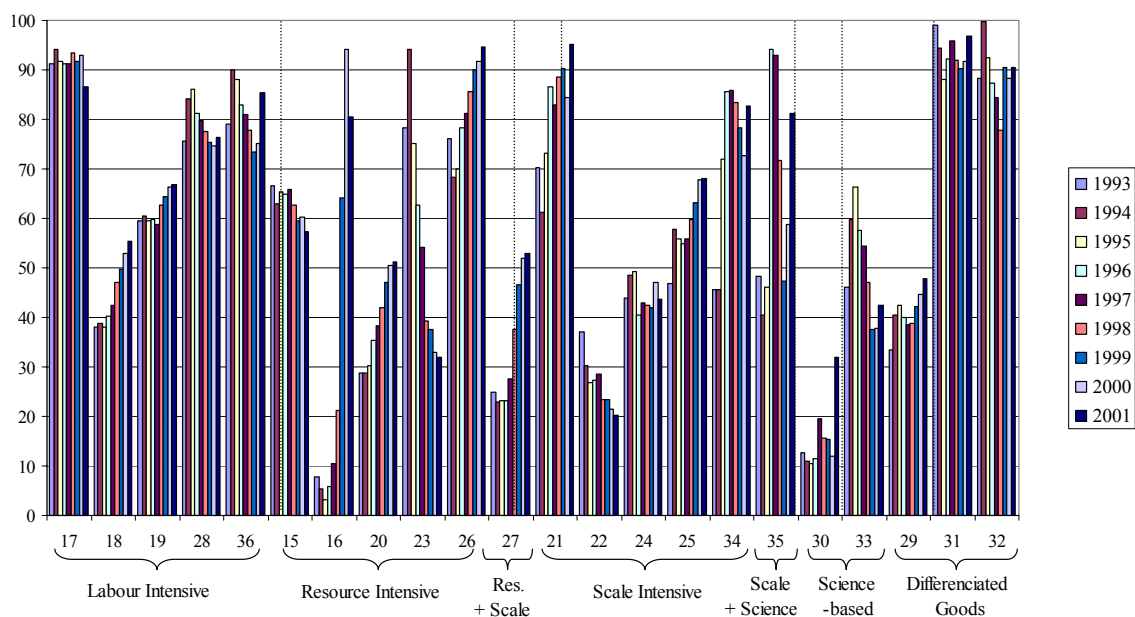
**Figure 10: Ireland – Grubel-Lloyd Index for IIT, 1993-2001**



As compared to Ireland (figure 10) the extent of integration is rather stable in Spain.

Ireland is facing quite volatile GLIs along the technology ladder. There are groups with quickly declining integration tendencies mainly found in labour intensive sectors, but also groups with quickly rising GLIs in some resource and scale intensive sectors. However, GLIs can generally be characterized with up and down movements without a clear tendency to rise or to fall. Basically, integration is lower than in Spain, volatility is much higher. Especially the middle and higher-middle technology groups are weakly integrated, namely record a GLI below 40.

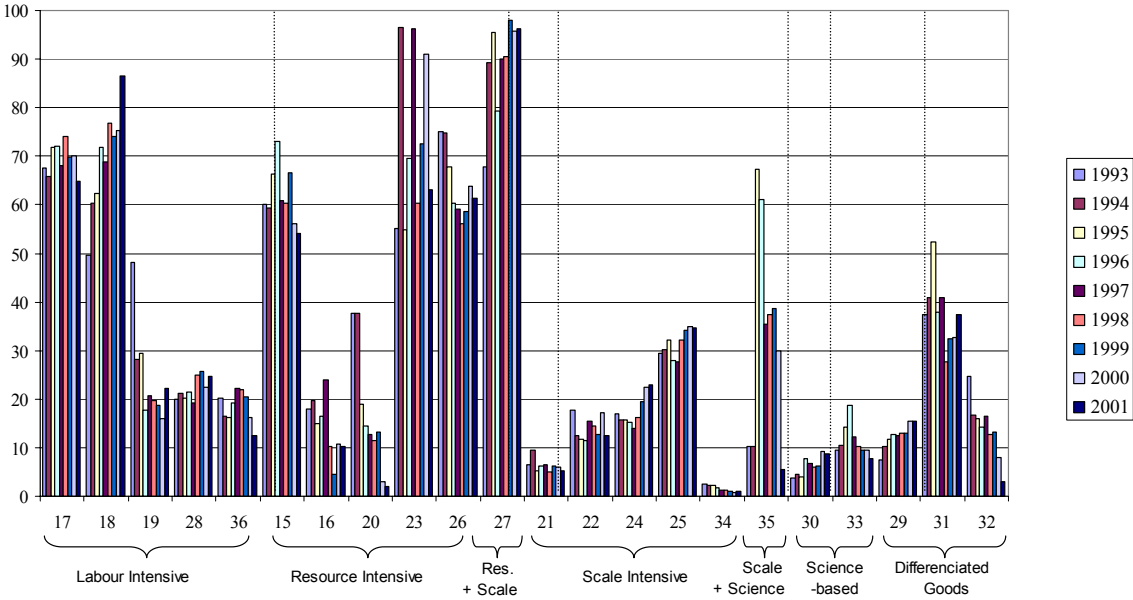
**Figure 11: Portugal – Grubel-Lloyd Index for IIT, 1993-2001**



Economic integration is even lower in Portugal (figure 11) than in Ireland and Spain. Many resource and scale intensive, as well as science-based industries are integrated less than 30 or even 20. Similarly to Spain, the tobacco industry displays the lowest extent of integration. Interestingly, some very high technology differentiated goods sectors are highly integrated with the EU15, indicating that imports also play an important role here. With a high extent of integration both in exports and imports, this may hint towards an assembly line production of electrical machinery and apparatus (31) and radio, television and communication equipment (32).

Greece is the least integrated country with the EU15 among the cohesion countries (figure 12). Although, in some labour and resource intensive industries GLIs reach higher levels, in most of the product groups, integration remains below 20 or even 10. Despite some rising GLIs, there does not seem to be an overall tendency for increasing integration throughout the 1990s.

**Figure 12: Greece – Grubel-Lloyd Index for IIT, 1993-2001**



#### 4. Competitiveness Among Selected Accession and Cohesion Countries

How will the new competitive landscape of the EU25 look like? Having analysed EU-trade patterns of selected accession countries in previous works (Borbély 2004) – a short summary is also found in annexes 2-4 of this paper –, and having focused on the according trade patterns of cohesion countries in this paper, one major question remains to be answered. Against which cohesion countries will the accession countries compete on the single European market? Will it be the cohesion countries? Will the cohesion countries lose competitive power on the EU market in the course of European integration and EU-Enlargement? Which countries will compete against each other in which types of

industries? Since foreign trade competition always concerns at least two countries, we will now turn to a comparative analysis of country results.

From the focus of countries' specialization as suppliers of goods for the EU15 market, one has to proceed in at least two steps to be able to draw conclusions on the competitive landscape of the Single European Market: compare (1) the RCAs and (2) the export unit values.<sup>8</sup> First of all, two countries face competition on the EU15 market, if both countries have a comparative advantage of exports in this specific industry. Thus, the national share of a product group in total manufacturing exports to the EU15 is higher than the respective share in total intra-EU manufacturing exports. This might be a necessary condition, but is this sufficient for competition? The answer is probably no.

If the export shares of one specific industry in two countries are higher than the respective export share of that industry on the EU market, these countries compete in terms of quantity, but do they compete in terms of quality, too? They still might export goods of completely different quality, which finally do not compete against each other, due to differences in consumers' preferences and to differences concerning purchasing power of consumers. Therefore it seems necessary to also look at the export unit values of the products in order to establish whether they belong to the same quality of goods and thus compete against each other or not. This is done by using the quartiles of the export unit value distribution of the EU15 countries. Hereby the quartiles of the distribution are assumed to represent the borders between the different quality classes of products: low quality products are situated lower than the 25%-quartile, lower-middle up to the 50%-quartile, higher-middle up to the 75%-quartile and high quality products are found above the 75%-quartile of the distribution. To simplify: middle quality compiles all values between the 25% and the 75%-quartiles. Accession countries' export unit values are not included in calculating the quartiles, because the main focus lies on the supplier position of the countries on the EU15 market, therefore the point of reference is the quality of intra-EU exports.<sup>9</sup> Annexes 2, 3 and 4 summarize the results for three accession countries, Hungary, Poland and the Czech Republic.<sup>10</sup>

From a theoretical perspective one can e.g. distinguish between different quality groups (e.g. A, B, and C or high, middle, and low) and then find out whether countries show overlaps in one or several of the quality categories. This is particularly interesting if one analyses over time. As regards EUVs in absolute terms, one might have to look at inflation dynamics too, which could distort the picture, as a country's export in a product category might move towards higher EUVs, which, however, could reflect an inflation phenomenon. In the 1990s, however, the inflation rate was rather low in the EU and the OECD countries, respectively, so that one might ignore these inflation aspects.

We will now turn to analysing the competitive structure in the five main product categories of the OECD taxonomy taking into account three accession and four cohesion countries. We compare the situation in the years 1993 and 2001 and analyse the shifts that have taken place.

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<sup>8</sup> If needed, one could in addition take a look at the importance of specific sectors and industries for the economy as a whole, by for instance analysing the sectoral export shares to GDP or to total manufacturing exports.

<sup>9</sup> The distribution of the EU15 export unit values for the year 1993 does not include all 15 countries: due to data availability, Sweden, Austria and Finland had to be excluded.

<sup>10</sup> See also Borbély (2004).

## 4.1. Labour Intensive Industries

It is striking, that Ireland does not compete in any labour intensive sectors as a supplier on the EU15 market at all. Spain only competes in one product group – leather -, all other countries in at least two or three. The situation in each product group is described in the following.

### *Textiles (17):*

In both years considered, there are three competitors on the EU15 market, namely Portugal, Greece and the Czech Republic. All three have raised their RCA from 1993 to 2001, thus strengthening their competitive position on the EU15 market. Greece provides low quality textiles in both years, while the Czech Republic has raised its quality of exports from low to medium, and Portugal has lowered its quality from high to medium. Table 4 summarizes the outcomes; the export unit values shown refer to the EU15 as a benchmark for quality determination.<sup>11</sup>

**Table 4: Textiles (17) - Low, middle and high quality product suppliers within the EU15 market measured by intra-EU15 export unit values**

	Range of Export Unit Values (€/kg) 1993	Range of Export Unit Values (€/kg) 2001	Competitors 1993	Competitors 2001
Low Quality	< 4.7	< 4.9	Greece <i>Czech Republic</i>	Greece
Middle Quality	4.7 - 6.0	4.9 - 8.1		<i>Czech Republic</i> Portugal
High Quality	> 6.0	> 8.1	Portugal	

### *Wearing Apparel (18):*

Five countries have a comparative advantage in wearing apparel: Portugal, Greece, Hungary, Poland and the Czech Republic. From 1993 to 2001 in all three accession countries comparative advantages were considerably reduced, in Hungary and Poland also the quality of exports: all three accession countries now provide the EU15 market with middle quality clothing. Greece has increased its advantage considerably, while reducing export unit values from 25 to 7 €/kg; it now provides the market with low quality wearing apparel. One might say that the accession countries crowded out Greece from middle quality to low quality exports in textiles. High quality textiles are only provided by Portugal in 2001; the rise in Portuguese export unit values from 25 €/kg in 1993 to 65 €/kg in 2001 is remarkable. Table 5 gives an overview.

<sup>11</sup> For a better visualization of the results, accession countries will be italicised in the upcoming tables.

**Table 5: Wearing Apparel (18) - Low, middle and high quality product suppliers within the EU15 market measured by intra-EU15 export unit values**

	Range of Export Unit Values (€/kg) 1993	Range of Export Unit Values (€/kg) 2001	Competitors 1993	Competitors 2001
Low Quality	< 19.3	< 17.9		Greece
Middle Quality	19.3 – 25.0	17.9 – 33.7	Greece <i>Czech Republic</i>	<i>Czech Republic</i> Hungary Poland
High Quality	> 25.0	> 33.7	Portugal Hungary Poland	Portugal

***Leather, Luggage, Footwear (19):***

**Table 6: Leather (19) - Low, middle and high quality product suppliers within the EU15 market measured by intra-EU15 export unit values**

	Range of Export Unit Values (€/kg) 1993	Range of Export Unit Values (€/kg) 2001	Competitors 1993	Competitors 2001
Low Quality	< 10.7	< 13.0	<i>Poland</i> <i>Czech Republic</i>	
Middle Quality	10.7 – 14.0	13.0 – 20.8	<i>Hungary</i>	<i>Hungary</i>
High Quality	> 14.0	> 20.8	Spain Portugal	Spain Portugal

The accession countries' market position clearly deteriorated during the 1990s; in the year 2001 only Hungary is left on the market with a comparative advantage in middle quality products. Poland and the Czech Republic do not compete any more. There is no change in high quality products; Spain and Portugal compete against each other. Table 6 summarizes.

***Fabricated Metal Products (28):***

In both years considered, only Poland and the Czech Republic compete against each other with low quality products of roughly 1 - 1.5 €/kg value (table 7).

**Table 7: Fabricated Metal Products (28) - Low, middle and high quality product suppliers within the EU15 market measured by intra-EU15 export unit values**

	Range of Export Unit Values (€/kg) 1993	Range of Export Unit Values (€/kg) 2001	Competitors 1993	Competitors 2001
Low Quality	< 2.5	< 2.5	<i>Poland Czech Republic</i>	<i>Poland Czech Republic</i>
Middle Quality	2.5 – 3.1	2.5 – 4.0		
High Quality	> 3.1	> 4.0		

***Furniture (36):***

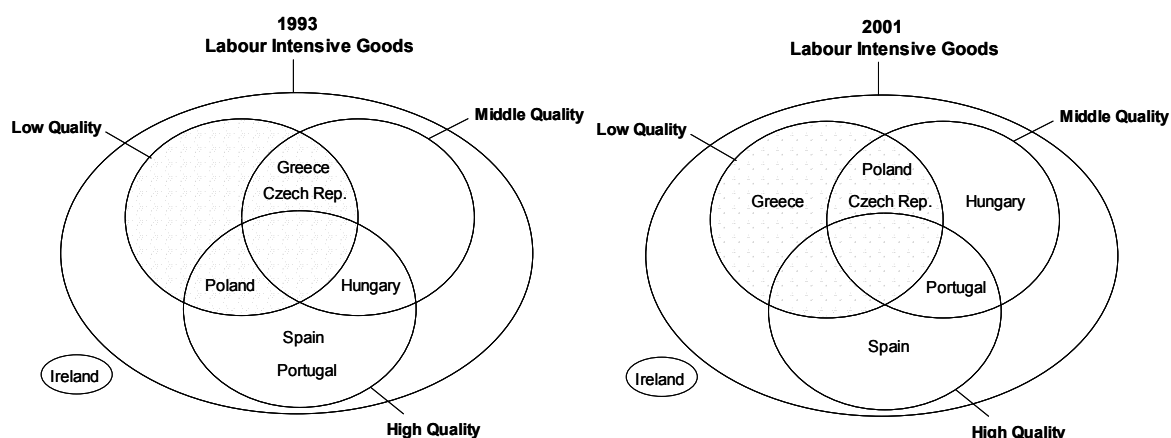
**Table 8: Furniture (36) - Low, middle and high quality product suppliers within the EU15 market measured by intra-EU15 export unit values**

	Range of Export Unit Values (€/kg) 1993	Range of Export Unit Values (€/kg) 2001	Competitors 1993	Competitors 2001
Low Quality	< 4.5	< 3.5	<i>Poland Czech Republic</i>	<i>Poland</i>
Middle Quality	4.5 – 6.0	3.5 – 6.5		<i>Czech Republic</i>
High Quality	> 6.0	> 6.5		

Again, it is only Poland and the Czech Republic which have a comparative advantage. While Poland keeps exporting low quality furniture, the Czech Republic could increase its export unit values considerably and is now providing the EU15 market with middle quality furniture (table 8).

Figure 13 provides a graphical analysis of the competitive structure in the labour intensive industrial sector as a whole, comparing the years 1993 and 2001.

**Figure 13: Structure of Competitiveness within the Labour Intensive Industrial Sectors**



To conclude, the competitive position of these three countries has not changed. The Czech Republic, Spain and Ireland remain in the same position, where the latter is not competing in the labour intensive sectors at all. No country was able to move up the quality ladder from 1993 to 2001. On the contrary, Hungary left the high quality sector and now provides only middle quality goods. Portugal moved from merely high to high and middle quality, Greece from middle and low quality to merely low quality. Poland combines low and middle quality in 2001, while it used to combine low and high quality in 1993. Generally, the accession and the cohesion countries are rather extensively present on the EU15 market with labour intensive products. Furthermore, these countries seem to specialize more and more on the middle and lower end of the quality ladder, giving space to other suppliers of higher quality labour intensive goods.

## 4.2. Resource Intensive Industries

For the sake of simplicity, the two product groups, which belong to two product categories each, 27 as resource + scale intensive and 35 as scale + science intensive, have been put to either category. Therefore basic metals (27) are included in the resource intensive industries.

While Ireland and Hungary used to compete in resource intensive sectors in 1993, they did not compete any more in 2001. Ireland and Hungary have clearly moved away from exporting resource intensive goods to the EU15. Spain again only competes in one product group – non-metallic mineral products (27)-, the other countries in at least two. Greece is the competitor most often represented within the resource intensive industries.

### *Food and Beverages (15):*

While Ireland used to be strongly present in this market in the year 1993, it does not have a relative comparative advantage any more in 2001. Greece is the only remaining competitor moving from middle to low quality products (table 9).

**Table 9: Food and Beverages (15) - Low, middle and high quality product suppliers within the EU15 market measured by intra-EU15 export unit values**

	Range of Export Unit Values (€/kg) 1993	Range of Export Unit Values (€/kg) 2001	Competitors 1993	Competitors 2001
Low Quality	< 0.5	< 0.7		Greece
Middle Quality	0.5 – 1.0	0.7 – 1.5	Greece	
High Quality	> 1.0	> 1.5	Ireland	

***Tobacco (16):***

Neither the cohesion, nor the three accession countries have a comparative advantage in exporting tobacco. This is due to the geographical location and the climate of all these countries, which does not favour the cultivation of tobacco.

***Wood and Cork (20)***

In 1993 Poland and the Czech Republic were competing against each other in low quality wooden exports, Hungary and Portugal in medium quality. Until 2001 Hungary exited the market, Portugal upgraded from middle to high quality products, and Poland downgraded from low to middle quality. Thus, there does not seem to be tough competition among these countries any more (table 10).

**Table 10: Wood and Cork (20) - Low, middle and high quality product suppliers within the EU15 market measured by intra-EU15 export unit values**

	Range of Export Unit Values (€/kg) 1993	Range of Export Unit Values (€/kg) 2001	Competitors 1993	Competitors 2001
Low Quality	< 0.4	< 0.4	<i>Poland Czech Republic</i>	<i>Czech Republic</i>
Middle Quality	0.4 – 0.7	0.4 – 0.8	<i>Hungary Portugal</i>	<i>Poland</i>
High Quality	> 0.7	> 0.8		Portugal



***Coke, Refined Petroleum, Nuclear Fuel (23)***

The only competitor in this market is Greece, who moved from exporting middle quality products in 1993 to high quality in 2001 (table 11).

**Table 11: Coke, Refined Petroleum and Nuclear Fuel (23) - Low, middle and high quality product suppliers within the EU15 market measured by intra-EU15 export unit values**

	Range of Export Unit Values (€/kg) 1993	Range of Export Unit Values (€/kg) 2001	Competitors 1993	Competitors 2001
Low Quality	< 0.1	< 0.2		
Middle Quality	0.1 – 0.2	0.2– 0.3	Greece	
High Quality	> 0.2	> 0.3		Greece

***Other non-metallic mineral products (26)***

Five of seven countries compete in this product group – with the exception of Ireland and Hungary. Greece remains in the position of supplying low quality, and Spain as a middle quality exporter. The accession countries moved up the quality ladder with Poland and the Czech Republic changing from low quality supplier in 1993 to middle quality in 2001, while Portugal changed from a middle to low quality supplier. High quality non-metallic products are still exported to the EU15 by other groups outside the accession and the cohesion countries (table 12).

**Table 12: Other non-metallic mineral products (26) - Low, middle and high quality product suppliers within the EU15 market measured by intra-EU15 export unit values**

	Range of Export Unit Values (€/kg) 1993	Range of Export Unit Values (€/kg) 2001	Competitors 1993	Competitors 2001
Low Quality	< 0.3	< 0.3	Greece <i>Czech Republic</i> <i>Poland</i>	Greece Portugal
Middle Quality	0.3 – 0.5	0.3– 0.7	Portugal Spain	<i>Poland</i> <i>Czech Republic</i> Spain
High Quality	> 0.5	> 0.7		

**Basic Metals (27):**

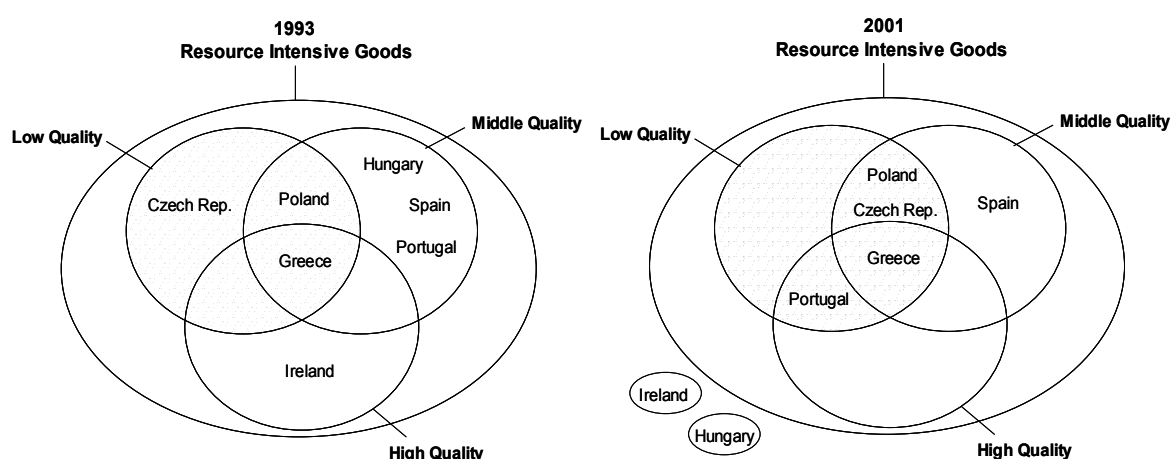
**Table 13: Basic Metals (27) - Low, middle and high quality product suppliers within the EU15 market measured by intra-EU15 export unit values**

	Range of Export Unit Values (€/kg) 1993	Range of Export Unit Values (€/kg) 2001	Competitors 1993	Competitors 2001
Low Quality	< 0.4	< 0.6	Greece <i>Czech Republic</i>	<i>Poland</i>
Middle Quality	0.4 – 0.5	0.6– 0.8	<i>Poland</i>	
High Quality	> 0.5	> 0.8		Greece

The Czech Republic has reduced its RCAs to such an extent, that it did not have a relative comparative advantage any more in the year 2001. It had competed against Greece in the low quality product group, however, Greece has upgraded its quality and supplied high quality basic metals to the EU15 in 2001. Polish exports belonged to the low quality group in the year 2001, whereas they were middle quality in 1993 (table 13).

Figure 14 provides a graphical analysis of the competitive structure in the resource intensive industrial sectors as a whole comparing the years 1993 and 2001.

**Figure 14: Structure of Competitiveness within the Resource Intensive Industrial Sectors**



Two countries completely exited competition in resource intensive industries: Ireland and Hungary. Three countries remained as suppliers in the same type of quality: Poland,

Spain, and Greece. Thus two countries altered their competitive position in the EU15 market. The Czech Republic has partially upgraded and now provides medium quality goods in addition to low quality; this is especially the case for non-metallic mineral products. Portugal has down- and upgraded at the same time and is now supplying the EU15 with low and high quality: Portuguese export quality of non-metallic mineral products moved from high to low quality, while wooden and cork exports counted as middle quality in 1993 and upgraded to high quality by 2001. The task of finding an overall trend of development within the resource intensive sectors seems to be too challenging.

### 4.3. Scale Intensive Industries

Other transport equipment (35) is included in here, as airspace is the only item which belongs to science-based goods, while most of the other transport equipment is rather scale-intensive in production.

The situation in each product group is described in the following.

#### *Pulp and Paper (21):*

In both years, the only country with a relative comparative advantage is Portugal. It supplies the EU15 with low quality pulp and paper products (table 14).

**Table 14: Pulp and Pulp (21) - Low, middle and high quality product suppliers within the EU15 market measured by intra-EU15 export unit values**

	Range of Export Unit Values (€/kg) 1993	Range of Export Unit Values (€/kg) 2001	Competitors 1993	Competitors 2001
Low Quality	< 0.7	< 0.7	Portugal	Portugal
Middle Quality	0.7 – 0.9	0.7– 0.9		
High Quality	> 0.9	> 0.9		

#### *Publishing and Printing (22):*

It is one of very few product groups, where export unit values of the EU15 declined between 1993 and 2001. Furthermore, in 1993 no country considered in this analysis had a relative comparative advantage; in 2001 the Czech Republic and Ireland entered the market. Ireland's export unit value of almost 58 €/kg is extraordinarily high, particularly if one considers that the second highest value, offered by the UK, is 10 €/kg (table 15).

**Table 15: Publishing and Printing (22) - Low, middle and high quality product suppliers within the EU15 market measured by intra-EU15 export unit values**

	Range of Export Unit Values (€/kg) 1993	Range of Export Unit Values (€/kg) 2001	Competitors 1993	Competitors 2001
Low Quality	< 3.8	< 2.6		<i>Czech Republic</i>
Middle Quality	3.8 – 5.9	2.6– 5.2		
High Quality	> 5.9	> 5.2		Ireland

***Chemicals and Chemical Products (24):***

Ireland alone appears as a competitor on the chemicals market. It supplies high quality products. Again, it strikes out with a remarkable increase in export unit values, which rose from 5 €/kg in 1993 to more than 15 €/kg in 2001. The latter is an extreme outlier, since the second highest export unit value offered by Luxembourg amounts for only 4 €/kg (table 16).

**Table 16: Chemicals (24) - Low, middle and high quality product suppliers within the EU15 market measured by intra-EU15 export unit values**

	Range of Export Unit Values (€/kg) 1993	Range of Export Unit Values (€/kg) 2001	Competitors 1993	Competitors 2001
Low Quality	< 0.7	< 1.0		
Middle Quality	0.7 – 1.3	1.0 – 2.2		
High Quality	> 1.3	> 2.2	Ireland	Ireland

***Rubber and Plastic Products (25):***

While no country has a comparative advantage in 1993, the Czech Republic and Spain compete against each other with middle quality products in 2001 (table 17).

**Table 17: Rubber and Plastic (25) - Low, middle and high quality product suppliers within the EU15 market measured by intra-EU15 export unit values**

	Range of Export Unit Values (€/kg) 1993	Range of Export Unit Values (€/kg) 2001	Competitors 1993	Competitors 2001
Low Quality	< 2.5	< 1.9		
Middle Quality	2.5 – 3.1	1.9– 3.8		<i>Czech Republic</i> Spain
High Quality	> 3.1	> 3.8		

***Motor Vehicles and Trailers (34):***

In this product group the accession and the cohesion countries have gained a lot of ground in the course of the 1990s. While only Spain was competing in the market in 1993, Poland, the Czech Republic and Portugal entered the market with low quality products and Hungary even with high quality motor vehicles and trailers. Spain remains supplying medium quality to the EU15 countries in both years (table 18).

**Table 18: Motor Vehicles and Trailers (34) - Low, middle and high quality product suppliers within the EU15 market measured by intra-EU15 export unit values**

	Range of Export Unit Values (€/kg) 1993	Range of Export Unit Values (€/kg) 2001	Competitors 1993	Competitors 2001
Low Quality	< 6.0	< 6.5		<i>Poland</i> <i>Czech Republic</i> Portugal
Middle Quality	6.0 – 7.4	6.5– 7.8	Spain	Spain
High Quality	> 7.4	> 7.8		<i>Hungary</i>

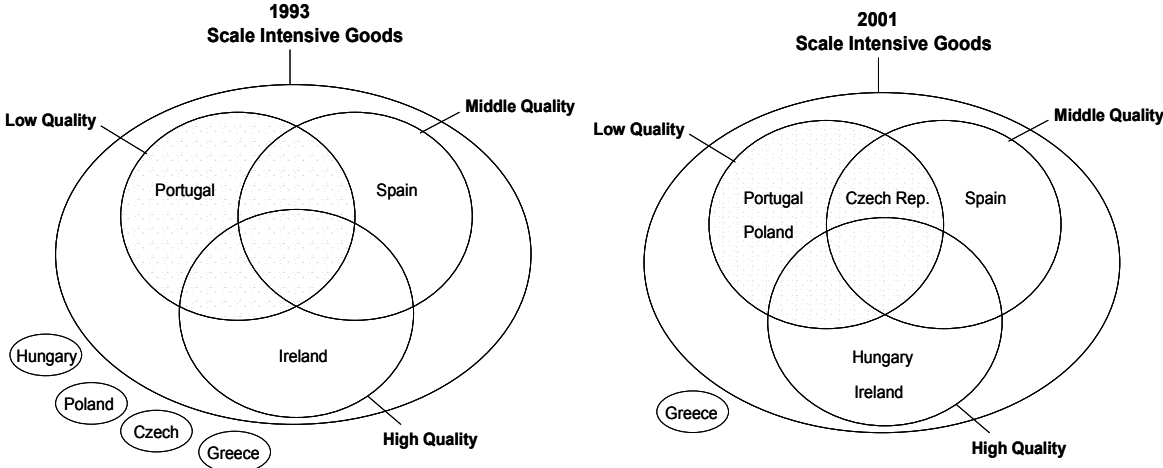
***Other Transport Equipment (35):***

This group has been included in the scale intensive category, although some of its products are rather science-based. However, it is not of significance for this analysis, as neither accession nor cohesion countries have an RCI exceeding one in this group.

Figure 15 provides a graphical analysis of the competitive structure in the scale intensive industrial sectors as a whole comparing the years 1993 and 2001.

In particular the accession countries managed to place themselves on the scale-intensive markets in the second half of the 1990s, although none of them had a comparative advantage in any scale intensive product group in the first half of the 1990s. Hungary is now a new competitor for Ireland in the high quality segment, the Czech Republic supplies middle and low quality products, and Poland is a new competitor for Portugal in the low quality segment. Greece is still not represented in any scale-intensive product group.

**Figure 15: Structure of Competitiveness within the Scale Intensive Industrial Sectors**



**4.4. Science-Based Industries**

*Office Machinery and Computers (30):*

In this sector there was a global fall of absolute prices in the 1990s due to enormous technological progress, which might impair quality ladder analysis. However, we assume that relative quality groupings are not affected by this phenomenon.

In 1993 Ireland is the only country with a relative comparative advantage on the EU15 market for office machinery and computers. It provided high quality products. Until 2001 it reduced the export unit values to middle quality. Also Hungary entered the market with low quality products (table 19).

**Table 19: Office Machinery and Computers (30) - Low, middle and high quality product suppliers within the EU15 market measured by intra-EU15 export unit values**

	Range of Export Unit Values (€/kg) 1993	Range of Export Unit Values (€/kg) 2001	Competitors 1993	Competitors 2001
Low Quality	< 53.6	< 43.1		<i>Hungary</i>
Middle Quality	53.6 – 77.8	43.1– 84.9		Ireland
High Quality	> 77.8	> 84.9	Ireland	

***Medical and Optical Instruments (33):***

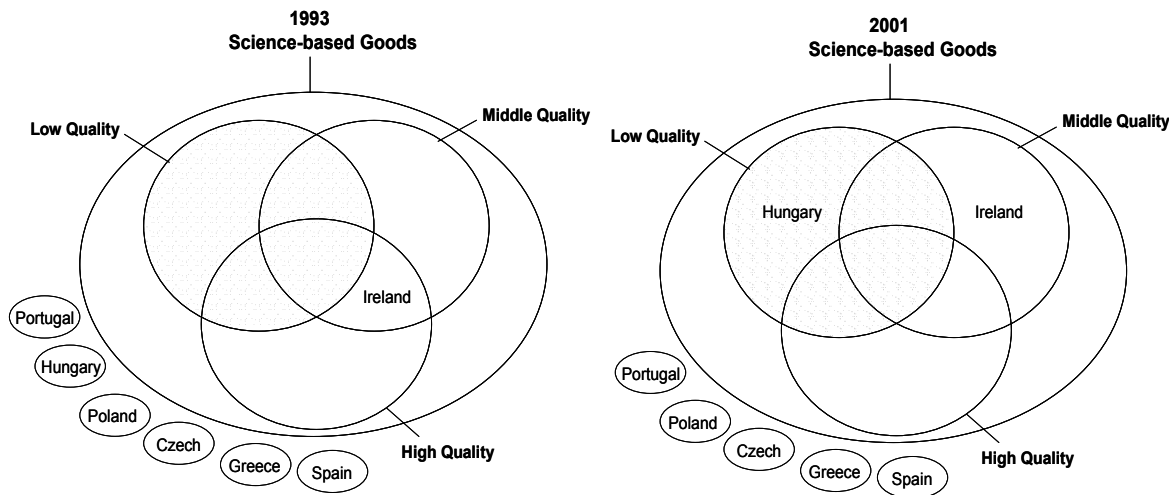
Participation in this sector is very scarce. Only Ireland used to have a relative comparative advantage in middle quality products in 1993, which did not exist any more in 2001 (table 20).

**Table 20: Medical and Optical Instruments (33) - Low, middle and high quality product suppliers within the EU15 market measured by intra-EU15 export unit values**

	Range of Export Unit Values (€/kg) 1993	Range of Export Unit Values (€/kg) 2001	Competitors 1993	Competitors 2001
Low Quality	< 28.8	< 24.2		
Middle Quality	28.8 – 54.0	24.2– 56.2	Ireland	
High Quality	> 54.0	> 56.2		

Figure 16 provides a graphical analysis of the competitive structure in the science-based industrial sectors as a whole comparing the years 1993 and 2001.

**Figure 16: Structure of Competitiveness within the Science-based Industrial Sectors**



It is striking that hardly any countries compete within the science-based sectors. In 1993 only Ireland with middle and high quality goods; by 2001 Ireland had downgraded to only middle quality goods, and Hungary entered with low quality goods. All the other countries do not have a comparative advantage at all.

**4.5. Differentiated Goods**

*Machinery and Equipment (29):*

**Table 21: Machinery and Equipment (29) - Low, middle and high quality product suppliers within the EU15 market measured by intra-EU15 export unit values**

	Range of Export Unit Values (€/kg) 1993	Range of Export Unit Values (€/kg) 2001	Competitors 1993	Competitors 2001
Low Quality	< 6.5	< 6.9		<i>Czech Republic</i>
Middle Quality	6.5 – 9.4	6.9 – 10.2		
High Quality	> 9.4	> 10.2		

Few words are required to describe the competitive situation in machinery and equipment. While none of the countries considered competed in 1993, only the Czech Republic managed to enter the market and to offer low quality products in 2001 (table 21).

*Electrical Machinery and Apparatus (31):*



This is the only product group within the differentiated goods, where participation is rather high among the accession and the cohesion countries. Hungary, the Czech Republic and Portugal have a comparative advantage in both years 1993 and 2001, however, only Hungary remains in the same product quality. The Czech Republic and Portugal swap positions: The Czech Republic succeeds in moving from low to middle quality, Portugal, on the other hand, slides down from middle to low quality products. None of the countries considered compete in high quality (table 22).

**Table 22: Electrical Machinery and Apparatus (31) - Low, middle and high quality product suppliers within the EU15 market measured by intra-EU15 export unit values**

	Range of Export Unit Values (€/kg) 1993	Range of Export Unit Values (€/kg) 2001	Competitors 1993	Competitors 2001
Low Quality	< 7.3	< 5.8	<i>Czech Republic</i>	<i>Poland Portugal</i>
Middle Quality	7.3 – 10.7	5.8 – 12.7	<i>Portugal Hungary</i>	<i>Hungary Czech Republic</i>
High Quality	> 10.7	> 12.7		

***Radio, Television and Communications (32):***

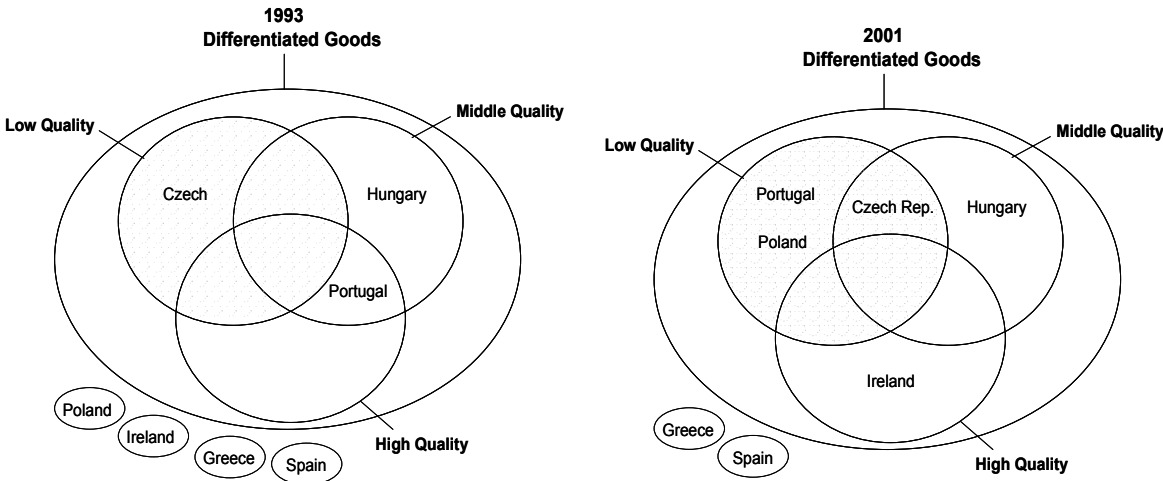
Although there are only a small number of countries in the market, there is relatively considerable movement within this product group. No country competes in both years 1993 and 2001. While Portugal supplied high quality goods in 1993, it did not compete any more in 2001. Instead, Ireland takes the position of supplying high quality and Hungary enters competition with middle quality. However, there is no competition among the accession and the cohesion countries, however, possibly with other European Countries (table 23).

**Table 23: Radio, Television and Communications (32) - Low, middle and high quality product suppliers within the EU15 market measured by intra-EU15 export unit values**

	Range of Export Unit Values (€/kg) 1993	Range of Export Unit Values (€/kg) 2001	Competitors 1993	Competitors 2001
Low Quality	< 22.1	< 28.0		
Middle Quality	22.1 – 42.4	28.0 – 91.9		<i>Hungary</i>
High Quality	> 42.4	> 91.9	Portugal	Ireland

Finally figure 17 summarizes the competitive structure of differentiated goods in both years. It seems that accession and cohesion countries gained competitive power in the sectors of differentiated goods in the course of the 1990s. While four countries were outsiders in 1993, namely Poland, Ireland, Greece and Spain, only Greece and Spain are left outside in 2001. Only Hungary remains in the same sectors in both years. The Czech Republic upgrades from only low to low and middle quality. Portugal and Poland provide instead low quality goods in 2001. Ireland enters the market with high quality products, thus, accession and cohesion countries are represented all along the quality ladder in 2001.

**Figure 17: Structure of Competitiveness within the sectors of Differentiated Goods**



## 5. Summary, Conclusions and Future Research

We can summarize the results from two different points of views. Firstly, we can compare each country's position in all industries throughout the 1990s to reveal the following picture. The Czech Republic has never had a comparative advantage with a high quality product. Poland seems to have downgraded its export product quality on the EU15 market: while in the year 1993 it supplied the EU15 with all three types of quality goods, it did not have a relative comparative advantage with high quality products any more in 2001 – whether this implies concerns for economic policy is difficult to say. Thus, the Czech Republic and Poland seem to specialize in the EU15 market in low and middle quality products. Hungary, on the other hand, started off with middle and high quality products and by 2001 it had also entered the market of low quality goods. Thus, now it competes along the entire length of the quality ladder.

On the contrary, Spain and Ireland have never had a relative comparative advantage with low quality products. Thus, Spain and Ireland seem to specialise in the EU15 market as suppliers of middle and higher quality goods. The other countries, Portugal and Greece, spread their comparative advantages across the range of low, middle and high quality products.

From this point of view, Poland and the Czech Republic are competitors mainly of Portugal and Greece in the lower and middle quality goods, but Hungary is also a potential competitor. In addition, Hungary faces competition from Spain and Ireland in higher quality products.

Secondly, we can analyse each product category separately, leading to the following conclusions. In labour and resource intensive industries there is an intensive market participation of accession and cohesion countries. With the exception of Spain in labour intensive goods, these countries specialize in medium and lower quality goods, scarcely competing in high quality. Ireland does not participate much in the market for both labour and resource intensive goods, whereas Hungary's only field of non-participation is in resource intensive goods. In scale intensive product groups, the accession countries gain more and more ground in the 1990s and subsequently, mostly again in low and medium quality. Only Hungary is able to compete with high quality goods against Ireland. Greece lacks sufficient resources, therefore not competing in resource intensive sectors at all. Accession and cohesion countries are very weak in competing in science-based industries. Most countries do not compete much in that market segment at all, only Ireland and later on Hungary were able to enter, however not with high quality products. The situation looks much better for the differentiated goods, where by the end of the 1990s all accession countries were competing. However, Greece and Spain remain on the outside in all cases. Again, the supply of high quality goods is mainly left to other European countries, only Ireland provides some high quality goods.

The comparative analysis of specialization within the EU market with a special focus on cohesion and accession countries is rather complex to put it in a nutshell. However, there appear to be some findings, which are rather robust for the 1990s:

- Accession countries are gaining competitive power in scale intensive industries.
- Most accession and cohesion countries have a strong disadvantage in science-based industries.
- Ireland competes neither in labour intensive, nor in resource intensive industries.

- Hungary does not compete in resource intensive industries.
- Spain does not compete much in differentiated goods.
- The Czech Republic and Poland tend to supply low and middle quality products and tend to compete against Greece and Portugal.
- Hungary, in addition, supplies higher quality goods competing against Spain and Ireland in some product groups.
- High quality goods are, however, mostly not supplied by accession and cohesion countries on the EU15 market.

To gain a complete picture of the competitive structure of suppliers on the EU15 market, one might include other European countries and some non-European suppliers of the EU market, as well. Due to the aim of this paper to analyse the competition, with which accession countries will be confronted on the EU market, the approach of looking at the cohesion countries is appropriate. We find that both the accession and the cohesion countries compete mostly within the same product categories with lower and medium quality goods. Thus, higher quality products, and especially science-based products of all qualities, are still supplied to the EU15 by countries other than the accession and the cohesion countries.

Further research might focus on other variables on a sectoral level rather than merely exports and imports. It would be interesting to look at sectoral wages and value-added in production to establish whether the competitive power of some product groups in a country is really originated by the country itself, or whether it is imported? High wages and high value added in product groups with a strong comparative advantage and a high export unit value might indicate that value added is really originated by the exporting country. However low wages and low value added in production might hint towards an assembly line type of production. Also the role of FDI in this context is unclear. These questions need to be addressed in future research.

Last but not least, it is necessary to use more advanced econometric methods for the analysis. The use of indicators for trade performance is just one of a variety of possible methods for measuring structural change. In future research, convergence indicators – e.g.  $\beta$ -convergence and  $\delta$ -convergence – should be calculated, as well as other econometric methods e.g. unit root tests.

## Annex 1

### NACE rev. 1.1. Classification (in parts)

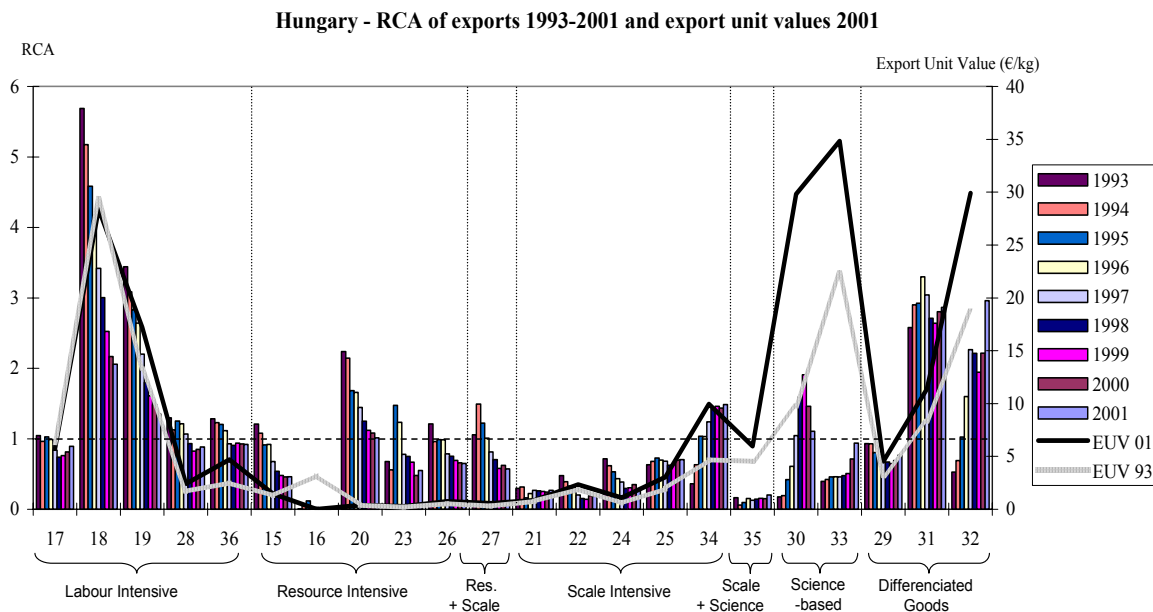
D	Manufacturing
15	Manufacture of food products and beverages
151	Production, processing and preserving of meat and meat products
152	Processing and preserving of fish and fish products
153	Processing and preserving of fruit and vegetables
154	Manufacture of vegetable and animal oils and fats
155	Manufacture of dairy products
156	Manufacture of grain mill products, starches and starch products
157	Manufacture of prepared animal feeds
158	Manufacture of other food products
159	Manufacture of beverages
16	Manufacture of tobacco products
160	Manufacture of tobacco products
17	Manufacture of textiles
171	Preparation of spinning of textile fibres
172	Textile weaving
173	Finishing of textiles
174	Manufacture of made-up textile articles, except apparel
175	Manufacture of carpets and rugs
176	Manufacture of knitted and crocheted fabrics
177	Manufacture of knitted and crocheted articles
18	Manufacture of wearing apparel; dressing and dyeing of fur
181	Manufacture of leather clothes
182	Manufacture of other wearing apparel and accessories
183	Dressing and dyeing of fur; manufacture of articles of fur
19	Tanning and dressing of leather, manufacture of luggage, handbags, saddlery, harness and footwear
191	Tanning and dressing of leather
192	Manufacture of luggage, handbags and the like, saddlery and harness
193	Manufacture of footwear
20	Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials
201	Sawmilling and planing of wood, impregnation of wood
202	Manufacture of veneer sheets; manufacture of plywood, laminboard, particle, board, fibre board and other panels and boards
203	Manufacture of builders carpentry and joinery
204	Manufacture of wooden containers
205	Manufacture of other products of wood; manufacture of articles of cork, straw and plaiting materials
21	Manufacture of pulp, paper and paper products
211	Manufacture of pulp, paper and paperboard
212	Manufacture of articles of paper and paperboard
22	Publishing, printing and reproduction of recorded media
221	Publishing
222	Printing and service activities related to printing

- 223      Reproduction of recorded media
- 23        Manufacture of coke, refined petroleum products and nuclear fuel
- 231       Manufacture of coke oven products
- 232       Manufacture of refined petroleum products
- 233       Processing of nuclear fuel
- 24        Manufacture of chemicals and chemical products
- 241       Manufacture of basic chemicals
- 242       Manufacture of pesticides and other agro-chemical products
- 243       Manufacture of paints, varnishes and similar coatings, printing ink and mastics
- 244       Manufacture of pharmaceuticals, medicinal chemicals and botanical products
- 245       Manufacture of soap and detergents, cleaning and polishing preparations, perfumes and toilet preparations
- 246       Manufacture of other chemical products
- 247       Manufacture of man-made fibres
- 25        Manufacture of rubber and plastic products
- 251       Manufacture of rubber products
- 252       Manufacture of plastic products
- 26        Manufacture of other non-metallic mineral products
- 261       Manufacture of glass and glass products
- 262       Manufacture of non-refractory ceramic goods other than for construction purposes; manufacture of refractory ceramic products
- 263       Manufacture of ceramic tiles and flags
- 264       Manufacture of bricks, tiles and construction products, in baked clay
- 265       Manufacture of cement, lime and plaster
- 266       Manufacture of articles of concrete, plaster and cement
- 267       Cutting, shaping and finishing of ornamental and building stone
- 268       Manufacture of other non-metallic mineral products
- 27        Manufacture of basic metals
- 271       Manufacture of basic iron and steel and of ferro-alloys
- 272       Manufacture of tubes
- 273       Other first processing of iron and steel
- 274       Manufacture of basic precious and non-ferrous metals
- 275       Casting of metals
- 28        Manufacture of fabricated metal products, except machinery and equipment
- 281       Manufacture of structural metal products
- 282       Manufacture of tanks, reservoirs and containers of metal; manufacture of central heating radiators and boilers
- 283       Manufacture of steam generators, except central heating hot water boilers
- 284       Forging, pressing, stamping and roll forming of metal; powder metallurgy
- 285       Treatment and coating of metals; general mechanical engineering
- 286       Manufacture of cutlery, tools and general hardware
- 287       Manufacture of other fabricated metal products
- 29        Manufacture of machinery and equipment n.e.c.
- 291       Manufacture of machinery for the production and use of mechanical power, Except aircraft, vehicle and cycle engines
- 292       Manufacture of other general purpose machinery
- 293       Manufacture of agriculture and forestry machinery
- 294       Manufacture of machinetools

- 295 Manufacture of other special purpose machinery
- 296 Manufacture of weapons and ammunition
- 297 Manufacture of domestic appliances n.e.c.
- 30 Manufacture of office machinery and computers
- 300 Manufacture of office machinery and computers
- 31 Manufacture of electrical machinery and apparatus n.e.c.
- 311 Manufacture of electric motors, generators and transformers
- 312 Manufacture of electricity distribution and control apparatus
- 313 Manufacture of insulated wire and cable
- 314 Manufacture of accumulators, primary cells and primary batteries
- 315 Manufacture of lighting equipment and electric lamps
- 316 Manufacture of electrical equipment n.e.c.
- 32 Manufacture of radio, television and communication equipment and apparatus
- 321 Manufacture of electronic valves and tubes and other electronic components
- 322 Manufacture of television and radio transmitters and apparatus for line telephony and line telegraphy
- 323 Manufacture of television and radio receivers, sound or video recording or reproducing apparatus and associated goods
- 33 Manufacture of medical, precision and optical instruments, watches and clocks
- 331 Manufacture of medical and surgical equipment and orthopaedic appliances
- 332 Manufacture of instruments and appliances for measuring, checking, testing, navigating and other purposes, except industrial process control equipment
- 333 Manufacture of industrial process control equipment
- 334 Manufacture of optical instruments and photographic equipment
- 335 Manufacture of watches and clocks
- 34 Manufacture of motor vehicles, trailers and semi-trailers
- 341 Manufacture of motor vehicles
- 342 Manufacture of bodies (coachwork) for motor vehicles; manufacture of trailers and semi-trailers
- 343 Manufactures of parts and accessories for motor vehicles and their engines
- 35 Manufacture of other transport equipment
- 351 Building and repairing of ships and boats
- 352 Manufacture of railway and tramway locomotives and rolling stock
- 353 Manufacture of aircraft and spacecraft
- 354 Manufacture of motorcycles and bicycles
- 355 Manufacture of other transport equipment n.e.c.
- 36 Manufacture of furniture, manufacturing n.e.c.
- 361 Manufacture of furniture
- 362 Manufacture of jewellery and related articles
- 363 Manufacture of musical instruments
- 364 Manufacture of sports goods
- 365 Manufacture of games and toys
- 366 Miscellaneous manufacturing n.e.c.
- 37 Recycling
- 371 Recycling of metal waste and scrap
- 372 Recycling of non-metal waste and scrap

## Annex 2

### RCA and export unit values in Hungary



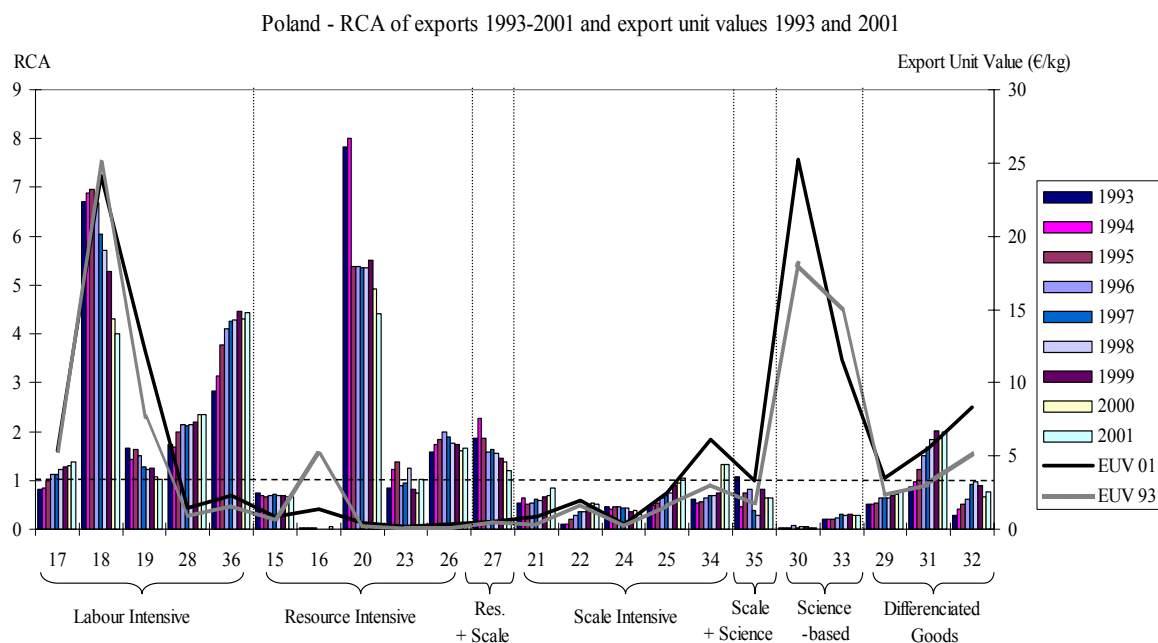
The above picture makes clear, that some very high and some very low technology intensive products play the most important role in Hungary's EU exports. RCAs exceed unity in two labour intensive product groups, wearing apparel (18) and leather products (19), with export unit values of 32 and 17 Euro/kg respectively. However, RCAs have been declining throughout the 1990s in these and in other labour and resource intensive – low technology – product groups. On the contrary, RCAs are rising and exceed unity in the differentiated goods' sectors, especially in electrical machinery and apparatus (31) and in radio, television and communication equipment (32) industries. Here, export unit values rose between 1993 and 2001 reaching 11 and 30 Euro/kg respectively in the year 2001. In most of the other product groups, especially in the middle technology industries, both RCAs and export unit values are rather low. One exception might be the manufacturing of motor vehicles (34), where Hungary had a comparative advantage throughout the second half of the 1990s with steadily rising RCAs and an export unit value of 10 Euro/kg in the year 2001. Although Hungary does not have a comparative advantage in any science-based product group, export unit values rose considerably between 1993 and 2001.

Concerning the importance of the product groups for the Hungarian export industries, the product groups 31, 32 and 34 play the most important role. In the year 2001, 12% of manufacturing exports were electrical machinery (31), 20% radio, TV and communication equipment (32) and 25% motor vehicles (34).



## Annex 3

### RCA, export unit values and export shares in Poland

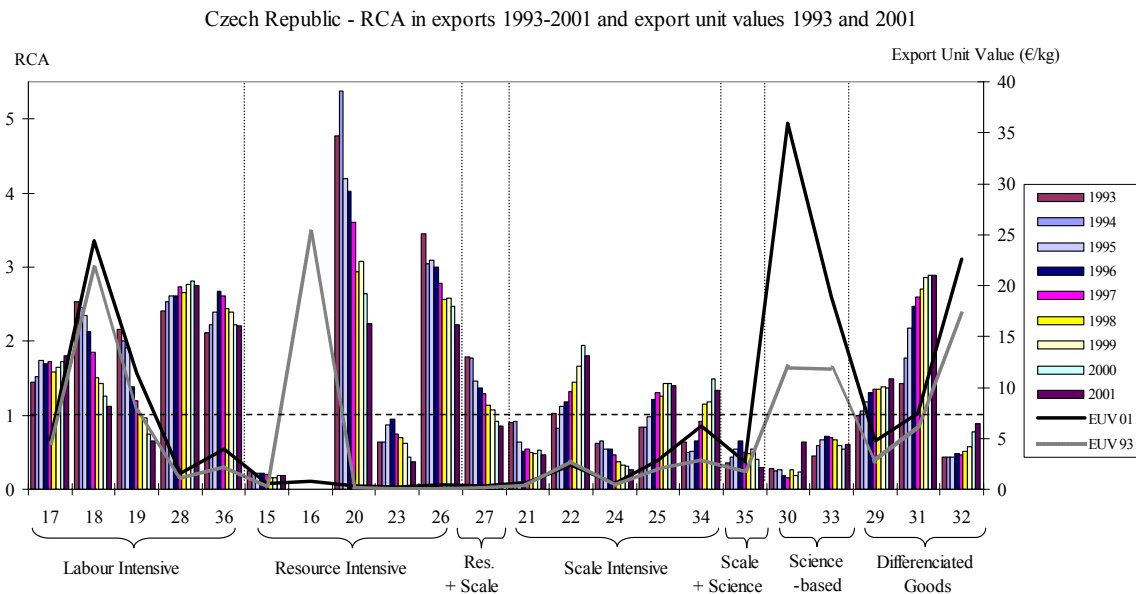


Most industries with a relative comparative advantage compared to the EU15 belong to the labour and resource intensive sectors, meaning they are positioned rather low on the technology ladder. The highest RCAs are yielded in wearing apparel (18), furniture (36) and wood and its products (20). However, especially for the latter two, export unit values are extremely low at clearly below 5 €/ kg. The value of one kg of exports in wearing apparel is considerably higher at roughly 25 Euro. In most of the scale intensive, science-based and differentiated goods' sectors Poland still has a comparative disadvantage, however, many RCAs in these sectors seem to have a tendency to increase. Thus, rubber and plastic products (25), motor vehicles (34) and especially electrical machinery and apparatus (24) have reached levels of RCA exceeding unity by the year 2001. Among these categories, export unit values are the highest in the science-based sector with roughly 25 and 12 €/kg in the year 2001 and 18 and 15 €/kg in the year 1993; however, especially in the science-based sector, Poland's comparative disadvantage is very distinct.

Concerning export shares, only two groups stand out. The share of wearing apparel (18) in total manufacturing exports in the year 2001 was 12%, similar to the share of motor vehicles with 13%. The other groups' export shares are rather evenly distributed.

## Annex 4

### RCA, export unit values and export shares in the Czech Republic



A similar tendency is visible in the Czech Republic as in Hungary. Many of the RCAs in the lower technology sectors have been declining and many in the higher technology intensive sectors have been rising in the course of the time period considered in the analysis. Also export unit values are similar to the other two countries, especially to Poland. Relative comparative advantages can be found mainly in the labour intensive, in the resource intensive and the differentiated goods' sectors. Within the labour intensive category, wearing apparel (18) with an export unit value of 25 €/kg is losing comparative advantage, as do leather products (19), which, have an export unit value of only 11 Euro. There was a very sharp decline of RCAs as well as of export unit values within the resource intensive category, where export unit values are extremely low. Similar to the other accession countries, the Czech Republic has a relative comparative disadvantage in science-based product groups, although, export unit values with 35 Euro per kg are considerably higher than in Hungary or Poland in the year 2001, and grew considerably compared to 1993 at 12 €/kg. The sharp rise of RCA in electrical machinery and apparatus (31) is remarkable, its export unit value is still low, although rising.

The highest share of manufacturing exports is to be found in motor vehicles (34) with 18% in the year 2001, followed by machinery and equipment (29) with 12% and electrical machinery and apparatus (31) with 11%.

## Literature

- BALASSA, B. (1965). Trade Liberalization and Revealed Comparative Advantage. Manchester School 33, pp: 99-123.
- BENEDICTIS, DE L. AND L. TAJOLI (2003). Economic Integration, Similarity and Convergence in the EU and CEECs Trade Structures. CESPRI Working Paper No. 148, Milano.
- BORBÉLY, D. (2004). EU Export Specialization Patterns in Selected Accession Countries. EIIW Working Paper No. 116, Wuppertal.
- DALUM, B. AND G. VILLUMSEN (1996). Are OECD Export Specialization Patterns Sticky? Relations to the Convergence-Divergence Debate. Danish Research Unit for Industrial Dynamics, DRUID Working Paper No. 96-3.
- DYKER D.A. AND S. KUBIELAS (2000). Technology and Structure in the Polish Economy under Transitions and Globalisation. Economic Systems, Vol. 24, No. 1, March 2000, pp: 1-24.
- FONTEGNÉ L., M. FREUDENBERG AND D.ÜNAL-KESENCI (1999). Haute Technologie et Échelles de Qualité : de Fortes Asymétries en Europe. CEPII, Paris.
- LAURSEN, K. AND I. DREJER (1997). Do Inter-sectoral Linkages Matter for International Export Specialisation? Danish Research Unit for Industrial Dynamics, DRUID Working Paper No. 97-15.
- LAURSEN, K. (1998). How Structural Change Differs and Why it Matters (for Economic Growth). Danish Research Unit for Industrial Dynamics, DRUID Working Paper No. 98-25.
- OECD (1987). Structural Adjustment and Economic Performance. OECD, Paris
- PAVITT, K. (1984). Sectoral Patterns of Technical Change: towards a Taxonomy and a Theory. Research Policy 13, pp: 353-369.
- SOÓS K. A. (2002). Upgrading on the Periphery: Accession Countries' Exports to the EU in International Comparison, 1993-2000. Revue Elargissement, No. 22.

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