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Accession countries´comparative advantage in the internal market: A Trade and factor analysis

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Ville Kaitila

Accession Countries' Comparative Advantage in the Internal Market: A Trade and Factor Analysis[1]

ABSTRACT

We analyse trade between Central and Eastern European (CEE) countries and the European Union during 1993-1998 using three methods. First, we calculate the share of intra-industry trade to determine the extent to which two countries trade in similar products. Second, we calculate similarity indices to determine the extent to which the structure of the exports of two countries is similar to a third country. Third, we calculate the revealed comparative advantage of CEE countries in the EU internal market and analyse the results in a two-dimensional space showing relative labour-skills and capital-intensity. We also depict how the factor intensity of comparative advantage has changed since 1993. With this last approach, we find that the comparative advantage of various CEE countries have developed in quite different directions. Some countries have evolved comparative advantage in industries requiring much skilled labour, while others have moved in the opposite direction. This differentiation is also reflected in degrees of capital intensity. A few CEE countries have not shifted in this two-dimensional space.

Key Words: EU, eastern enlargement, comparative advantage, factor intensity

1 Introduction

This is an assessment of the trade structure and factor intensity of transition countries currently seeking EU accession.[1] Trade has evolved considerably during the period under analysis (1993-1998) and its structure has changed. During the six years under consideration, the EU and accession countries entered into Europe Agreements designed, among other things, to liberalise trade in manufactured goods. Today trade in such goods is by and large free, and some liberalisation has also taken place in the trade of agricultural goods and foodstuffs.

Europe Agreements are bilateral agreements between the European Union and individual applicant countries. These agreements are basically similar. It should be emphasised, however, that these agreements do not exist between the applicant countries. The result is a hub-and-spoke situation that creates trade between the EU and each applicant country separately, while discouraging trade among applicant countries. To counterbalance this situation, several Central and Eastern European (CEE) countries have signed free-trade agreements among themselves. Nevertheless, the EU remains by far the most important trading partner for any CEE country.

Our intention here is to review how the EU trade of accession countries has evolved as their trade regimes liberalised. There is no reason to believe *a priori* that evolution should be similar even though the countries are all in transition from a socialist to a market economy. Indeed, we find major differences not only in their relative comparative advantage in 1993, but also – and more significantly – how their relative comparative advantage has evolved since then. Accession countries have liberalised and reformed their economies to a varying degree, which, along with differences in their earlier manufacturing bases, political stability, administrative reforms and geographical proximity to major EU markets has led to different developments in comparative advantage and foreign direct investment.

There are numerous studies of the trade of accession countries in the 1990s. This study draws on Neven (1995) in its classification of the factor intensity of revealed comparative advantage. In addition to an analysis on comparative advantage in 1985-86 and 1991-92, Neven analysed import penetration, and inter- and intra-industry trade. Aturupane et al. (1997) and Fidrmuc et al. (1999) analysed intra-industry trade between the CEE countries and the EU. Kaitila (1999) took a closer look at the trade between Hungary, the Czech Republic and the EU, and Kaitila and Widgrén (2001) examined the

trade between the Baltic countries and the EU. The study at hand extends these latter two studies to cover all CEE countries and several years, and analyses the factor intensity of revealed comparative advantage.

2 Data and Methodology

We use OECD data provided in the International Trade by Commodities Statistics (ITCS). The data are at the Harmonised System 4-digit level and there are 1,367 commodity groups in all. We use the EU countries' import and export data regardless of the fact that data for Poland, Hungary and the Czech Republic are also available in the data base. We do this for the sake of symmetry between the accession countries.

HS-data for the EU countries are available for all countries in 1993-1998, except for Austria in 1993 and 1994 in which case we have used SITC-data at the 4-digit level and transformed it to the Harmonised System. We note that there is a small difference in these and do not present Austria's intra-industry trade figures for these two years. In other calculations (similarity and revealed comparative advantage), we ignore this deficiency and use the transformed Austrian data for 1993 and 1994 because it should not have a noticeable impact on the results. Another shortcoming of the Austrian data is that the OECD does not report Austria's trade with Poland in 1993 and 1994 even at the SITC-system. To cover this deficiency, we have used Polish data for these two countries' bilateral trade in those years.

We will first approach the EU and CEE countries' trade with calculations of intra-industry trade (IIT) in section 3. These calculations reveal the extent to which trade between any two countries is based on inter-industry trade and to what extent it is based on intra-industry trade (IIT), i.e. taking advantage of increasing returns to scale. An analysis of similarity indices of the structure of trade in section 4 complements the picture we get from the IIT calculations. Here we analyse the extent to which the exports of two countries to a third country or area are similar. This is a simple method of determining who competes with whom.

We examine revealed comparative advantage (RCA) in the internal market and its factor intensity in section 5. Here we compare the current EU countries and CEE applicant countries. We use Neven's (1995) five-category classification for goods on the basis on their relative intensity in labour skills and capital. We calculate the countries' position in this two-dimensional space and look at how it has evolved since 1993. Notably, the results reveal quite

diverse developments among countries. In section 6, we briefly discuss the effects of EU membership from the point of view of CEE countries' trade relations. Section 7 draws conclusions from the analysis.

3 Intra-Industry Trade

Intra-industry trade (IIT) covers the simultaneous exports and imports of similar goods between two countries or regions. IIT is associated with competition in oligopolistic industries, increasing returns to scale and intra-firm trade.

The share of IIT is usually high between developed industrialised countries and fairly low between countries that are at various stages of economic development. IIT has indeed been lower in trade between European countries in transition and the European Union than in intra-EU trade. But as the countries of Central and Eastern Europe have narrowed their differences in economic structures and income levels, the share of IIT in total trade has risen.

Previous research has demonstrated that most of this IIT is vertical, and not horizontal, in character (see e.g. Aturupane et al. 1997 and Kaitila 1999). This means that although the countries are engaged in export and import of goods classified in the same product group, the goods are usually of dissimilar quality. Unit export prices of CEE countries are typically lower than their unit import prices, although certain exceptions exist. In this study we will not analyse this issue, however.

The extent of intra-industry trade is measured using a Grubel-Lloyd (1971) index. It measures the sum of the absolute differences between the exports (x) and the imports (m) of commodities k in trade between countries i and j, where k runs through all the products in which the countries are engaged in trade with each other. In the denominator we have the total sum of exports and imports between the countries. If the index equals zero, there is no intra-industry trade between the countries. As the index approaches 100, also the share of IIT in total trade approaches 100 per cent. More formally, the index is given by

$$GL_{ij} = \left[1 - \frac{\sum_k \left| x_{ij}^k - m_{ij}^k \right|}{X_{ij} + M_{ij}} \right] \times 100.$$

Figure 1 shows the evolution of the share of IIT in trade between each of the CEE countries and the European Union (EU15). The share of IIT has risen since 1993 for all accession countries. The highest levels, those for the Czech Republic and Slovenia, are already at an average intra-EU IIT level as can be seen by comparing these figures with those in Figure 2.

Figure 1. Share of intra-industry trade in total trade between the EU and CEE countries in 1993-98 (HS4), %[3]

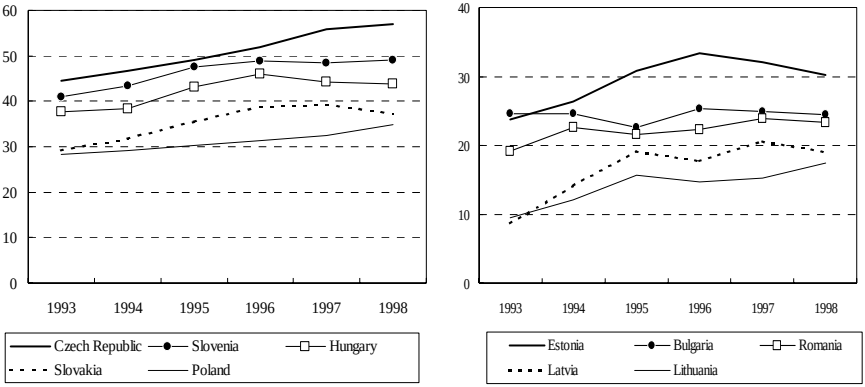
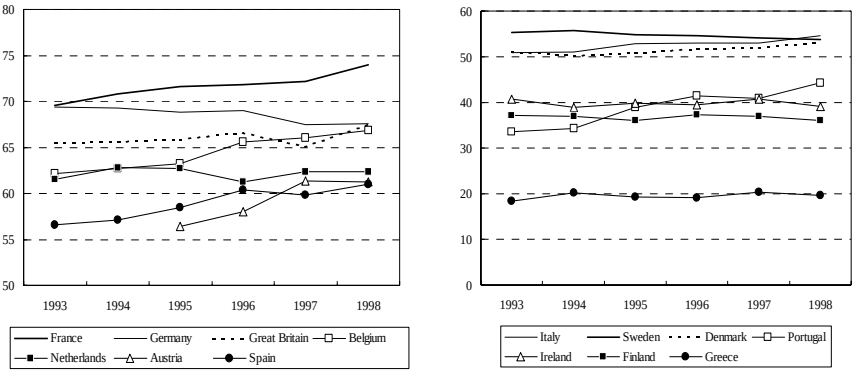


Figure 2. Share of intra-industry trade in intra-EU trade in 1993-98 (HS4), %



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Overall, the countries on the left side of Figure 1 can roughly be compared with the EU countries in their intra-EU trade. The second group of countries on the right of Figure 1 is doing relatively poorly in this respect. In this latter group we can raise at least Estonia into the first group of countries on the basis of later analysis. Besides, Estonia's economy is so small that it cannot possibly reach a high level of IIT in its trade with the EU. Small countries are bound to specialise more in their exports than in their imports.

Some CEE countries continue to edge upward in Figure 1, notably the Czech Republic, Poland and Lithuania. Meanwhile, Slovenia, Latvia, Bulgaria and Romania appear to stall. On the other hand, Hungary, Estonia and Slovakia have retreated since 1996. This is an interesting observation in view of our later analysis on the factor-intensity of the countries' revealed comparative advantage in the EU market. It seems likely that these countries are increasingly specialising in the exports of a limited group of products.[4] In Hungary's case, we note piston engines (12.7 per cent of exports to the EU in 1998) and automatic data processing machines (8.1 per cent), for Estonia transmission apparatus for radio-telephony (8.3 per cent) and for Slovakia motor vehicles for transporting persons (26.7 per cent). The share of these products in their imports from the EU is unlikely to rise this high, so we see a negative effect on the extent of IIT.

The level of IIT in intra-EU trade has remained more stable than between CEE countries and the EU. This makes sense because EU countries have more mature economies. Yet, even within the EU, we see France, Belgium, Austria, Spain and Portugal edging upward, and Germany downward (see Figure 2).

In Table 1 we find the share of IIT in the most important bilateral CEE-EU trade relations. The table shows the bilateral IIT shares for the CEE countries' three most important EU trading partners. High levels of IIT in bilateral trade relations also hint at large inflows of foreign direct investment. IIT is often related to intra-firm trade and FDI is a sign of interdependence between economies. Hungary and the Czech Republic have the highest bilateral IIT shares with their most important trading countries, Germany, Austria and Italy. The Hungarian and Czech economies are highly intertwined with the output of many sectors in Europe, for example, the auto industry. An example of a smaller country can be found in Estonia, which reaches rather high levels of IIT in its trade with Finland and Sweden, the most important sources of FDI for the Estonian economy. Brenton *et al.* (1999) find evidence that there is a relationship of complementary, not substitutability, bet-

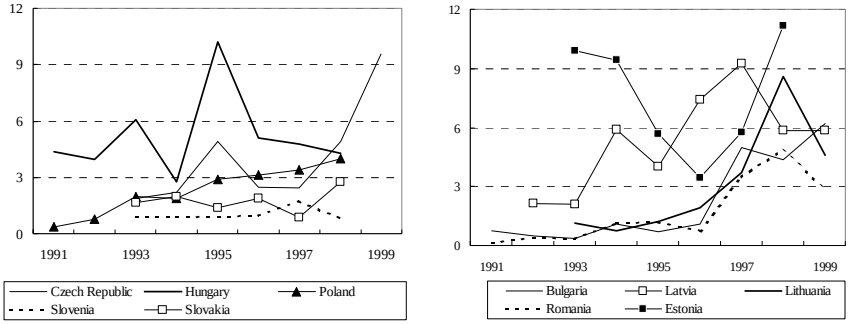
ween FDI and trade between the CEE countries and the European Union.

Table 1. Share of IIT between CEE countries and their three most important export partners in 1998, %

	Germany	Italy	France	Austria	Sweden	UK	Finland	Greece	Netherlands
Bulgaria	15.1	24.1						26.4	
Czech Republic	59.0	31.0		38.5					
Estonia					33.0		25.7		9.2
Hungary	40.2	34.5		46.3					
Latvia	12.1				16.5	3.7			
Lithuania	11.2		13.1			5.0			
Poland	30.0	20.5	21.3						
Romania	17.0	26.5	21.1						
Slovakia	34.4	20.3		37.0					
Slovenia	37.7	36.1	29.8						

The countries with the lowest IIT shares are by and large those that have the lowest GDP per capita levels, the lowest FDI inflows and that have also reformed their economies the least. FDI inflows as per cent of GDP in 1991-1999 are shown in Figure 3.

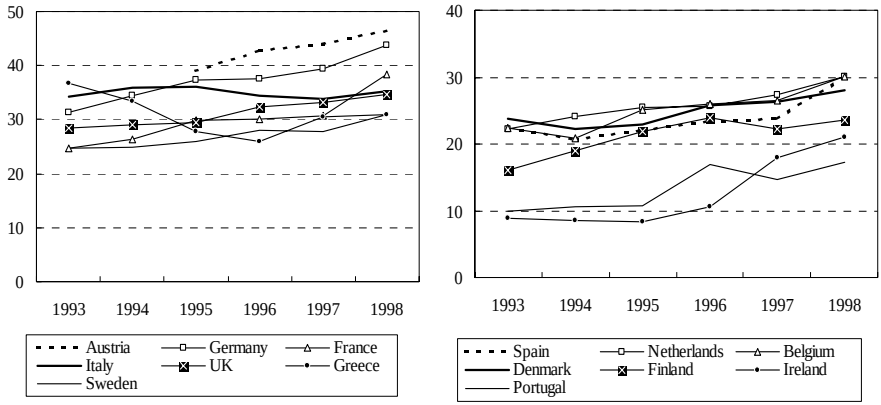
Figure 3. FDI inflow, % of GDP



Source: IMF International Financial Statistics; own calculations

Figure 4 shows the share of IIT between an aggregated CEE-10 and each EU country since 1993 (except for Austria since 1995). As could be expected from the above analysis, in all cases (bar Greece) the share of IIT has risen. Neven (1995), too, found this to have happened between 1985-87 and 1990-92.

Figure 4. Share of IIT between the EU countries and an aggregated CEE-10



The high IIT share between CEE countries and Austria, Germany and France is evidence that not only the factor endowments, but also the comparative advantage of CEE countries as an aggregate is approaching that of Western Central Europe (or northern Europe as Neven calls it). Using earlier data, Neven argued that the factor endowments of the CEE countries were rather similar to those of Southern Europe. Indeed, there is evidence of this being the case in the early 1990s, given that IIT shares were the highest in the CEE countries' trade with Greece and Italy in 1993. Since then, however, the CEE countries' factor endowments have rapidly approached those of Austria, Germany and France, and more recently Ireland, which has notable high-tech exports to the EU.[5] On the other hand, the share of IIT in trade between the CEE countries and Italy has not changed since 1993.

4 Similarity of the structure of exports

The similarity index measures the extent to which the exports of two countries are similar to one another. The approach differs somewhat from the one taken in intra-industry trade. While in the IIT calculations we compared the absolute levels of the exports and imports of a good in two countries' bilateral trade, the similarity-index approach analyses the relative importance of a good in the exports of two countries into a third country or area. The latter is therefore an attempt to analyse which countries compete in a given market area.

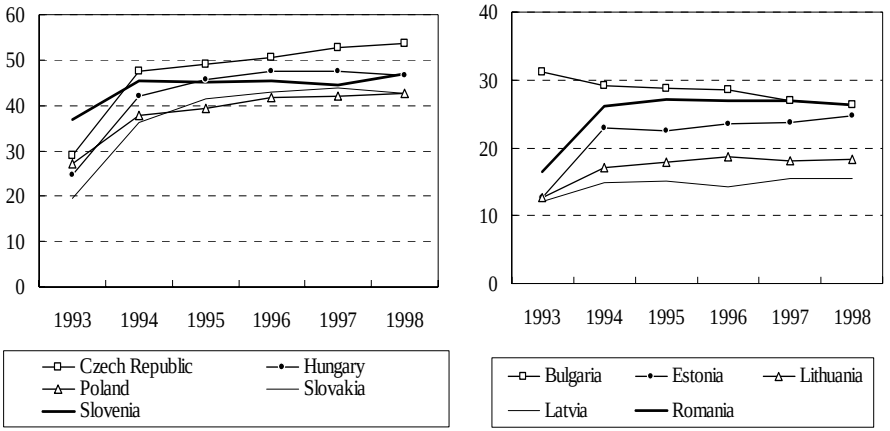
The similarity index is calculated following Drábek and Smith (1997) as

$$S(ab,c) = 100 * \sum_k \min(X_k(ac), X_k(bc)),$$

where X_k is the share of product k in exports from either country a or country b to country c. In Tables 2 and 3, a is the CEE country in the first row, b is the EU country in the first column, and country c is the EU as a whole. We call this a biased similarity index because we compare, for example, Bulgaria's exports to all 15 EU countries to Austria's exports to the EU (excluding Austria, of course). That is to say, we do not exclude the exports of Bulgaria to Austria from the calculations, which would render the index "unbiased" in our terminology. We assume that the exports of Bulgaria to Austria, in the above example, can be substituted for exports to other EU countries.[6] The similarity index takes values between 0 and 100 as the similarity between the two countries' exports to the EU becomes more pronounced.

In Figure 5 we track the evolution of the biased similarity index between the CEE countries' exports to the EU and all intra-EU exports in 1993-98. We see that there is a somewhat puzzling jump from 1993 to 1994. This cannot be due to the deficiencies in the Austrian data, which we mentioned in section 2 on data and methodology, because the data for 1994 are constructed in the same way as 1993.

Figure 5. Biased similarity indices between the CEE countries' exports to the EU and intra-EU exports 1993-98



Since 1994, most countries have continued to edge upward, but at a slower pace. A few countries, such as Romania, Latvia and Lithuania have stalled since 1994. Hungary and Slovakia seem to have joined this latter group after 1996. A major exception is Bulgaria, which started out at a relatively high level in 1993, but whose similarity index has declined steadily ever since.

Table 2 shows the biased similarity index for 1998, while Table 3 gives percentage change since 1994. We chose 1994 instead of 1993 due to the uncertainty over the 1993 results. The countries are ranked so that higher similarity levels and larger increases are found higher and to the left of the tables.

It is not surprising to see that the countries that score the highest values for the similarity index are the wealthiest CEE countries that also have the highest levels of IIT in their EU trade, namely the Czech Republic, Slovenia, Hungary, Poland and Slovakia. The other CEE countries lag far behind these five in this respect. Of these, Romania, Bulgaria and Estonia are more or less at the same level, while Lithuania and Latvia are again clearly below even these.

Table 2 Biased similarity indices in exports to the EU in 1998, %

	Czech Republic	Slovenia	Hungary	Poland	Slovakia	Romania	Bulgaria	Estonia	Lithuania	Latvia	CEE-10
Austria	51.5	46.2	45.2	42.3	40.7	25.8	25.4	24.8	18.7	16.1	53.9
France	51.3	43.7	43.9	39.9	40.5	23.2	25.6	19.5	14.9	11.8	53.3
Italy	51.5	49.7	42.1	42.7	40.8	32.1	29.8	24.2	21.5	16.2	53.2
Germany	55.2	48.8	41.2	38.6	43.1	22.4	22.1	19.9	13.9	11.8	51.9
Spain	50.2	48.1	39.0	38.7	48.4	23.4	24.5	17.9	15.8	11.5	50.6
Belgium-Luxembourg	47.9	43.2	37.2	38.9	42.1	24.8	26.4	21.5	17.5	14.8	48.7
UK	44.0	37.8	45.2	35.1	34.9	19.2	19.3	23.5	13.9	15.5	48.4
Portugal	44.7	44.5	37.5	40.3	46.4	36.6	33.4	25.9	29.3	18.7	47.4
Denmark	37.2	33.5	35.2	35.5	28.3	26.7	22.2	30.4	20.6	19.8	40.2
Sweden	39.4	33.5	33.1	32.2	33.0	19.9	16.9	28.3	15.9	15.6	40.1
Netherlands	34.0	28.9	41.6	31.5	28.6	19.8	21.6	24.9	18.6	15.9	39.2
Finland	28.6	24.3	26.2	25.2	25.3	17.9	16.6	31.3	16.5	16.9	31.9
Greece	18.1	20.1	22.4	22.0	19.1	21.6	25.7	17.9	22.4	16.8	25.3
Ireland	18.4	15.5	27.1	15.7	13.6	10.0	10.9	13.4	9.2	7.5	21.1
EU	53.5	46.9	46.6	42.7	42.6	26.3	26.3	24.8	18.3	15.4	57.8

The exports of the most advanced CEE countries (the Czech Republic, Hungary and Slovenia) are most similar to those of Germany, Austria, Italy and France. Hungary also scores relatively high values with the UK and the Netherlands. Poland, on the other hand, has an export structure most similar with Austria, Italy and Portugal, which suggests that Poland competes more with southern Europe than the other Central European countries. Poland's GDP per capita is also significantly lower than in the Czech Republic, Hungary or Slovenia. Slovakia, too, has a more southern European flavour in this respect with highest similarities with Spain and Portugal. We can also see that the Balkan countries, Romania and Bulgaria, score their highest similarity-index values with southern Europe, namely Portugal and Italy. Also Lithuania is closer to southern Europe in this respect with highest index values with Portugal, Greece and Italy. Estonia differs in this respect as its index values are the highest relative to the Nordic countries, Finland, Denmark and Sweden. Latvia scores very low index values.

From the EU side, Austria, France and Italy, but also Germany and Spain score high similarity values of over 50 per cent when we compare their exports to the EU to those of all ten CEE countries. Belgium, the United Kingdom and Portugal are not far behind. This shows again that there is a duality in the CEE countries export structure. Some of their industry competes with southern Europe, but some with Western Central Europe. On the other hand, Finland, Greece and Ireland score very low in their similarity indices.

There have occurred significant changes in the structure of the CEE countries' exports to EU15 since 1994. The most significant absolute increases have taken place in the similarity of trade between the EU and Slovakia, the Czech Republic, Poland and Hungary. The Czech Republic and Slovakia have most similarity with Spain, Germany and Portugal. In the case of Hungary, similarity has increased the most with the United Kingdom. In the case of Poland and Slovenia, the increase is the most pronounced with Austria and Portugal. We can also see the decline in the case of Bulgaria. Romania and Latvia are relatively close to not having any change in their average similarity indices. Estonia has seen an increase in its similarity index values against the Nordic countries.

For the aggregated CEE-10 there is a most pronounced increase in the similarity of the structure of exports with Austria, Spain and Germany. There is a decline in the similarity with Greece and Ireland. The latter may be due to a change in Ireland's export structure as much as in that of CEE countries.

Table 3 Change in biased similarity indices in exports to the EU in 1994-1998, per centage points

	Slovakia	Czech Republic	Poland	Hungary	Estonia	Slovenia	Lithuania	Latvia	Romania	Bulgaria	CEE-10
Austria	4.6	9.5	11.0	7.3	3.8	10.0	4.9	4.0	5.7	2.7	13.7
Spain	18.0	12.4	7.4	3.6	0.4	5.1	3.6	1.4	1.2	-1.6	10.1
Germany	11.0	10.7	5.9	4.5	2.1	3.9	1.9	1.5	2.1	-1.1	9.5
UK	5.8	6.2	4.0	11.3	4.0	2.0	0.0	-0.7	-0.3	-3.4	8.6
France	6.5	7.4	5.2	4.9	1.1	2.0	1.8	1.4	1.2	-2.9	8.5
Belgium-Luxembourg	8.1	8.4	6.2	1.3	1.4	3.8	2.4	0.0	1.7	1.2	6.7
Portugal	10.8	8.2	8.1	-2.4	-5.4	8.8	6.8	2.3	0.3	-2.3	5.0
Italy	1.9	3.0	5.2	-0.3	-0.3	0.2	4.0	2.7	0.8	-2.1	4.7
Denmark	0.5	3.3	4.9	0.5	4.1	1.0	4.0	5.1	3.5	0.6	3.1
Sweden	1.0	2.8	3.3	3.4	5.5	0.3	2.1	1.0	0.7	-3.0	1.9
Finland	-3.3	-2.2	0.3	1.7	6.8	-2.2	1.8	-1.2	0.9	-2.0	-0.1
Netherlands	0.5	-0.7	2.2	6.6	1.2	0.7	0.3	0.7	-2.3	-3.3	-0.2
Ireland	-1.4	-3.6	-1.1	4.3	-2.7	-3.4	-0.1	0.0	-3.2	-4.9	-1.4
Greece	-3.9	-2.3	-2.0	-5.1	-4.5	-1.0	2.3	1.9	-4.8	-2.2	-3.9
EU	6.5	6.1	5.0	4.7	1.8	1.5	1.3	0.5	0.2	-2.9	8.1

Table 4 shows the similarity of the exports to the EU between the CEE countries. We can see more pronounced similarities in the export structure of three separate regions: Central Europe, the Baltic countries, and the Balkans. More exactly the groups are 1) the Czech Republic, Hungary, Poland, Slovakia and Slovenia, 2) Estonia, Latvia and Lithuania, and 3) Bulgaria and Romania. We can also distinguish a mixed group 4) Lithuania, Poland and Romania. This latter inter-regional similarity is at least partly due to clothing exports.

Table 4 Similarity indices in exports to the EU in 1998 %

	Czech Republic	Hungary	Slovakia	Slovenia	Poland	Estonia	Latvia	Lithuania	Romania	Bulgaria
Czech Republic	100.0									
Hungary	45.2	100.0								
Slovakia	54.1	40.9	100.0							
Slovenia	54.6	39.0	50.6	100.0						
Poland	53.2	43.1	43.2	49.3	100.0					
Estonia	31.7	28.4	28.1	26.6	37.6	100.0				
Latvia	19.7	17.2	22.0	22.4	27.1	51.3	100.0			
Lithuania	24.3	22.3	28.0	22.8	35.6	43.4	39.9	100.0		
Romania	33.4	31.4	38.0	33.3	44.1	31.7	25.7	40.3	100.0	
Bulgaria	26.6	28.1	31.4	26.7	36.5	24.7	21.0	36.0	48.8	100.0

For comparison, Table 5 shows similarity indices in intra-EU trade. The largest countries, France, Germany and the UK score values that exceed 70 per cent. This is due to the fact that as the largest exporters they have a wider export base, and further, they twist the structure of intra-EU trade towards the structure of their own trade. The Czech Republic that scored the highest value in Table 2, reaches the level of Sweden in its exports to the EU in Table 5. Note again that we are comparing Czech exports to EU15 (including Sweden) to Sweden's exports to EU15 (excluding Sweden). The countries of Central Europe reach higher similarity index values than Finland, Ireland or Greece.

Table 5 Similarity indices in intra-EU trade in 1998

	France	Germany	UK	Belgium-Luxembourg	Italy	Spain	Netherlands
France	100.0						
Germany	70.3	100.0					
UK	66.2	62.5	100.0				
Belgium-Luxembourg	60.7	62.4	55.1	100.0			
Italy	58.2	60.9	50.9	51.8	100.0		
Spain	60.1	58.9	49.9	56.7	56.3	100.0	
Netherlands	52.7	50.6	55.8	54.6	43.9	43.2	100.0
Austria	54.6	58.1	48.1	48.8	55.8	47.0	39.7
Sweden	49.4	48.8	50.0	40.6	45.1	42.5	36.5
Denmark	44.3	46.0	44.7	41.3	46.4	36.1	42.7
Portugal	41.3	42.6	34.5	42.4	43.1	47.2	28.8
Finland	33.4	34.5	34.5	31.6	30.9	26.9	31.5
Ireland	32.7	29.5	38.4	26.7	24.8	23.2	39.2
Greece	25.2	22.9	22.5	24.8	29.4	28.2	23.4
EU	78.9	77.3	71.4	67.8	65.7	63.2	60.1

	Austria	Sweden	Denmark	Portugal	Finland	Ireland	Greece	EU
Austria	100.0							
Sweden	51.7	100.0						
Denmark	42.9	37.5	100.0					
Portugal	37.5	30.7	27.0	100.0				
Finland	38.4	53.4	30.5	23.2	100.0			
Ireland	25.2	22.7	29.4	16.3	16.1	100.0		
Greece	21.0	18.3	26.2	26.7	13.5	17.8	100.0	
EU	59.5	52.7	50.7	44.1	37.7	35.0	27.8	100.0

5 Factor intensity of revealed comparative advantage in the EU market

In this section, we calculate the factor intensity of the revealed comparative advantage (RCA) of both the EU countries' and the CEE countries' exports to EU15. We then analyse the change that has taken place in this factor intensity during the period 1993-1998.

We have used the Balassa (1965) index to measure revealed comparative advantage.[7] The idea is that trade flows reveal the comparative advantage of nations. This simple index cannot, of course, explain what is behind the comparative advantage. For our purposes, the Balassa index is calculated as the ratio of the share of a given product in a country's exports to another country or area to the share of that product in total intra-EU exports. In formal terms, the Balassa index is given by

$$BI = \frac{x_{ij}^k / X_{ij}}{x^k / X}$$

where x_{ij}^k is exports of product *k* from country *i* to country *j*, X_{ij} is aggregate exports from country *i* to country *j*, x^k is intra-EU exports of product *k*, and *X* is aggregate intra-EU exports. If the index is greater than one for product *k*, the country enjoys a comparative advantage in the exports of that good.

After having calculated the products in which a country enjoys a revealed comparative advantage in the EU market in given years, we disregard the exports of those goods in which the country did not enjoy a revealed comparative advantage. We are left with only those exports with comparative advantage, i.e. those product groups in which the value of the Balassa index is larger than unity. We will then divide these into categories following Neven (1995).

Neven classified manufacturing industries into five categories at the NACE CLIO 3-digit level (some at 4-digit) according to their capital intensity and labour-skills intensity (see Figure 6). To determine these he used the following variables:

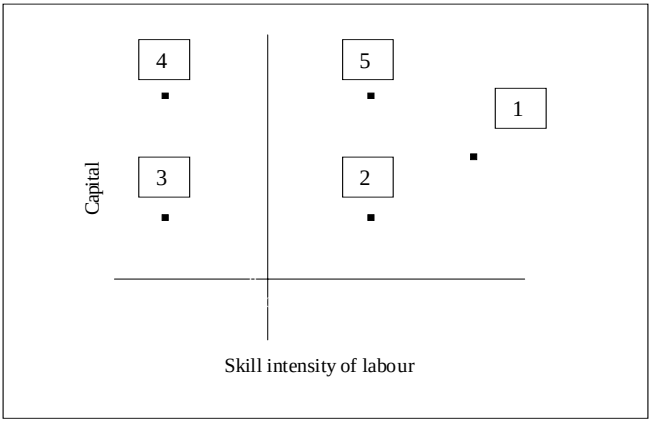
- share of white collar workers in total industry labour force,
- medium wage,
- the ratio of all labour costs to value added, and
- the ratio of fixed investment to value added.

Neven used data from western Europe from the latter part of the 1980s to determine the classification for each sector. Although the data used to determine the categories for manufacturing industries is relatively old, this is unlikely to constitute a problem here.

Another issue is how well these variables represent sectors in transition economies. Certainly, as transition progresses, the potential problem decreases. The share of white-collar workers in total employment is likely to have increased in the CEE countries during the 1990s. Wages are lower in the CEE countries than in the EU, but the ratio of wages to value added hardly differs as much even though it may be a bit lower in the accession countries than in the EU. There has been a more pronounced need for investment in the CEE countries than in the EU, so it is possible that the ratio of investment to value added is higher in the accession countries than in the EU. On the other hand, the European Union hardly constitutes a homogenous group in this respect either.

The sectors with high capital intensity are characterised by a high level of investment as a percentage of value added, while low average wage and a high share of wages in value added are the characteristics of a labour-intensive industry. With a high average wage and a high share of labour in value added, the sector is intensive in human capital. The share of blue-collar workers is used as proxy for the intensity of human capital. See Appendix 1 for a full list of the industries in the five categories. Figure 6 shows the five categories in a two-dimensional space as reproduced here from Neven's article.[8]

Figure 6. Industries' 5-category classification



Category 1 is characterised by a high proportion of wages in value added, very high wages, and a very high proportion of white-collar workers. These are high-tech industries intensive in human capital.

Category 2 is intensive in human capital, but uses only little physical capital. It has a relatively low level of investment relative to value added, high wages, and a high level of wages in value added.

Category 3 is intensive in labour and uses relatively little capital. Average wages are low, and there is a low level of investment and a high level of wages in value added.

Category 4 includes industries that are intensive in labour and capital. There is a high level of investment, relatively low wages, a low proportion of white-collar workers, and an intermediate proportion of wages in value added.

Category 5 is dominated by food-processing industries that are intensive in both capital and human capital. The exports foodstuffs to the EU have not been totally free and this may decrease the CEE countries' revealed comparative in category 5. On the other hand, consumers may be rather conservative, and may choose not to purchase foodstuffs produced in the CEE countries even if trade were free.

We ran into some deficiencies with the data, however, because Neven's categories do not cover the whole HS classification. It turned out that division into the five categories was only available for between 70 per cent of Latvia's exports with RCA to the EU and 96 per cent of Romania's exports with RCA to the EU in 1998. Consequently, between 6 and 30 per cent of CEE countries' exports to the EU could not be categorised into the five groups. For Latvia and Lithuania in particular, the problem becomes acute for 1993, when only 35 and 49 per cent of their exports with revealed comparative advantage, respectively, could be categorised. For the other CEE countries, the data covers over 76 per cent of exports even in 1993. Some 10-40 per cent of intra-EU exports had to be disregarded due to this same deficiency.

The biggest commodity groups that Neven's classification leaves outside are petroleum oils, and coal and briquettes. These were especially important for Latvia and Lithuania in their exports to the EU in the early part of the 1990s, but their importance had waned significantly by 1998. Latvia does not produce oil itself nor does have oil refining capacity. The oil in question is actually Russian oil travelling through the country and does not really represent Latvia's comparative advantage. As such it should not even appear in the trade statistics.[9]

Table 5 shows the division of the CEE countries' revealed comparative advantage into the five categories in 1998 and the percentage point change in the values from 1993. At first sight, we notice that in 1998 category 4, which is relatively capital-intensive but with low skill-intensity of labour, emerges as the most important group for all CEE countries except Lithuania and Romania for which category 3 is the most important. Category 3 is also relatively important for Bulgaria. When we look more closely at the results, we see that the share of category 4 varies between 24 per cent for Romania and 73 per cent for Latvia. Combining categories 3 and 4, the low-skills intensive industries emerge as the dominant sectors covering between 58 per cent of Hungary's and 95 per cent of Latvia's revealed comparative advantage. Appendix 2 shows those product groups in which the CEE countries enjoyed a comparative advantage in 1998 and whose share in the countries' total exports to the EU exceeded 2 per cent. Also the Neven-category in question is shown in the table.

This leaves a potential for large difference in the importance of categories 1, 2 and 5, which are relatively more skill-intensive. Category 1 is quite pronounced for Hungary, Estonia and Lithuania. Hungary and Estonia have received large inflows of foreign direct investment. Lithuania has received

less foreign direct investment. The importance of category 1 for Lithuania is explained by the fact that about 10 per cent of its exports to the EU consists of fertilisers, which are classified into category 1 as chemical products. The large share of category 1 for Hungary and Estonia is explained by other factors: automatic data processing machines and video-recording apparatus in the case of the former and transmission apparatus for radio-telephony in the case of the latter.

Table 5 Share of CEE countries RCA-exports to the EU in each of the five categories in 1998, %, and percentage change between 1993 and 1998

CEE country	Category					
	1	2	3	4	5	3+4
Bulgaria	7.0	4.5	37.2	42.8	8.5	80.0
Czech Republic	5.2	19.2	14.7	58.7	2.2	73.4
Estonia	18.0	6.5	25.3	46.8	3.4	72.1
Hungary	25.3	15.5	18.1	39.9	1.2	58.0
Latvia	2.1	1.1	21.2	73.3	2.2	94.5
Lithuania	15.4	7.3	37.0	34.4	5.9	71.4
Poland	6.9	8.1	33.0	45.4	6.6	78.4
Romania	1.6	6.2	66.9	24.4	0.9	91.3
Slovakia	6.5	10.9	19.5	60.4	2.7	79.9
Slovenia	3.0	20.1	18.7	57.2	1.0	75.9

CEE country	Category					
	1	2	3	4	5	3+4
Bulgaria	-1.5	-3.2	1.6	8.3	-5.2	9.9
Czech Republic	-2.1	7.3	-12.3	10.8	-3.7	-1.5
Estonia	12.6	-0.7	-0.4	-11.2	-0.3	-11.6
Hungary	15.9	3.0	-20.8	6.1	-4.1	-14.7
Latvia	-3.2	-0.3	5.1	-0.2	-1.3	4.8
Lithuania	-1.7	5.5	16.8	-12.7	-7.8	4.1
Poland	1.3	2.0	-8.8	7.6	-2.1	-1.2
Romania	-1.3	2.9	-2.6	2.7	-1.7	0.0
Slovakia	-1.0	3.8	-14.1	17.2	-5.9	3.1
Slovenia	1.1	0.8	-16.3	14.8	-0.3	-1.6

Category 2, also a relatively high-skill category is important in the comparative advantage of Slovenia, the Czech Republic, Hungary and Slovakia. Category 5, which consists largely of food industries, is understandably of little importance, although it is a major employer in many of CEE countries.

We can also see that there has occurred a significant change since 1993 in many of the categories. Hungary and Estonia have increased the share of category 1 by about 15 percentage points. Category 1 is also important for Lithuania, but it has declined slightly. Category 2 has remained largely unchanged for most countries; some positive change has been experienced in the Czech Republic and Lithuania.

Category 3, with low intensity in both skills and capital has experienced significant declines in Hungary, Slovenia, Slovakia and the Czech Republic, the most developed of the CEE countries. On the other hand, category 3 has increased its importance in Lithuania. Category 4, another low-skills group, but with high capital intensity, has been on the rise in Slovakia, Slovenia and the Czech Republic. This is due to, among other things, the expansion in western car industries based in these countries. Meanwhile, there is a fall in Estonia and Lithuania. The importance of category 5 has declined moderately in all CEE countries. Overall, we see that there has been a significant decline in the low-skills categories 3 and 4 for Hungary and Estonia, while there is a rise especially in Bulgaria but also in Latvia and Lithuania. The CEE countries are on different paths again.

Table 6 presents the respective figures for the EU countries in 1998 and the percentage point change since 1993. It is perhaps not very surprising that the labour-skill-intensive categories 1, 2 and 5 are more important in the EU countries than in the CEE countries. Even so, category 4 is, again, the single most important category being the most important for ten (with Luxembourg) of the EU countries. In addition to this, category 3 is very important in Greece and Portugal, but also Italy and Denmark. Overall categories 3 and 4 combined are the most important for the southern European countries of Spain, Portugal and Italy. This is evidence that CEE countries are still competing more, on average, with southern EU countries than northern ones as regards the factor intensity of their comparative advantage.

Within the EU, we also find countries for which categories 1, 2 and 5 are most important, namely Ireland, the Netherlands, the United Kingdom and Sweden, where these high-skill categories account for over 50 per cent of the comparative advantage.

The changes since 1993 are understandably smaller in the more mature economies of the European Union than in the transition countries. Even in the EU, however, there are noticeable shifts in this respect. Ireland and the Netherlands have increased the share of category 1 significantly, while Portugal has increased the share of category 4. For Greece and Portugal, the share of category 3 has fallen significantly. The same has taken place for Ireland in category 4.

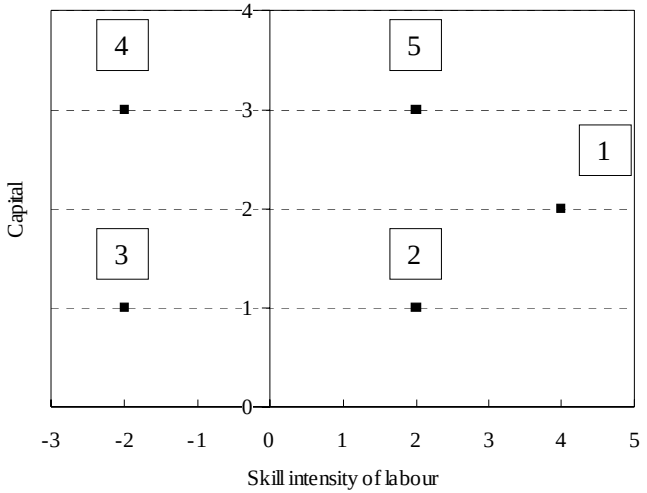
Table 6 Share of intra-EU RCA-exports in each of the five categories in 1998, %, and change between 1993 and 1998, percentage points

EU country	**Category**					
	1	**2**	**3**	**4**	**5**	**3+4**
Austria	10.8	16.2	12.8	55.1	5.1	67.9
Belgium-Luxembourg	21.2	10.4	6.8	55.3	6.2	62.1
Denmark	10.1	31.6	22.5	30.8	5.0	53.4
Finland	18.6	8.4	5.2	47.3	20.5	52.4
France	21.8	13.2	3.6	51.1	10.3	54.7
Germany	19.8	21.2	5.9	50.5	2.6	56.4
Greece	1.8	19.6	36.3	25.3	17.1	61.5
Ireland	75.2	7.8	0.4	6.7	10.0	7.0
Italy	2.4	21.9	25.7	46.4	3.6	72.2
Netherlands	44.0	17.5	3.7	25.6	9.3	29.3
Portugal	3.9	10.3	35.6	40.4	9.8	76.1
Spain	4.8	9.8	6.5	72.9	6.1	79.4
Sweden	22.0	16.2	7.1	39.9	14.8	47.0
UK	49.0	18.8	3.2	27.0	2.1	30.2

EU country	Category					
	1	2	3	4	5	3 +4
Austria	-4.1	-4.0	0.5	5.5	2.1	6.0
Belgium-Luxembourg	3.2	1.4	2.0	-6.0	-0.6	-4.1
Denmark	2.5	0.1	3.4	-4.4	-1.6	-1.0
Finland	7.1	1.1	-2.4	-2.1	-3.7	-4.5
France	-0.2	3.6	-1.1	-0.8	-1.5	-1.9
Germany	0.3	-3.5	-1.5	5.1	-0.5	3.7
Greece	0.5	6.6	-11.3	5.9	-1.6	-5.4
Ireland	23.6	-2.5	-1.3	-12.3	-7.5	-13.6
Italy	-0.7	1.3	-4.6	4.2	-0.3	-0.4
Netherlands	10.4	-3.0	-1.6	-1.5	-4.4	-3.0
Portugal	-0.5	-0.5	-13.7	15.8	-1.1	2.1
Spain	0.0	0.5	0.8	-0.1	-1.2	0.7
Sweden	6.7	-1.0	-0.7	-2.4	-2.6	-3.2
UK	5.7	4.5	-0.3	-9.7	-0.1	-10.1

Next we will make an effort to try to pinpoint the countries' revealed comparative advantage in the two-dimensional space of Figure 6. Figure 7 sketches these five categories again as functions of the labour-skill intensity and capital intensity of production. It also shows what values we have used to depict the relative skill and capital intensities here, something that Neven did not do. We have applied the values ($x = 4$, $y = 2$) for category 1, (2, 1) for category 2, (–2, 1) for category 3, (–2, 3) for category 4, and (2, 3) for category 5 in order to place a country in a single point on a chart such as Figure 7. The above values for x and y are the limits that a country can reach in the following analysis. It should be stressed that the values are relatively arbitrary and have been chosen on the basis of Figure 6 depicting the relative skills-capital intensity of the different categories. Moreover, we cannot conclude that, for example, $y = 2$ would mean that production is twice as capital-intensive as $y = 1$. Also remember that each category 1 through 5 comprises a large variety of different manufacturing industries (see the Appendix)

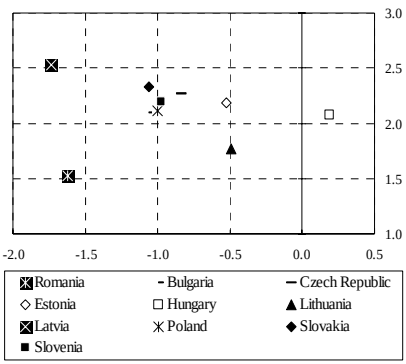
Figure 7. Neven's 5-category classification with values used in this study

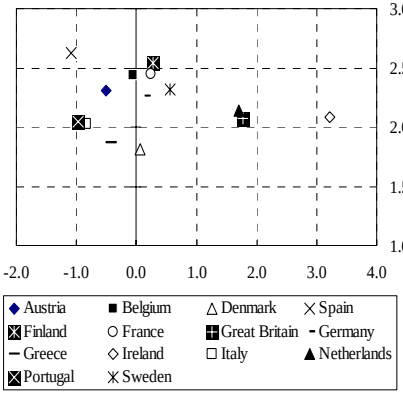


Using the above values for the five categories, we can show where a country lies in the skills-capital division relative to other countries. Figure 8 shows this point for the CEE countries (on the left) and the EU countries (on the right) in 1998. As might be expected, EU countries are generally positioned to the right of CEE countries. This means that the comparative advantage of EU countries' intra-EU exports is, on average, more skill-intensive than that of the exports of CEE countries. There also seems to be a small difference in the average capital-intensity in favour of EU countries.

Although we may not conclude from the figure that $y = 2$ is twice as capital-intensive as $y = 1$, we do see that Romania's comparative advantage is based on a much lower level of capital intensity than that of the other countries. Among the CEE countries, Latvia, on the other hand, has a relatively capital-intensive comparative advantage. Both countries are, however, very far on the left signifying that their comparative advantage is based on low-skill manufacturing sectors.

Figure 8. Revealed comparative advantage of exports to the EU in 1998





The other CEE countries are more or less at the same level of capital intensity in their comparative advantage as most EU countries. On the horizontal axis, the latter are, on average, to the right of the CEE countries. Slovakia, Bulgaria, Poland, Slovenia and the Czech Republic are more or less at the same skills level as Portugal, Spain and Italy. Estonia and Lithuania are approximately at the same level as Austria and Greece. Lithuania's comparative advantage in the high-skills sectors is based on fertilisers, while that of

Estonia is based on transmission apparatus for radio telephony. Hungary is the only CEE country that has risen to the positive sector on the horizontal axis. The skill intensity of its comparative advantage in the internal market is approximately the same as that of France or Germany. The Netherlands, the UK and Ireland are in a class of their own in the skill intensity of their comparative advantage in the EU market.

As could be expected, changes have occurred in the relative position of CEE countries' comparative advantage in the EU market since 1993. Figure 9 traces these movements. The figure shows the position of each CEE country in 1993, 1995, 1997 and 1998. The smallest marker denotes its position in 1993 and the largest marker its position in 1998. A noticeable fact is that the CEE countries have moved in different directions in the skills-capital space.

Hungary and Estonia have moved significantly towards the right thus increasing the skills-intensity of their comparative advantage. Hungary also seems to have increased its capital-intensity. But there also seem to have happened shifts to the left in this respect even though they are not as clear as these two. Slovakia's comparative advantage has moved to the left during 1995-1998, but taking into account its position in 1993, this is no longer quite so obvious. On the other hand, it seems clear that Slovakia has moved upward, increasing the capital intensity of its comparative advantage. This is due to the rapid increase in auto exports. The Czech Republic, too, has edged upward but more moderately. Poland has remained more or less constant during 1995-1998. Slovenia, on the other hand, has moved upward quite radically, although most of this development occurred before 1995.

Latvia has remained more or less constant since 1995, while Lithuania has experienced a radical decline in the capital intensity of its comparative advantage. Of the Balkan countries, Bulgaria has shifted to the left while Romania has remained constant if we disregard the movement in the 1995 marker in Figure 9.

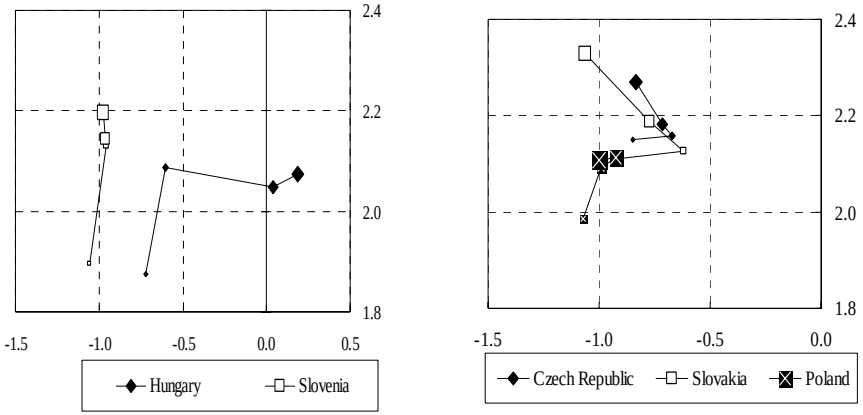
The fact that some countries have remained relatively constant in Figure 9 could mean that either their factor intensity has remained unchanged or that shifts have counterbalanced each other. Looking at how the shares of categories 1 through 5 have evolved in the 1990s, we can check what has happened in each country. There was shift in Poland's revealed comparative advantage from category 3 to category 4 between 1993 and 1995, but thereafter shifts have been relatively small. In the Czech Republic, a continuous relative shift away from categories 3 and 5 has benefited category 4. Since 1995, category 1 has also lost ground. In Latvia between 1993 and 1995 there

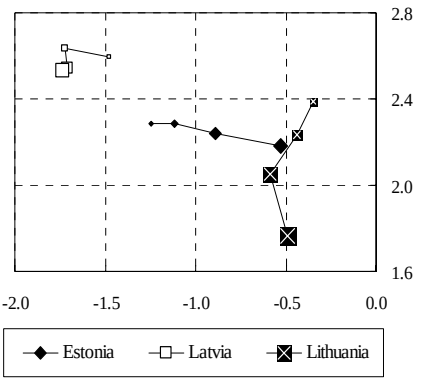
was a shift from category 1 into category 4, and further between 1995 and 1997 from category 4 to category 3. After 1997 there was no significant movement. In Romania, a significant movement from category 3 to category 4 took place between 1993 and 1995. This development was, however, turned around between 1995 and 1997. In 1998, category 3 continued to gain ground.

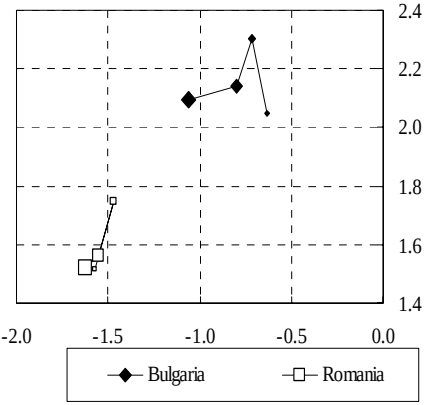
We can also look at the most important product groups in which the CEE countries have enjoyed a comparative advantage in 1998. These are recorded in appendix 2 along with the share of these products in CEE countries' exports to the EU in 1993 and 1998. An asterisk (*) shows which products have evolved a comparative advantage since 1993.

Some noticeable changes should be discussed here. Neither Bulgaria nor Romania managed to create new important product groups in which they would have a comparative advantage. Both countries' comparative advantage lies in clothing (especially that of Romania) and flat-rolled iron products (significant increase in Bulgaria's exports). All the other countries have new important product groups in which they now enjoy a comparative advantage they did not have in 1993. In the case of Latvia and Lithuania the development is very moderate, however.

Figure 9. Factor intensity of CEE countries' revealed comparative advantage in exports to the EU in 1993 (smallest marker), 1995, 1997 and 1998 (largest marker).







For the Czech Republic, Slovakia and Slovenia, these new important comparative advantage products lie in the production of motor vehicles (category 4). For Hungary and Estonia, we see a dramatic increase in the importance of smaller consumer goods in category 1. These are computers, televisions and video cassette players in Hungary's case, and telephone network equipment and office machine parts in Estonia's case. Also piston engines have become very important Hungarian exports, although the country already enjoyed a comparative advantage in them in 1993. Poland's most important comparative advantage has remained relatively stable. Latvia and Lithuania significantly reduced the share of Russian transit oil included in their actual exports to the EU. This has been substituted for exports of wood (category 4) in the case of Latvia and clothing (category 3) in the case of Lithuania. This helps to explain the decline in the degree of capital intensity of Lithuania's comparative advantage.

Taking CEE countries as a whole, we see a shift in comparative advantage away from categories 3 and 5 and into categories 1 and 4 between 1993 and 1995. This represents a move towards a more heterogeneous comparative advantage. Between 1995 and 1997, movement was much less pronounced, but there was a minor shift away from categories 4 and 5 into categories 2 and 3. Basically, this was a move towards a slightly less capital-intensive comparative advantage. In 1998, movement was small and took mainly place away from category 5 into category 4.

Why have CEE countries that apparently started out their transition from more or less similar positions moved in such different directions? The coun-

tries certainly formed a much tighter cluster in 1993 than in 1998. In 1993, the non-weighted standard deviation of x was 0.383 and that of y 0.301. By 1998, the standard deviation of x had risen to 0.556 and that of y had fallen to 0.258.[10] In terms of capital intensity, CEE countries' comparative advantage converged, but in terms of labour skills there has occurred a significant increase in diversity. One reason for this is surely the particular type of FDI that has poured into Hungary and Estonia, which have moved to the right much more radically than any other CEE country. This did not happen in the Czech Republic, even though FDI inflows have been relatively significant there, too. A more thorough analysis of the particular FDI flows, among other things, might help explain why the comparative advantage of some countries has become less capital intensive, while it has become more so for others.

6 The effects of EU membership on trade

What effects will EU membership likely have on the CEE countries we have discussed? One of the fundamental principles in the European Union is the free movement of goods. By and large, this has by now been achieved between the accession countries and the EU. Foodstuffs, however, are still largely restricted. While this is a trade barrier, it does not mean that foodstuffs would necessarily be a major export focus of CEE countries if trade were totally unrestricted.

EU membership will further decrease trade barriers between countries, and especially between the new EU countries. It will further enhance trade relations in Europe. Because the current EU is much more important for the CEE countries as an export market than vice versa, the CEE countries will gain more from lower trade barriers than current EU members. A further effect in this direction will be the CEE countries' eventual membership in Economic and Monetary Union, which new member countries are likely to join a few years after EU accession.

Most Favoured Nations tariffs not only differ in the applicant countries, they differ from EU tariffs. The accession countries tariffs will thus have to adjust to their levels in the EU. By and large, CEE countries will have to cut their import tariffs with the outside world when they join the EU. For manufactured goods, the average EU tariff is less than three per cent, while in CEE countries the average is about seven per cent. On average, the CEE countries' tariffs will decline in manufactured goods, oil, wood products, chemi

-cals, transport equipment, and electric machinery and equipment. This along with fiercer competition in the internal market will increase the competitive pressure they face. Estonia is an exception – it has practically no tariffs and therefore its average tariffs will actually rise when it joins the EU. On the other hand, the average tariffs in agriculture are only about one per cent in the CEE countries, while they are over 15 per cent in the EU. Tariffs will also rise for fish products. (Baldwin *et al.* 1997).

As member countries, the CEE countries will be eligible for funding from EU structural funds and other EU funds. These funds have often been used to improve infrastructure and enhance competitiveness. Central Europe is an obvious gainer from an improvement in its infrastructure and transport connections with the major markets in the EU. It has been decided that revenue from these funds may not exceed four per cent of a country's GDP, but even as such their impact is likely to be substantial. The impact of these funds is also likely to be more substantial in CEE countries than it has been in their current receivers Ireland, Spain, Portugal and Greece. This is because the CEE countries are poorer and because their geographical position in central Europe (basically near Germany) gives them an edge over such distant countries as Greece and Portugal.

Structural funds may, however, become an obstacle to eastern enlargement if their funding is not increased from current levels. The countries that receive funding now are unlikely to wish to share in with newcomers. Meanwhile, there is little political support for increased budget funds among current EU members.

EU membership will thus both increase the competition faced by CEE manufacturing industries and increase their competitiveness. Foreign direct investment will play an important role in this process. The clustering of certain type of know-how in a particular region will have the effect of attracting further investment into sectors that use similar know-how. Declining transport costs are also likely to enhance CEE countries' comparative advantage. Rising production costs in the countries geographically closest to the EU (and which also happen to be the most likely to join the EU first) will encourage certain industries to move to those countries that have so far been shadowed by the relative success of others. Politics may affect this development significantly. Postponed reform of democratic institutions, legal system, bureaucracy and economic policies can severely hinder these otherwise favourable developments.

7 Conclusions

This study analysed trade relations between Central and Eastern European (CEE) accession countries and the European Union (EU15) in 1993-1998. During these six years, the former evolved differently as to the share of intra-industry trade (IIT) with EU countries, the similarity of their exports to the EU and intra-EU exports, and the factor intensity of the comparative advantage of their exports to the EU.

In the early 1990s, it seemed that the CEE countries would compete mainly with southern Europe (the Mediterranean EU countries) than northern Europe. By the late-1990s, however, this picture changed. Some CEE countries seem to compete mainly with northern Europe. Meanwhile some CEE countries retain the type of comparative advantage they had in the early 1990s.

The more advanced CEE countries already have intra-industry trade levels comparable to their average levels in intra-EU trade. This is especially true of the Czech Republic. This is evidence that the trade is based on increasing returns to scale in oligopolistically competing industries. However, some CEE countries' development, e.g. that of Hungary and Slovenia, has stalled in this respect after 1996. Meanwhile, the share of IIT in the trade of other countries, like Estonia, has declined. In 1993, the CEE countries as a group had their highest level of IIT in their trade with Greece and Italy, but by 1998, Austria, Germany and France had clearly passed them.

To analyse this from a slightly different perspective, we used an index that compares the similarity of the structure of two countries' exports to a third country or area. Comparing the exports of a CEE country and an EU country to EU15, the Czech Republic and Poland have continued to raise their similarity index values, while most other countries have stalled. We get the highest values for the similarity index on the EU's side for Austria, France and Italy, and on the accession countries' side for the Czech Republic, Slovenia and Hungary. Comparing the CEE countries' exports to the EU using the similarity index we distinguished four groups: 1) Central Europe (the Czech Republic, Hungary, Poland, Slovakia and Slovenia), 2) the Baltic countries (Estonia, Latvia and Lithuania), 3) Balkan countries (Bulgaria and Romania), and 4) a mixed group (Lithuania, Poland and Romania).

Combining the results from the analysis of intra-industry trade and similarities in export structures, we see first that the most advanced and wealthiest of CEE countries (the Czech Republic, Hungary, Slovenia and to a lesser

extent Slovakia and Poland) have reached levels comparable to the average in the EU, while the others (the Baltic and Balkan accession countries) lag behind. Second, we see that after 1996 this development has mostly come to a halt. However, taking CEE countries as an aggregate, the share of IIT in their trade with individual EU countries has continued to increase and this share is the highest in trade with some of the core EU countries (Germany, Austria and France).

When analysing the factor intensity (labour skills vs. capital) of CEE countries' comparative advantage in the internal market several issues emerge. First, the CEE countries' comparative advantage is based more on low-skill-intensive manufacturing sectors that that of the incumbent EU countries. Second, there has been a differentiation in the CEE countries' comparative advantage in this respect since 1993. These countries' comparative advantage has become more heterogeneous in the intensity of labour skills.

Third, the CEE countries have moved in different, in fact all possible, directions in the skills-capital space, or remained still. Hungary and Estonia have moved towards a more skill-intensive comparative advantage. Hungary has become comparable to France or Germany in this respect, while Estonia is similar to Austria or Greece. The comparative advantage of Spain, Italy and Portugal was less labour-skills-intensive in 1998 than that of Hungary or Estonia. Some of the CEE countries have moved towards a more capital-intensive comparative advantage (e.g. Poland, Slovenia and Slovakia), while Lithuania has moved towards a less capital-intensive comparative advantage. There are also cases where the country's comparative advantage seems to have become less skill intensive (Bulgaria, and in recent years also Slovakia). Meanwhile, Poland, Romania and Latvia have not really moved in this respect. In 1998, Romania's comparative advantage was the least capital intensive and based on very low-skilled-labour industries. Of the CEE countries, Latvia's comparative advantage was also based on very low-skilled-labour industries but it was also quite capital intensive.

The CEE countries' revealed comparative advantage has evolved very differently in 1993-1998 and there appear some clear trends in how the countries' roles have evolved in the greater European economy. In the early 1990s, it seemed that the CEE countries would compete with more southern EU countries and less with northern EU countries. For some CEE countries this is no longer the case. FDI flows have been very important in this process, and they have had a major impact on the CEE counties' foreign trade.

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Notes

[1] Financial support from Yrjö Jahnsson Foundation is gratefully acknowledged.

[2] Bulgaria, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia and Slovenia. From the EU side we calculate all results for EU15, which, however, was formed only after Austria, Finland and Sweden joined the EU in 1995.

[3] Data from 1993 and 1994 do not include Austria.

[4] Hungary's base of comparative advantage remains relatively wide, however (see Kaitila 1999).

[5] Neven, too, found that the share of IIT was high between Germany and the CEE countries

[6] In reality there are differences here. The biased similarity index is typically a little higher than the unbiased index.

[7] Neven calculated $(x_{ij}/X_{ij}) - (m_{ij}/M_{ij})$ to determine comparative advantage. His approach differs from the one here in other respects as well.

[8] More accurately from Neven's discussion paper published in CEPR discussion paper series No. 1000 in 1994.

[9] We did not have a category for the relative skills/capital factor division for all HS4 commodity groups. Consequently, in the analysis of the revealed comparative advantage of the countries we were unable to use all the commodity groups in which the country in question had a comparative advantage. The table shows the percentage share of exports with RCA included in the analysis over the skills/capital intensity of the goods production in different years.

EU country	1993	1998	CEE country	1993	1995	1997	1998
Austria	86.8	90.5	**Bulgaria**	76.5	85.0	87.1	88.2
Belgium-Luxembourg	73.9	76.4	**Czech Republic**	84.8	86.1	86.9	89.2
Denmark	73.6	75.4	**Estonia**	82.7	71.9	67.7	79.4
Finland	86.5	85.0	**Hungary**	76.4	81.9	84.4	84.0
France	74.2	77.9	**Latvia**	32.7	51.4	53.5	69.6
Germany	77.8	82.5	**Lithuania**	47.0	80.8	87.0	90.1
Greece	76.4	79.4	**Poland**	78.9	82.8	81.1	80.6
Ireland	74.3	72.4	**Romania**	92.3	94.5	95.8	96.0
Italy	85.1	86.5	**Slovakia**	83.8	89.2	91.5	94.0
Netherlands	59.1	61.4	**Slovenia**	92.4	91.9	90.7	91.1
Portugal	85.7	88.1					
Spain	80.2	82.6					
Sweden	80.3	81.2					
United Kingdom	73.8	73.6					

[10] The standard deviation for x in the EU countries in 1998 was 1.208 and for y 0.247. Consequently, when it comes to the skill intensity of comparative advantage the EU countries still form a much more heterogeneous group than the CEE countries do. In 1993 the same figures for the EU15 countries were 0.939 and 0.292 respectively, so the EU countries comparative advantage has diverged in its skill intensity but converged in its capital intensity just as has happened in the CEE countries

Appendix 1 Classification of sectors (NACE CLIO) according to factor intensities as calculated by Neven (1995)

Proxy variables for cluster analysis:
var1 = 08/11, var2 = 18/11, var3 = 18/73, var4 = 80/73
(08): Employees, including commercial and technical apprentices (men + women)
(11): Occupied people, including home workers listed on pay file
(18): Total staff spending
(73): Raw added value at factor prices
(80): Total investment

Category	t/l	w/l	w/y	i/y
1	high	high	high	high
2	high	high	high	low
3	low	low	high	low
4	low	low	low	high
5	high	high	low	high

t/l = share of white collar workers in total industry labour force
w/l = medium wage
w/y = the ratio of all labour costs to value added
i/y = the ratio of fixed investment to value added

Factor intensities in Germany (Neven 1995)

Category	t/l	w/l	w/y	i/y
1	0.489	0.032	0.774	0.146
2	0.355	0.026	0.796	0.134
3	0.223	0.023	0.857	0.080
4	0.240	0.023	0.751	0.147
5	0.379	0.028	0.643	0.210

Category 1

2500 Chemical industry
2510 Manufacture of basic industrial chemicals
2550 Manufacture of paint, varnish and printing ink
2560 Manufacture of other chemical products, mainly for industrial and agricultural purposes
2570 Manufacture of pharmaceutical products
2580 Manufacture of soap, synthetic detergents, perfume and toilet preparations
2590 Manufacture of other chemical products, chiefly for household and office use
2601 Chemical and man-made fibres
3300 Manufacture of office machinery and data processing machinery
3440 Manufacture of telecommunications equipment, electrical and electronic measuring and recording equipment and electro-medical equipment
3450 Manufacture of radio and television receiving sets, sound reproducing and recording equipment and of electronic equipment and apparatus, manufac ture of gramophone records and pre-recorded magnetic tapes
3640 Aerospace equipment manufacturing and repairing

Category 2

2430 Manufacture of concrete, cement of plaster products for construc-tional purposes
2460 Production of grindstones and other abrasive products
3200 Mechanical engineering
3220 Manufacture of machine tools for working metal, and of other tools and equipment for use with machines
3230 Manufacture of textile machinery and accessories; manufacture of sewing machines
3240 Manufacture of machinery for the food, chemical and related indus tries
3250 Manufacture of plants for mines, the iron and steel industry and foun dries, civil engineering and the building trade; manufacture of me chanical handling equipment
3270 Manufacture of other machinery and equipment for use in specific branches of industry

3280 Manufacture of other machinery and equipment
3400 Electrical engineering
3420 Manufacture of electrical machinery
3460 Manufacture of domestic type electrical appliances
3480 Assembly and installation of electrical equipment
3600 Manufacture of other means of transport
3700 Instrument engineering
3710 Manufacture of measuring, checking and precision instruments and apparatus
3720 Manufacture of medical and surgical equipment and orthopaedic appliances
3730 Manufacture of optical instruments and photographic equipment
4110 Manufacture of vegetable and animal oils and fats
4150 Processing and preserving of fish and other seafood fit for human consumption
4170 Manufacture of spaghetti, macaroni etc.
4190 Manufacture of bread and flour confectionery
4290 Manufacture of tobacco products
4380 Manufacture of carpets, linoleum and other floor coverings, including

Category 3

2220 Manufacture of steel tubes
2480 Manufacture of ceramic goods
3110 Foundries
3140 Manufacture of structural metal products
3150 Boilermaking, manufacture of reservoirs, tanks and other sheet-metal containers
3210 Manufacture of agricultural machinery and tractors
3520 Manufacture of bodies for motor vehicles and of motor-drawn trailers and caravan
3610 Shipbuilding
3620 Manufacture of standard and narrow-gauge railway and tramway rolling stock
3740 Manufacture of clocks and watches and parts thereof
4350 Jute industry
4360 Knitting industry
4400 Leather and leather goods industry
4420 Manufacture of products from leather and leather substitutes

4500 Footwear and clothing industry
4510 Manufacture of mass-produced industry
4530 Manufacture of ready-made clothing and accessories
4560 Manufacture of furs and of fur goods
4630 Manufacture of carpentry and of joinery components and of parquet
4670 Manufacture of wooden furniture
4920 Manufacture of musical instruments
5000 Building and civil engineering
5010 Construction of flats, office blocks, hospitals and other buildings, both residential and non-residential
5020 Civil engineering, construction of road, bridges, railway
5030 Installation
5040 Building completion work
5100 Building and civil engineering without specialisation

Category 4

2200 Production and preliminary processing of metals
2210 Iron and steel industry excluding integrated coke ovens
2230 Drawing, cold rolling and cold folding of steel
2240 Production and preliminary processing of non-ferrous metals
2400 Manufacture of non-metallic mineral products
2410 Manufacture of clay products for constructional purposes
2440 Manufacture of articles of asbestos
2450 Working of stone and of non-metallic mineral products
2470 Manufacture of glass and glassware
3100 Manufacture of metal articles (except for mechanical, electrical and instru ment engineering and vehicles)
3120 Forging, closed-died forging, pressing and stamping
3130 Secondary transformation, treatment and coating of metals
3160 Manufacture of tools and finished metal goods, except electrical equipment
3190 Other mechanical workshops not elsewhere specified
3260 Manufacture of transmission equipment for motive power
3470 Manufacture of electric lamps and other electric lightning equipment
3500 Manufacture of motor vehicles and of motor vehicles parts and accessories
3510 Manufacture and assembly of motor vehicles, manufacture of motor vehicle engines
3530 Manufacture of parts and accessories for motor vehicles
3630 Manufacture of cycles and motorcycles and parts and accessories thereof

3650 Manufacture of transport equipment not elsewhere specified
4120 Slaughtering, preparing and preserving of meat
4210 Manufacture of cocoa, chocolate and sugar confection
4300 Textile industry
4320 Cotton industry
4330 Silk industry
4370 Textile finishing
4390 Miscellaneous textile industries
4410 Tanning and dressing of leather
4550 Manufacture of household textiles other make-up textile goods
4600 Timber and wooden furniture industries
4610 Sawing and processing of wood
4620 Manufacture of semi-finished wood products
4640 Manufacture of wooden containers
4650 Other wood manufacture
4660 Manufacture of articles of cork and articles of straw and other plant materials, manufacture of brushes and brooms
4720 Processing of paper and boards
4730 Printing and allied industries
4800 Processing of rubber and plastics
4810 Manufacture of rubber products
4830 Processing of plastics
4900 Other manufacturing industries
4910 Manufacture of articles of jewelry and goldsmiths' and silversmiths' wares
4940 Manufacture of toys and sports goods
4950 Miscellaneous manufacturing industries

Category 5

2300 Extraction of minerals other than ferrous metals and energy-producing minerals; peat extraction
2420 Manufacture of cement, lime and plaster
4100 Food, drink and tobacco industry
4130 Manufacture of dairy products
4140 Processing and preserving of fruits and vegetables
4160 Grain milling
4180 Manufacture of starch and starch products
4200 Sugar manufacturing and refining
4220 Manufacture of animal and poultry food

4230 Manufacture of other food products
4240 Distilling of ethyl alcohol from fermented materials; spirit distilling and compounding
4250 Manufacture of wine of fresh grapes and of beverages based thereon
4270 Brewing and malting
4280 Manufacture of soft drinks, including the bottling of natural spa water
4700 Manufacture of paper and paper products; printing and publishing
4710 Manufacture of pulp, paper and board

Appendix 2 Product groups in CEE countries' exports to the EU in 1998 in which the countries had a revealed comparative advantage and whose share in total exports to the EU exceeded 2 per cent. Also find the share of this product group in total exports to the EU in 1993. An asterisk (*) shows that the country did not have a comparative advantage in these products in 1993.

CEE country	HS4	Description	Category	Share 1998	Share 1993
Bulgaria	6204	Women's/girls' suits, jackets, dresses etc.	3	5.3	3.2
	6203	Men's or boys' suits, jackets, trousers etc.	3	3.4	1.8
	6110	Jerseys, pullovers, etc, knitted or crocheted	3	2.5	2.0
	6206	Women's or girls' blouses, shirts etc.	3	2.1	2.1
	7208	Flat-rolled products of iron or non-alloy steel	4	10.3	0.9
	7402	Unrefined copper; copper anodes	4	5.3	2.6
	2204	Wine of fresh grapes	5	3.2	5.1
Czech Republic	8544	Insulated wire/cable and electric conductors	2	2.4	1.0
	8703	Motor vehicles for transporting persons	4	10.1	4.1*
	8708	Parts and accessories of motor vehicles	4	4.9	1.0*
	9401	Seats and parts for aircraft seats, car seats	4	2.5	1.4
	8536	Electrical apparatus for electrical circuits	N/A	2.1	0.8
Estonia	8525	Transmission apparatus for radio-telephony etc.	1	8.3	0.0*
	9403	Other furniture and parts thereof	3	3.7	2.2
	4403	Wood in the rough	4	8.2	6.2
	4407	Wood sawn/chipped	4	5.3	1.9
	7204	Ferrous waste and scrap	4	2.7	2.9
	2710	Oil (not crude) from petroleum etc.	N/A	8.7	8.4
	8473	Parts and accessories for offices machines	N/A	3.3	0.0*
Hungary	8471	Automatic data processing machines	1	8.1	0.5*
	8521	Video recording or reproducing apparatus	1	3.3	0.0*
	8544	Insulated wire, cable electric conductors	2	3.4	3.0
	8407	Piston engines	4	12.7	1.5
	8473	Parts for office machines and typewriters	N/A	2.6	0.2*
	8528	Television receivers (incl. videos)	N/A	2.2	0.1*

Latvia	6204	Women's/girls' suits, jackets, dresses etc.	3	3.1	1.1
	9403	Other furniture and parts thereof	3	2.3	0.5*
	4407	Wood sawn/chipped	4	21.2	3.6
	4403	Wood in the rough	4	11.3	3.2
	2710	Oil (not crude) from petroleum etc.	N/A	12.7	44.5
	2709	Crude oil from petroleum etc.	N/A	5.9	13.7
	4412	Plywood, veneered panels etc.	N/A	3.9	1.6
Lithuania	3102	Mineral or chemical fertilisers, nitrogenous	1	6.8	5.2
	3105	Mineral or chemical fertilisers, other	1	3.8	1.3
	8544	Insulated wire, cable, etc.; optic fibre cable	2	4.4	0.3*
	6204	Women's/girls' suits, jackets, dresses, etc.	3	7.4	1.5
	6203	Men's or boys' suits, jackets, trousers etc.	3	5.3	1.7
	6206	Women's or girls' blouses, shirts etc.	3	2.3	0.7
	9403	Other furniture and parts thereof	3	2.1	1.1
	4407	Wood sawn/chipped	4	6.5	1.0
	7112	Waste and scrap of precious metal	4	3.9	0.5
	7204	Ferrous waste and scrap	4	2.1	2.5
	2710	Oil (not crude) from petroleum etc.	N/A	4.6	44.8
Poland	6204	Women's/girls' suits, jackets, dresses etc.	3	3.8	4.1
	9403	Other furniture and parts thereof	3	3.6	3.2
	9401	Seats and parts for aircraft seats, car seats	4	4.4	2.7
	2701	Coal; briquettes etc. from coal	N/A	4.1	7.4
	8528	Television receivers (including videos)	N/A	2.8	0.0*
Romania	8544	Insulated wire, cable etc.; optic fibre cable	2	2.2	0.6
	6204	Women's/girls' suits, jackets, dresses etc.	3	9.3	6.9
	6203	Men's or boys' suits, jackets, trousers etc.	3	8.1	8.1
	6403	Footwear, uppers of leather	3	5.2	3.8
	9403	Other furniture and parts thereof	3	4.9	9.7
	6406	Parts of footwear	3	4.4	4.0
	6110	Jerseys, pullovers etc, knitted or crocheted	3	3.4	3.2
	6202	Women's or girls' coats, not knitted or crocheted	3	2.5	4.3
	6206	Women's or girls' blouses, shirts etc.	3	2.5	1.9
	6201	Men's or boys' coats, not knitted or crocheted	3	2.4	3.6
	6205	Men's or boys' shirts	3	2.4	2.8
	7208	Flat-rolled products of iron or non-alloy steel	4	4.6	2.4
	7601	Unwrought aluminium	4	2.9	0.3
Slovakia	8544	Insulated wire, cable etc.; optic fibre cable	2	5.0	1.3
	6203	Men's or boys' suits, jackets, trousers etc.	3	2.7	4.3
	8703	Motor vehicles for transporting persons	4	26.7	1.6*
	8708	Parts and accessories of motor vehicles	4	4.2	0.4*
	7601	Unwrought aluminium	4	2.3	0.2*
	7208	Flat-rolled products of iron or non-alloy steel	4	2.3	3.9
Slovenia	8516	Electric heating/drying water, space, hair etc.	2	2.1	2.1
	6204	Women's/girls' suits, jackets, dresses etc.	3	2.7	4.1
	9403	Other furniture and parts thereof	3	2.1	2.5
	8703	Motor vehicles for transporting persons	4	13.3	6.9*
	9401	Seats and parts for aircraft seats, car seats	4	5.6	2.6