ETLA **ELINKEINOELÄMÄN TUTKIMUSLAITOS**
THE RESEARCH INSTITUTE OF THE FINNISH ECONOMY
Lönnrotinkatu 4 B 00120 Helsinki Finland Tel. 358-9-609 900
Telefax 358-9-601 753 World Wide Web: http://www.etla.fi/

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Ville Kaitila* - Mika Widgrén**

REVEALED COMPARATIVE ADVANTAGE IN TRADE BETWEEN THE EUROPEAN UNION AND THE BALTIC COUNTRIES***

* The Research Institute of the Finnish Economy, ETLA
** Yrjö Jahnsson Foundation, Helsinki
Centre for Economic Policy Research, London

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TIIVISTELMÄ: Tutkimus tarkastelee Viron, Latvian ja Liettuan ulkomaankauppaa Euroopan unionin kanssa vuonna 1996. Baltian maiden ja EU:n väliset vapaakauppasopimukset olivat astuneet voimaan vuonna 1995. Tutkimuksessa käytetään Eurostatin Combined Nomenclature kauppatilastoja 4-numerotasolla. Ensimmäisessä vaiheessa kuvataan Baltian maiden ja EU:n välistä tavarakauppaa, sen rakennetta ja kehitystä 1990-luvulla. Samalla tehdään tarkastelu ristikkäiskaupan laajuudesta sekä sen horisontaalisesta ja vertikaalisesta komponentista. Toisessa vaiheessa tarkastellaan Baltian maiden ja Euroopan unionin välisen kaupan paljastettua suhteellista etua. Tätä varten lasketaan Baltian maiden EU-viennille nk. similariteetti-indeksi ja sen jälkeen paljastetun suhteellisen edun Balassa-indeksi. Näillä menetelmillä tullaan siihen johtopäätökseen, että Baltian maat kilpailevat EU-markkinoilla samoilla tuotteilla, mutta että niiden kauppa on maantieteellisesti suuntautunut eri kansallisille markkinoille Euroopan unionissa. Viron ulkomaankaupassa korostuvat Suomi ja Ruotsi, kun taas Latvia ja Liettua ovat suuntautuneet enemmän Saksan ja muun Länsi-Euroopan markkinoille. Tästä huolimatta Baltian maiden eriaikainen jäsenyys Euroopan unionissa suosisi sitä tai niitä maita, jotka liittyvät EU:hun ensimmäisinä.

ABSTRACT: The report analyses the foreign trade of Estonia, Latvia and Lithuania with the European Union in 1996. Free-trade relations between the Baltic countries and the EU had been established in 1995. The study uses Eurostat's Combined Nomenclature trade data at the 4-digit level. First, the structure and development of goods trade between the Baltic countries and the EU is discussed. Also an analysis of intra-industry trade including its horizontal and vertical components is included. Second, revealed comparative advantage in trade between the Baltic countries and the EU is analysed. So-called similarity indices for the Baltic countries' exports to the EU and Balassa indices of revealed comparative advantage are calculated. Using these methods it is concluded that the Baltic countries compete against each other in the EU market, but that their trade is geographically dispersed. The role of Finland and Sweden is emphasised in the EU trade of Estonia, while Latvia and Lithuania are more oriented towards the German and other West-European market. Regardless, a two-wave accession of the Baltic countries would favour that or those countries that enter the EU in the first wave.

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1 Introduction

After Estonia, Latvia and Lithuania regained their independence in 1991, they have had to reorient their previously Moscow-led trade that almost entirely took place with the rest of the ex-Soviet Union. Due to its geographic proximity and economic size, the European Union is the most obvious trading partner for the Baltic countries.

Indeed, by 1997 48 per cent of Estonia's exports went into the European Union.[1] The corresponding figure for Latvia was 49 and for Lithuania 33 per cent. Of Estonia's imports 55 per cent came from the EU, while for Latvia this figure was 53 and for Lithuania 46 per cent. Judging by the trade figures, Lithuania seemed to be economically less integrated into Western Europe than either Estonia or Latvia as the aggregate share of Russia, Belarus, Ukraine and Latvia in its exports was 52 per cent. This paper does not deal with the Baltic countries' trade with other transition countries, however, but analyses the trade between the Baltic countries and the European Union.

A concise history of the Baltic countries' reintegration into the Western European economy starts at the official level in 1992 and 1993 with the signing of free trade agreements with the then non-EU members Finland and Sweden. After this, free trade agreements between the EU and the Baltic countries came into force in 1995. These agreements decreased the trade barriers and helped to increase trade. Further trade liberalisation has taken place since then. In early 1998, the bilateral Europe Agreements between the European Union and each Baltic country came into force. After these agreements, there still remain quotas and other regulations for the trade in processed agricultural goods and fish. Also the EU's rules of origin regulations restrict trade in textiles and clothing as the Baltic countries have to import the fibres used in the production of these goods.

The *hub-and-spoke* nature of the Europe Agreements diverts trade. As bilateral agreements, they encourage trade between the hub (the EU) and each spoke (Estonia, Latvia and Lithuania) separately. They therefore discourage trade between the Baltic countries and non-EU countries such as Russia. As a counterweight to this, the Baltic countries have signed free trade agreements with each other covering not only industrial products but also agricultural goods. All Baltic countries have also signed bilateral free trade agreements with other countries in Central and Eastern Europe.

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[1] In reality, some of Estonian exports to the EU are exports to Russia. As the tariffs between Estonia and Russia are higher than between the EU and Russia, this is a way to cut costs.

It is important to note the effects of the remaining obstacles to trade, especially those for processed agricultural products. Only four per cent of all Baltic exports to the EU in 1997 were live animals, plants, food products, beverages, tobacco etc, while the food processing industry alone accounted for 30 per cent of industrial production in Estonia, 43 per cent in Latvia and 27 per cent in Lithuania. Even though these goods are partly produced for the domestic markets, exports to other transition countries are significant. Currently the Baltic countries do not show a revealed comparative advantage in these goods in the EU market and, before trade is liberalised, it is difficult to say whether such advantage potentially exists or not. Meanwhile, the Russian economic crisis that began in mid-1998 is driving parts of the Baltic food industry into bankruptcy. Consequently, the Baltic countries' potential comparative advantage in the EU market is likely to suffer.

Estonia was included as the only Baltic country in the group of six candidate countries to begin actual negotiations for EU membership in early 1998. Latvia and Lithuania were at the time left in the second wave of eastern enlargement. This division is not carved in stone however, as, depending on the success of the political, economic and social restructuring of the candidate countries on the basis of, among other things, the *acquis communautaire*, the accession process may advance at different speeds. That Estonia was included in the first wave reflected its advance at the time that division was made. Since then both Latvia and Lithuania, but especially the former, have made progress, and thus the order and timing of the Baltic countries' accession into the European Union is by no means certain.

The analysis is done using Eurostat trade data at the four-digit level of the Combined Nomenclature (CN) for 1993 and 1996. Between these two years Finland, Sweden and Austria became members of the EU. For these three countries data at the four-digit level was not available for 1993. Even so, we are able to construct a systematic analysis of the trade between the European Union and the Baltic countries for these two years, and these countries' revealed comparative advantage in the EU markets and vice versa for 1996.

The study consists of three parts. First, a description of trade between the EU and the Baltic countries is made. This part includes calculations for intra-industry trade (IIT) also making a distinction between horizontal and vertical IIT. Second, an analysis of the comparative advantage in trade is constructed. This part is based on Balassa indices and similarity indices. And third, we will take a look at what clues the evolution of the trade gives as to the future of trade and the countries' comparative advantage taking into consideration the possibility of a two-phase-accession of the Baltic countries into the European Union.

2 Trade between the European Union and the Baltic Countries

Development and Structure of Trade

Total EU15 exports to the three Baltic countries accounted for 1,472 million ECUs in 1993. This had risen to 4,213 million by 1996. Total EU15 imports were 1,799 million ECUs in 1993 and 3,440 in 1996. The EU trade deficit of some 327 million in 1993 had thus become a surplus of 774 million by 1996. There remained a small deficit in EU trade with Latvia, but that too had decreased significantly by 1996, and by the next year it had turned into a surplus.[2]

Table 1 Total EU exports to the Baltic countries in 1996

	Estonia	Latvia	Lithuania	All Baltic countries
Total EU, mill. ECUs	1,660	1,103	1,451	4,213
o/w from, %				
France	2.1	3.5	5.3	3.6
Belgium-Luxembourg	2.0	4.3	4.1	3.3
Netherlands	3.8	7.7	6.3	5.7
Germany	14.1	29.1	38.6	26.5
Italy	3.7	5.7	8.4	5.9
United Kingdom	3.8	8.3	6.6	5.9
Ireland	0.6	1.0	0.9	0.8
Denmark	3.7	6.3	8.6	6.1
Greece	0.1	0.4	0.3	0.2
Portugal	0.1	0.1	0.3	0.2
Spain	0.6	1.0	2.5	1.3
Sweden	12.0	14.8	7.9	11.3
Finland	52.7	16.8	8.5	28.1
Austria	0.6	1.2	1.7	1.1
Total EU	100.0	100.0	100.0	100.0

In 1996 the largest EU exporter to the Baltic countries was Finland, which accounted for 28 per cent of total EU exports, followed closely by Germany with a share of 27 per cent. The two thus accounted for some 55 per cent of all EU exports to the Baltic countries. This shows how concentrated trade between the EU and the Baltic countries is. The share of Finland, Germany, Sweden and Denmark in all EU exports to Estonia, Latvia and Lithuania was 83, 67 and 64 per cent, respectively.

EU imports from the Baltic countries look somewhat different, however. The largest importer was Germany with a 23 per cent share of all EU imports, but it was followed by the

[2] Trade potential between the EU countries and the Baltic countries has been analysed in Erkkilä and Widgrén (1995), Kaitila and Widgrén (1998) and Baldwin (1994). In this paper, we do not analyse trade potential but merely the structure of trade.

UK and the Netherlands, both accounting for just under 17 per cent of all imports. Finland's share becomes almost negligible for both Latvia and Lithuania as does Sweden's for the latter.

Table 2 Total EU imports from the Baltic countries in 1996

	Estonia	Latvia	Lithuania	All Baltic countries
Total EU, mill. ECUs	1,125	1,181	1,133	3,440
o/w to, %				
France	3.2	4.5	5.6	4.5
Belgium-Luxembourg	3.2	3.5	7.3	4.7
Netherlands	12.1	27.9	8.2	16.2
Germany	14.2	21.1	33.5	22.9
Italy	1.7	1.2	5.4	2.8
United Kingdom	12.1	20.1	18.0	16.8
Ireland	0.2	1.3	0.5	0.7
Denmark	5.2	4.9	7.3	5.8
Greece	0.1	0.1	0.2	0.1
Portugal	0.3	0.6	1.6	0.8
Spain	0.3	0.8	3.8	1.6
Sweden	20.5	11.5	4.9	12.3
Finland	26.5	2.4	2.3	10.3
Austria	0.3	0.2	1.4	0.6
Total EU	100.0	100.0	100.0	100.0

The main products in aggregate EU exports to the Baltic countries are fairly similar regardless of the importing nation. The most important product groups are machinery, equipment and vehicles, and mineral fuels. Other important goods are plastics and paper products.

Table 3 Main EU export and import products in trade with Estonia (CN2) in 1996, millions of ECUs and % share of total trade

CN	EU Exports	Value	%	CN	EU Imports	Value	%
85	Electrical machinery and equipment etc.	225	13.5	27	Mineral fuels and oils	208	18.5
84	Nuclear reactors, boilers, machinery etc.	201	12.1	44	Wood and articles of wood	195	17.3
87	Vehicles, other than railway or tramway	134	8.1	62	Clothing accessories, not knitted or crocheted	99	8.8
27	Mineral fuels and oils	115	6.9	85	Electrical machinery and equipment etc.	79	7.0
39	Plastics and articles thereof	69	4.2	84	Nuclear reactors, boilers, machinery etc.	77	6.8
48	Paper and paperboard	54	3.2	94	Furniture, bedding etc.	64	5.7
73	Articles of iron and steel	52	3.1	72	Iron and steel, mainly scrap	48	4.3

The EU countries' imports from the Baltic countries are slightly less homogenous. The main import products from Estonia were mineral fuels and oils, largely transit trade from Russia, and wood and wood products. Furthermore non-knitted clothing is fairly important. What differs especially from Latvia but also from Lithuania is the importance of machinery in

EU imports from Estonia. These products also contribute to the relatively larger share of intra-industry trade between Estonia and the EU.

EU imports from Latvia are dominated by mineral fuels and oils, again transit trade from Russia. The variety of Latvia's own exports is fairly limited and dominated by wood and articles of wood. In 1997 the share of oil in Latvia's exports had decreased to less than 30 per cent and wood and articles of wood had risen correspondingly. This was due to the decrease in world market prices of oil. The trend may have continued during 1998 for the same reason. Clothing is the next most important export product in Latvia's exports to the EU.

Table 4 Main EU export and import products in trade with Latvia (CN2) in 1996, millions of ECUs and % share of total trade

CN	EU Exports	Value	%	CN	EU Imports	Value	%
84	Nuclear reactors, boilers, machinery etc.	120	11.4	27	Mineral fuels and oils	502	42.5
27	Mineral fuels and oils	90	8.5	44	Wood and articles of wood	308	26.1
87	Vehicles, other than railway or tramway	84	8.0	62	Clothing accessories, not knitted or crocheted	71	6.0
85	Electrical machinery and equipment etc.	82	7.7	72	Iron and steel, mainly scrap	35	2.9
22	Beverages, spirits and vinegar	53	5.0	61	Clothing accessories, knitted or crocheted	32	2.7
48	Paper and paperboard	48	4.5	74	Copper, mainly scrap	31	2.6
39	Plastics and articles thereof	32	3.0	52	Cotton	29	2.4

Lithuania's main export product is clothing, a fifth of all its exports to the EU, but again also wood and mineral fuels are important.

Table 5 Main EU export and import products in trade with Lithuania (CN2) in 1996, millions of ECUs and % share of total trade

CN	EU Exports	Value	%	CN	EU Imports	Value	%
84	Nuclear reactors, boilers, machinery etc.	199	14.0	62	Clothing accessories, not knitted or crocheted	163	14.4
85	Electrical machinery and equipment etc.	130	9.2	44	Wood and articles of wood	150	13.2
87	Vehicles, other than railway or tramway	130	9.1	27	Mineral fuels and oils	140	12.4
39	Plastics and articles thereof	79	5.5	31	Fertilisers	129	11.4
99	Other	53	3.7	85	Electrical machinery and equipment etc.	74	6.6
90	Optical etc. instruments and apparatus	43	3.0	61	Clothing accessories, knitted or crocheted	54	4.8
43	Fur skins and artificial fur and articles thereof	41	2.9	72	Iron and steel, mainly scrap	40	3.5

Table 6 shows estimates for the maximum significance of transit exports for Baltic countries. Possible arbitrage goods cover 34 per cent of Estonia's exports, 51 per cent of Lat-

via's exports and 37 per cent of Lithuania's exports. Out of these the share of oil was 55, 82 and 25 per cent, respectively. The overall significance of transit exports decreased substantially between 1992 and 1994 but the decline seems to have stabilised thereafter. In 1996, transit exports still covered 40 per cent of Baltic countries' exports to the EU. These figures are strongly affected by the fairly volatile world market price of oil. The transit trade in oil may also, under some unlikely circumstances be affected by the political conditions in and around the Baltic countries.

The absolute value of transit exports from the Baltic countries to EFTA countries was 951 million US dollars in 1992, 1,422 million in 1994 and 1,767 million in 1996. Hence the high relative shares in 1992 can be explained by a low level of the Baltic countries' exports right after regaining their independence. Comparison of 1994 and 1996 figures show that arbitrage goods have maintained their importance in Baltic countries' exports to the EU although export growth has been somewhat faster in other products than arbitrage goods.[3]

Table 6 Estimates for transit exports from Baltic countries to the EU and EFTA in 1992 and 1994 and to EU15 in 1996

	1992		1994		1996	
Country	Share of possible arbitrage goods in exports, %	Share of possible arbitrage goods in exports excluding oil, %	Share of possible arbitrage goods in exports, %	Share of possible arbitrage goods in exports excluding oil, %	Share of possible arbitrage goods in exports, %	Share of possible arbitrage goods in exports excluding oil, %
Estonia	44.9	39.2	21.7	16.6	33.7	15.3
Latvia	70.5	14.8	57.8	7.2	51.2	9.1
Lithuania	68.5	28.7	47.3	15.1	37.3	27.9
Baltic countries total	63.6	26.4	45.3	12.2	40.9	16.3

Source: 1992 and 1994 Hoekman & Djankov (1996) and 1996 own calculations. In 1992 and 1994 transit exports consist of the following 2-digit SITC items: non-metallic minerals and metals, crude fertilisers and metalliferrous ores and scrap (27-28), petroleum and products (33), non-metallic mineral products (66), non-ferrous metals (68), transport equipment (78-79), and gold (97). Estimates for 1996 consists of the following 2-digit CN items: earths and stone etc. (CN25), ores etc. (CN26), mineral fuels, oils, etc. (CN27), inorganic chemicals and compounds etc. (CN28), organic chemicals (CN29), pharmaceutical products (CN30), fertilisers (CN31), natural pearls, precious stones and metals (CN71), iron and steel (CN72), articles of iron and steel (CN73), copper and articles thereof (CN74), nickel and articles thereof (CN75), aluminium and articles thereof (CN76), lead and articles thereof (CN78), zinc and articles thereof (CN79), tin and articles thereof (CN80), other base metals and articles thereof (CN81), railway rolling stock (CN86), automobiles and bicycles (CN87), aircraft and parts thereof (CN88), and ships and boats (CN89).

[3] Note that Switzerland, Liechtenstein, Norway and Iceland are included in the 1994 but not in the 1996 figures.

Figure 1 shows the share of transit exports from each Baltic country to each EU country. There are substantial differences between the latter. In Baltic countries' exports to the EU the share of transit trade exceeds 50 per cent in exports to France, Belgium, the Netherlands, the UK, Greece and Spain. These countries account for 44 per cent of EU imports from Baltic countries. If we take the Baltic countries' five most important EU export markets, Germany, the Netherlands, the UK, Finland and Sweden, there are substantial differences as exports to the Netherlands and the UK are almost solely based on transit trade, whereas arbitrage goods have only a negligible importance in exports to Finland and Sweden.

Figure 2 gives a more detailed picture of the Baltic countries' transit exports to the EU. It shows the estimated shares of potential arbitrage goods for each Baltic country in their exports to each EU country in 1996.

Figure 1 Estimates for shares of transit trade in Baltic countries' exports to EU countries in 1996

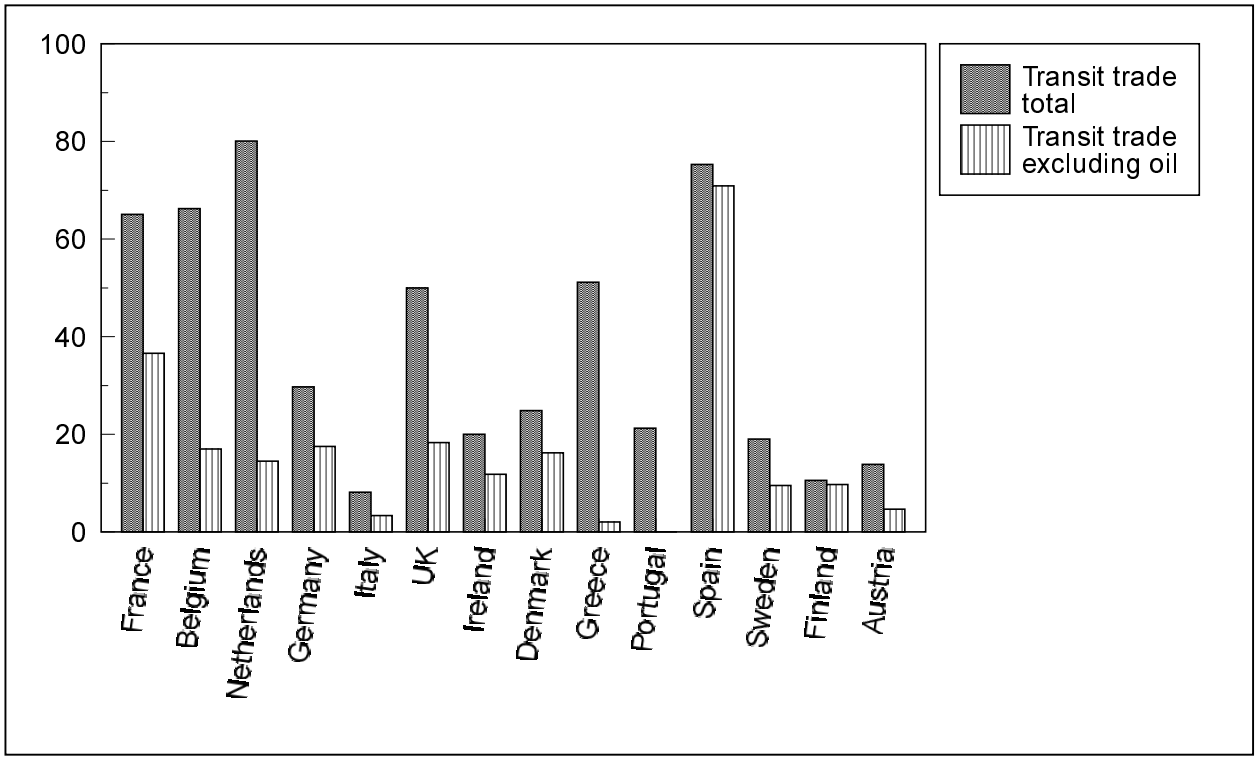
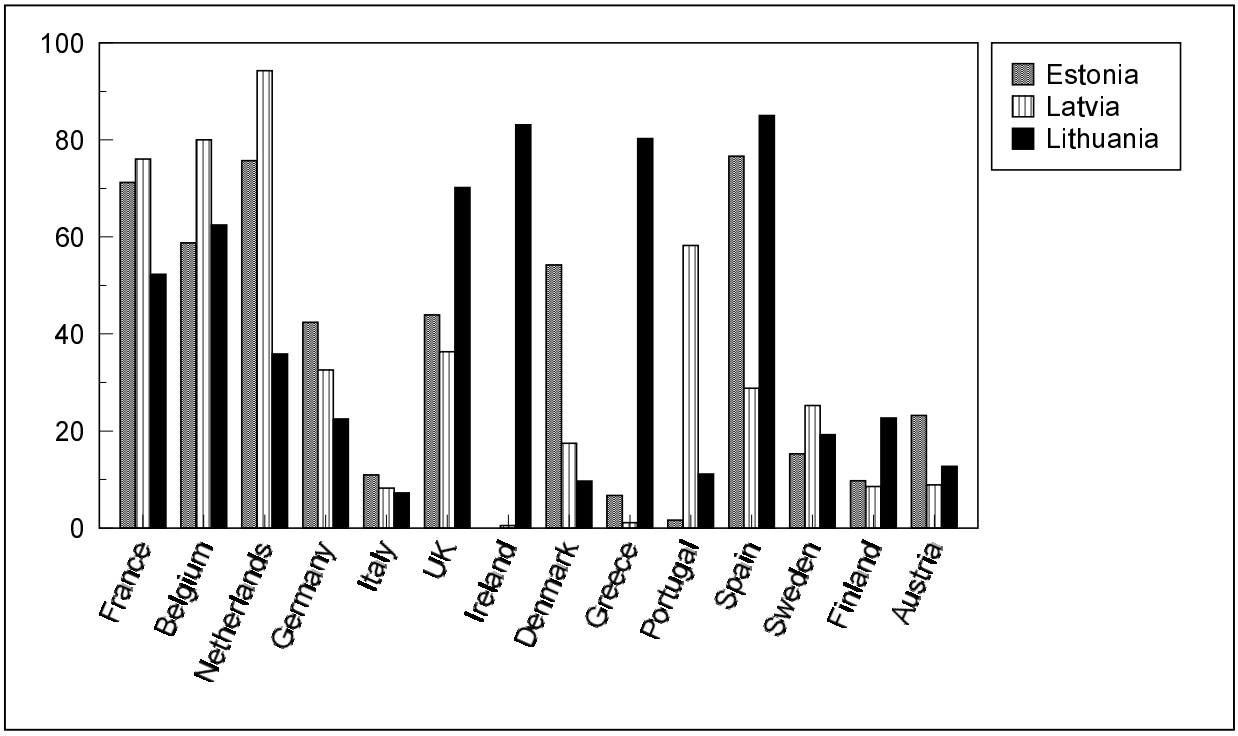


Figure 2 **Estimates for Baltic countries' transit exports to EU countries, share of total exports, %, in 1996**



Intra-Industry Trade

The share of intra-industry trade (IIT) is usually high between developed industrialised countries and fairly low between countries that are at different stages of economic development. IIT has indeed been lower in trade between European countries in transition and the EU than in intra-EU trade. But as the countries of Central and Eastern Europe have been narrowing down the difference in economic structures and income levels, also the share of IIT in total trade has been rising. Previous research shows that most of this IIT is, however, vertical and not horizontal in character (see e.g. Aturupane *et al.* 1997). This means that even though the countries are engaged in the exports and imports of goods that are classified in the same product group, the goods are of dissimilar quality. We shall first look at overall IIT levels and then proceed to the question of the quality of the goods.

The extent of intra-industry trade is calculated using the Grubel-Lloyd 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 these two countries. If the index takes value 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

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

Table 7 summarises the results for IIT in EU-Baltic trade with intra-EU trade as a comparison. We may note a few points. First, the overall level of intra-industry trade between the EU and the Baltic countries is fairly low. Second, it has been increasing fairly rapidly. To some extent this may be credited to the Finnish and Swedish EU membership in 1995, even though also the other EU countries have increased their IIT levels. In trade with the Baltic countries in aggregate, all EU countries, save Greece, have seen their IIT levels rise at the CN4 level. For individual Baltic countries there are some further exceptions to this general rule, but typically between countries that do not trade a lot with each other. Third, the EU countries geographically close to the Baltic countries, i.e. Finland, Sweden and Denmark exhibit by far the highest levels of IIT. The countries farther away from the Baltic Sea have both lower levels of aggregate trade and lower levels of IIT. This also corresponds with the usual observation that country-specific factors explain IIT. The Baltic countries' income levels are so different from those in the EU that geographic proximity remains the only explanatory country-specific factor behind the levels of IIT. Compared to intra-EU levels the shares of IIT are, in general, very low in the Baltic countries' trade with the EU.

Table 7 Grubel-Lloyd indices of intra-industry trade between the EU and the Baltic countries, and in intra-EU trade (CN4)

Country	Baltic countries		Estonia		Latvia		Lithuania		Intra-EU
	1993	1996	1993	1996	1993	1996	1993	1996	1996
France	1.4	5.6	2.2	6.9	0.6	4.3	1.0	6.5	74.3
Belgium-Luxembourg	6.6	10.4	1.1	3.1	1.7	18.1	3.9	5.9	67.9
Netherlands	3.2	5.0	6.7	4.3	1.1	3.4	2.8	10.0	61.5
Germany	10.2	13.1	6.9	12.1	7.0	16.0	8.1	14.9	70.0
Italy	7.0	8.0	2.7	7.2	8.4	9.9	4.8	4.0	52.9
United Kingdom	4.3	5.9	2.5	3.5	2.1	6.4	2.9	4.0	66.9
Ireland	0.0	0.7	0.0	0.7	0.0	0.5	0.0	0.3	39.4
Denmark	14.7	23.0	13.7	20.3	8.0	15.7	15.9	22.7	52.2
Greece	3.2	1.0	0.0	0.0	4.7	0.0	3.0	0.2	19.3
Portugal	0.1	4.7	0.4	1.9	0.0	0.0	0.0	5.1	41.4
Spain	0.2	2.1	0.0	1.7	1.3	3.5	0.1	1.5	59.5
Sweden	..	22.0	..	25.6	..	11.4	..	8.6	55.2
Finland	..	25.1	..	28.7	..	7.4	..	9.7	38.9
Austria	..	5.2	..	5.0	..	3.4	..	6.0	58.3
Total EU	11.1	25.6	11.9	34.8	8.3	19.3	8.4	16.9	..

At the individual Baltic country level the picture is, of course, mostly similar to that in the aggregate. Estonia leads in the extent of IIT, which is mostly due to its trade with Finland and Sweden. Indeed, as much as over a third of Estonia's trade with the EU is based on IIT at the four-digit level.

Latvia's highest shares of IIT are in its trade with Germany, Denmark and Sweden. For Lithuania, the highest levels of intra-industry trade are with Denmark and Germany. In all trade with the EU, however, Lithuania comes in last as IIT covers only some 17 per cent of its trade. For each Baltic country IIT is highly concentrated on their trade with their most important trading partners.

Tables 8-10 list those CN4-products where an EU country and one of the Baltic countries have more than 3 million ECUs worth of exports and imports, while the share of intra-industry trade exceeds 80 per cent. This will reveal the products that are both important for a Baltic country and where IIT is prevailing. It is worthwhile noting the most extensive IIT in ECU terms especially where it takes place in mechanical equipment. At the CN4 level there is extensive IIT between Estonia and Finland in wires, cables and electric conductors, but also in sound and video recording equipment. Finnish companies have a lot of subcontracting in Estonia which is reflected in these figures. Such IIT also exists between Germany and Latvia in electric transformers, static converters and inductors. Between Lithuania and the EU such trade did not exist in 1996. There the large IIT products were in alimentation and textiles.

Table 8 The CN4 product groups with more than 3,000,000 ECUs worth of total trade between an EU country and Estonia and more than 80 % of intra-industry trade in 1996

Country	CN	Products	Total trade 1000 ECUs	IIT, %
Sweden	2710	Oil (not crude) from petrol and bituminous minerals etc.	10,741	83.5
Finland	8544	Insulated wire, cable, electric conductors; optic fibre cable	24,851	97.9
	8522	Parts and accessories of sound/video recording equipment	11,575	93.5
	6403	Footwear, uppers of leather	8,700	80.9
	4407	Wood sawn or chipped length	4,321	93.2
	6110	Sweaters, pullovers etc, knitted or crocheted	4,091	86.4
	9506	Articles and equipment for sports	3,942	82.4
	8431	Parts for machinery for lifting and handling machinery	3,513	89.6
	7307	Tube or pipe fittings, of iron or steel couplings	3,171	84.3
	5209	N/A (52: Cotton)	3,159	92.4

Table 9 The CN4 product groups with more than 3,000,000 ECUs worth of total trade between an EU country and Latvia and more than 80 % of intra-industry trade in 1996

Country	CN	Products	Total trade 1000 ECUs	IIT, %
Germany	8504	Electric transformers, static converters and inductors	14,145	91.0
	6108	Women's or girls' undergarments	3,671	98.1
Italy	4104	Leather of bovine or equine	3,505	99.7
Sweden	6212	Brassieres, girdles, corsets, braces, suspenders etc.	5,998	88.1

Table 10 The CN4 product groups with more than 3,000,000 ECUs worth of total trade between an EU country and Lithuania and more than 80 % of intra-industry trade in 1996

Country	CN	Products	Total trade 1000 ECUs	IIT, %
Germany	1604	Prepared or preserved fish; caviar	4,888	88.1
	6403	Footwear, uppers of leather	4,781	95.9
	2309	Preparations used in animal feeding	3,443	93.9
UK	5208	Woven cotton fabrics	3,346	92.3

As already argued, intra-industry trade is usually high between highly industrialised countries. In some cases, however, we may get a misleading picture of the trade as a country may be exporting for example high quality electronics while at the same time importing electronics of lower quality. This results in a high level of IIT even though, due to the difference in quality, the goods are not necessarily substitutes for each other. By making the reasonable assumption that price reflects quality positively, we may analyse whether the countries are engaged in trading goods that are not only of the same type but also of (approximately) the same quality.

The unit export and import prices are calculated as the ratio of trade figures in ECUs to those in tons. There are some problems with this approach as a heavier product is not, *ceteris paribus*, necessarily of poorer quality. Also with the available trade data, an additional problem is presented by the lack of weight data (the tons) for many products thus rendering it impossible to calculate the unit prices even when there exists data for trade measured in ECUs.

As shown in table 11, the EU's aggregate unit export prices are five to six times higher than its unit import prices in trade with the Baltic countries. There are also very large differences between the countries partly due to the small trade flows. The largest figures, those above ten, are for country-pairs not engaged in extensive trade.

Table 11 The ratio of the EU's unit export and unit import prices in trade with the Baltic countries and in intra-EU trade (CN4) in 1996

	Estonia	Latvia	Lithuania	Intra-EU
France	6.78	14.00	11.47	1.00
Belgium-Luxembourg	7.20	3.47	14.89	1.50
Netherlands	5.61	4.66	5.74	0.87
Germany	7.86	8.26	5.28	1.54
Italy	3.41	2.23	3.85	1.68
United Kingdom	5.96	4.36	6.04	0.50
Ireland	21.67	1.60	9.62	4.24
Denmark	4.28	2.04	3.07	0.82
Greece	0.01	16.60	3.96	0.52
Portugal	1.07	15.71	7.44	1.10
Spain	15.13	2.44	7.40	0.87
Sweden	6.56	7.95	5.76	0.56
Finland	2.02	4.71	10.68	0.94
Austria	3.10	3.26	8.45	0.83
Total EU	4.64	5.34	6.66	1.04

But to what extent are the countries trading in goods of similar quality? To analyse this, intra-industry trade is next divided into its horizontal (HIIT) and vertical (VIIT) components. The former refers to trade in goods of similar quality and the latter to goods of dissimilar quality. We adopt here the approach taken by Greenaway *et al.* (1994) and determine HIIT as those goods where the ratio of unit export prices to unit import prices is at a par, ± 15 per cent. The ± 15 per cent should allow for the difference between f.o.b. and c.i.f. prices in trade. Due to the lack of much of the unit price data, it does not make sense to calculate HIIT for many of the EU-Baltic country pairs.

The results are given in table 12. There we may first note the last column that shows the extent of horizontal intra-industry trade in intra-EU IIT. It varies from Ireland's 12 per cent[4] to 52 per cent for Belgium-Luxembourg. The share of HIIT between the EU countries and the Baltic countries is, as was to be expected, lower than in intra-EU trade. At the aggregate level, Estonia fares better than either Latvia or Lithuania. Not only is there more IIT in trade between Estonia and the EU, also the share of horizontal IIT is clearly higher than for Latvia or Lithuania. The shares of both IIT and HIIT may be expected to rise in the future as the Baltic countries catch up with the current EU countries.

[4] It should be noted, however, that Ireland's unit export prices in its aggregate intra-EU exports are over four-fold its unit import prices, so the small share of HIIT is more to Ireland's favour than vice versa.

Table 12 Horizontal intra-industry trade in EU-Baltic trade and intra-EU trade (CN4) in 1996, % of all IIT

Country	Estonia	Latvia	Lithuania	Intra-EU
France	..	..	..	42.7
Belgium-Luxembourg	..	..	..	52.4
Netherlands	..	1.4	2.5	49.8
Germany	3.1	3.4	3.9	43.2
Italy	..	..	..	25.9
United Kingdom	..	..	..	52.3
Ireland	..	..	..	12.3
Denmark	..	..	3.6	31.3
Greece	..	..	..	20.7
Portugal	..	..	..	23.2
Spain	..	..	..	28.9
Sweden	11.3	6.6	17.5	33.3
Finland	12.1	..	..	15.1
Austria	..	..	..	18.4
Total EU	16.4	5.8	5.7	..

Horizontal intra-industry trade (HIIT) is given by the share of products whose ratio of unit export and unit import prices is ± 15 per cent off par.

Due to no simultaneous exports and imports in many product groups and lack of price data in some others, the extent of vertical and horizontal IIT is only calculated for Estonia's, Latvia's and Lithuania's main EU trading partners and the EU as a whole. But even for the countries that we can with any sense calculate the extent of HIIT, the table in the footnote[5] should be noted. The smaller the trade coverage is, the less reliable the results above are. For the EU as a whole the coverage is, however, fairly good, and also the results sufficiently reliable to draw conclusions.

The pattern of IIT may reflect the foreign direct investment (FDI) made between the countries, in this case flowing typically from the EU to the Baltic countries. The EU country in question may be using the Baltic country as a base for production partly substituting for, partly complementing domestic production. Indeed the high level of IIT in Estonia's trade with Finland and Sweden is met by the dominance of these countries in the stock of FDI in Estonia. Especially many Finnish but also Swedish companies are engaging Estonian companies in subcontracting. Other motivation for FDI is the possibility for firms to expand as the domestic EU market may already be quite mature and does not offer real growth prospects.

The largest source of FDI in Latvia has been Denmark, which also has the second-largest IIT level. Germany is the second largest EU source of FDI into Lithuania and has the

[5] **Table 12b Share of trade used to calculate the results for the Baltic countries in table 12, %. The rest of the data could not be used due to lack of unit price data**

	Estonia		Latvia		Lithuania	
	Exports	Imports	Exports	Imports	Exports	Imports
Netherlands	..	..	38	91	42	62
Germany	44	83	47	85	57	86
Denmark	..	..	..	..	41	87
Sweden	70	94	62	74	35	57
Finland	86	98	..	..	..	..
Total EU	87	99	65	99	70	97

second largest share of IIT. Even though there is thus a positive correlation between the FDI flows and the extent of IIT, one should not make too strong judgements on the basis of this evidence. The data should be disaggregated at the level of industries.

Table 13 The stocks of foreign direct investment in the Baltic countries from the EU, the United States and Russia by country of origin, % of all FDI

Country of origin	Estonia, Q2 1998	Latvia, Q4 1996	Lithuania, Q4 1997
France	0	0	2
Luxembourg	0	0	4
Netherlands	3	2	1
Germany	4	5	11
Italy	1	0	1
United Kingdom	4	7	8
Ireland	0	2	5
Denmark	5	27	6
Sweden	18	5	12
Finland	31	3	5
Austria	2	2	2
United States	6	11	26
Russia	4	14	2
Other	22	22	15

Some caution should be exercised with the FDI data also because the country that the data shows to have made the investment is not always the real country of origin. This may be the case with a joint-project by companies of two different countries. One such example is joint-Nordic investment in Baltic beverage companies.

Table 14 shows the stocks of foreign direct investment in each Baltic country. Manufacturing industry has been a major receiver of FDI in Estonia and Lithuania with wholesale and retail trade a close second. Latvia displays a somewhat different pattern as the Russian investments into transport and Nordic investment into communications were together the number one receiver of FDI into the country. Also financing has received a lot of FDI.

Table 14 The Stock of Foreign Direct Investment in Estonia 6/1998, Latvia 9/1997 and Lithuania 7/1997

Sector	Estonia	Latvia	Lithuania
Manufacturing industry	38	30	40
Wholesale, retail trade	28	8	31
Transport, storage, communication	13	36	11
Real estate, renting and business activities	8	2	1
Financing	3	17	5
Agriculture, hunting, forestry	2	0	1
Hotels, restaurants	2	2	3
Construction	2	1	4
Other	4	4	4

Sources: Bank of Estonia, and Latvian and Lithuanian Statistics authorities

3 Revealed Comparative Advantage

Next, we approach the main issue of this study, i.e. revealed comparative advantage in trade between the EU and the Baltic countries. This issue is first analysed with the help of a similarity index of trade and then using the Balassa index of revealed comparative advantage[6]. The products, where a Baltic country has a comparative advantage in its exports to the EU are usually those in which it is specialising in its exports to the EU. Consequently, these are also the products in which the Baltic countries compete with the EU countries in the EU market.

Similarity of Baltic Exports to the EU

The similarity index measures the extent to which the exports of two countries are similar. It is here calculated following Drábek and Smith (1997):

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

where X_k is the share of product k in exports from either country a or country b to country c. In table 15, countries a and b are the two Baltic countries in the first row and country c is the EU country in the first column. The index takes values from 0 to 100 as the similarity between the two Baltic countries' exports to an EU country becomes more pronounced.

[6] Originally in Balassa (1965) where he states that "Comparative advantages appear to be the outcome of a number of factors, some measurable, others not, some easily pinned down, others less so. One wonders, therefore, whether more could not be gained if, instead of enunciating general principles and trying to apply these to explain actual trade flows, one took the observed pattern of trade as a point of departure […]."

Table 15 Similarity index for the Baltic countries' exports (CN4) to the EU in 1996

EU country	Estonia vs. Latvia	Estonia vs. Lithuania	Latvia vs. Lithuania
France	22.7	22.4	8.6
Belgium-Luxembourg	31.8	40.9	51.7
Netherlands	55.2	44.6	30.1
Germany	44.7	26.9	44.5
Italy	16.4	15.5	31.1
United Kingdom	49.2	53.5	20.2
Ireland	20.8	8.0	8.0
Denmark	34.7	23.8	48.2
Greece	1.0	0.5	0.4
Portugal	13.9	0.9	11.3
Spain	8.0	6.1	27.7
Sweden	38.9	42.3	31.0
Finland	32.5	30.1	26.7
Austria	17.1	14.5	9.3
Total EU	52.0	52.1	43.7

On the basis of these results, Estonia's exports to the EU are more similar to those of Latvia or Lithuania than the exports of the two latter countries are to each other. Consequently, the accession of Estonia into the EU while Latvia and Lithuania were to be left outside to wait for their turn, could be equally harmful for the two southernmost Baltic countries as Estonia's trade barriers with the EU would then be lower than those of either Latvia or Lithuania.

When comparing the similarity of EU countries' intra-EU exports with the exports of Estonia, Latvia and Lithuania to the EU in aggregate we find in table 16 that Estonia's exports are more similar to intra-EU exports than those of Latvia or Lithuania.

Table 16 Similarity index between the Baltic countries' exports to the EU compared to intra-EU exports (CN4) in 1996

	Estonia	Latvia	Lithuania
France	19.0	10.7	13.6
Belgium-Luxembourg	21.1	13.9	16.6
Netherlands	24.8	17.2	18.5
Germany	18.7	11.2	13.9
Italy	24.3	13.8	19.2
United Kingdom	20.2	17.0	13.1
Ireland	15.8	8.0	10.6
Denmark	26.5	16.5	18.3
Greece	18.1	15.7	21.4
Portugal	25.3	16.7	25.9
Spain	17.8	10.3	15.1
Sweden	25.7	15.7	17.4
Finland	25.1	16.4	16.2
Austria	25.2	13.8	17.3
Total EU	24.1	15.0	18.1

On the basis of the similarity indices, no single EU country seems to stand out as being particularly affected by competition from Estonia. The Netherlands, Italy, Denmark, Portugal, Sweden, Finland and Austria score slightly above-average levels of similarity. In the case of Latvia, the same takes place with the Netherlands, the UK, Denmark, Greece, Portugal, Sweden and Finland. For Lithuania the respective countries are the Netherlands, Italy, Denmark, Greece and Portugal. The Baltic countries are, however, competing more with each other in the EU market than with any of the present EU countries. These results are next given more proof in the more statistical analyses using the Balassa indices.

Balassa Index of Revealed Comparative Advantage

Balassa indices are here calculated as the ratio of the share of a given product in a country's exports to another country to the share of that product in aggregate intra-EU exports, i.e.

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

where x_{ij}^{k} is the exports of country *i* to country *j* of product *k*,
X_{ij} is total exports of country *i* to country *j*,
x^{k} is the intra-EU exports of product *k*,
X is total intra-EU exports.

In tables A1 to A6 in the Appendix we find a comparison of the revealed comparative advantage (RCA) as calculated using this Balassa index. The analysis is done using the number of product groups with Balassa indices over or below one, i.e. the number of product groups where a country has a comparative advantage ($BI > 1$) or a comparative disadvantage ($BI < 1$) at the CN4 level. The analysis is done for the three Baltic countries and their six most important export and import countries in the EU.

The structure of Latvia's comparative advantage seems to be less diversified than that of either Estonia or Lithuania. Out of the 1,242 product groups at the CN4 level, Estonia has a comparative advantage in 194 groups in the aggregate EU market, Lithuania in 165 groups, while Latvia in only 107 groups.

All EU countries had a more diversified RCA structure in their intra-EU exports (i.e. more product groups with $BI > 1$) than in their exports to the Baltic countries save Sweden in its exports to Estonia and Finland in its exports to all three Baltic countries.

In tables 17-19 we find those products, where the Baltic countries have not only a relatively high value of the Balassa index, but also significant exports to the EU. Even though a higher value of the index does not necessarily denote a higher comparative advantage, this approach may be thought to secure that the year in question was not exceptional.

Oil is a product where all Baltic countries have both a high Balassa index and a significant amount of exports. Oil is, however, mainly transit trade from Russia, and therefore the advantage that the Baltic countries have is mainly geographic and in infrastructure. In addition to oil, all Baltic countries have a comparative advantage in the exports of wood and wood products, which is also one of their a major export products.

Important RCA product groups are, furthermore, some parts of office and household machinery, some clothing and ferrous waste and scrap for Estonia, some clothing and copper waste and scrap for Latvia, and fertilisers, clothing, and tubes and cables for Lithuania.

Table 17 Estonia's exports to the EU: high Balassa indices and high trade intensity (CN4) in 1996

CN	Description	Balassa in exports to EU > 2	% of all exports to EU
2710	Oil (not crude) from petrol and bituminous minerals	9.5	15.5
4407	Wood sawn or chipped	19.0	7.3
4403	Wood in the rough; roughly squared poles, piles, posts	82.8	5.2
8473	Parts and accessories for typewriters and word processing machines	3.5	4.2
9403	Office and household furniture	3.3	2.7
7204	Ferrous waste and scrap	14.4	2.4
5208	Woven cotton fabrics	17.6	2.4
8529	Parts for television, radio and radar apparatus	6.9	2.2
6204	Women's or girls' outer clothing	4.9	2.1

Table 18 Latvia's exports to the EU: high Balassa indices and high trade intensity (CN4) in 1996

CN	Description	Balassa in exports to EU > 2	% of all exports to EU
2710	Oil (not crude) from petrol and bituminous minerals	20.5	33.5
4407	Wood sawn or chipped	36.2	13.9
2709	Crude oil from petroleum and bituminous minerals	9.5	8.4
4403	Wood in the rough; roughly squared poles, piles, posts	102.5	6.4
7404	Copper waste and scrap	29.6	2.6
4412	Plywood, veneered panels and similar laminated wood	27.4	2.5
6204	Women's or girls' outer clothing	5.4	2.3

Table 19 Lithuania's exports to the EU: high Balassa indices and high trade intensity (CN4) in 1996

CN	Description	Balassa in exports to EU > 2	% of all exports to EU
2710	Oil (not crude) from petrol and bituminous minerals	6.5	10.7
4407	Wood sawn or chipped	25.5	9.8
3102	Mineral or chemical fertilisers, nitrogenous	69.5	7.5
6204	Women's or girls' outer clothing	11.0	4.6
6203	Men's or boys' outer clothing	11.8	4.4
3105	Mineral or chemical fertilisers	46.6	3.8
7112	Waste and scrap of precious metal	186.3	3.5
8540	Thermionic, cold cathode or photo-cathode tubes	22.2	3.5
7204	Ferrous waste and scrap	18.6	3.1
8544	Insulated wire, cable, electric conductors; optic fibre cable	5.1	2.5

To analyse whether the EU countries' RCA in exports to the Baltic countries depends on their revealed comparative advantage in the EU, we calculate a χ^2 test for the values of the Balassa indices smaller than or greater than unity. The test has been done on the basis of the two-by-two tables as shown in the Appendix. In this case, the null hypothesis is that comparative advantages are independent. The test statistic can be written as follows

$$\chi^2 = \frac{N\left(|AD - BC| - \frac{N}{2}\right)^2}{(A+B)(C+D)(A+C)(B+D)},$$

where *N* denotes the number of 4-digit CN classes (1,242 in all), *A* denotes the number of classes where an EU country has a revealed comparative advantage in both a Baltic market and EU markets, *B* the number of classes where an EU country has revealed comparative advantage in EU markets but not in the Baltic market in question, *C* the number of classes where there is comparative advantage in the Baltic but not in EU markets and, finally, *D* gives the number of classes where an EU country does not have revealed comparative advantage in either market. The results are given in columns 2, 3 and 4 in table 20. The values in bold are significant at the 1 per cent level with one degree of freedom. If the value is larger than 6.64, we can reject H0, which means that comparative advantage in Baltic trade is not independent of the comparative advantage in intra-EU trade.

Table 20 Chi square tests for the independence of Balassa indices in Baltic-EU trade *vs.* intra-EU trade (CN4). If index value exceeds 6.64 it is significant at the 1 % level and H0 is rejected.

	EU to Estonia	EU to Latvia	EU to Lithuania	Estonia to EU	Latvia to EU	Lithuania to EU
France	**19.41**	**8.69**	**20.20**	2.33	0.94	1.02
Belgium-Luxembourg	**29.81**	**19.85**	**18.18**	0.48	0.37	1.81
Netherlands	**45.91**	**59.75**	**20.46**	0.03	0.01	0.37
Germany	**27.80**	**10.02**	**19.73**	**11.79**	3.19	**14.79**
Italy	**135.69**	**168.69**	**86.71**	2.62	0.28	1.40
United Kingdom	**34.84**	**31.55**	**33.94**	0.43	0.01	5.42
Ireland	**66.52**	**30.35**	**72.83**	0.08	0.03	0.39
Denmark	**108.34**	**69.48**	**48.18**	**38.15**	**20.13**	**19.68**
Greece	**25.01**	**14.59**	**34.15**	**18.20**	**7.82**	**22.29**
Portugal	**80.01**	**29.20**	0.28	**50.48**	**25.35**	**48.17**
Spain	**17.90**	**13.82**	**15.45**	0.35	1.39	2.62
Sweden	**37.41**	**13.43**	**47.47**	**6.89**	0.14	0.04
Finland	**7.24**	**29.15**	**12.13**	**11.45**	1.61	1.26
Austria	**9.10**	**15.45**	**7.76**	**15.82**	**9.95**	**15.11**

The table shows that in their exports to the Baltic countries the EU countries' RCA clearly depends on their revealed comparative advantage in the EU markets. The only exception to this is Portugal whose RCA in its exports to Lithuania seems to be independent of its revealed comparative advantage in the EU markets. Otherwise the test variables are highly significant. This contradicts earlier studies (see Kaitila and Widgrén 1998) where no significant correlation between revealed comparative advantage in EU and Baltic markets was found for countries that are the most important exporters in Baltic markets.[7] In terms of χ^2 statistics the largest exporters obtain the lowest but, still, highly significant values.

In their exports to the EU, the Baltic countries' RCA is mostly independent of EU countries' revealed comparative advantage in the EU markets. There are some exceptions though. In the last three columns of table 20, we have country pairs between each EU country and each Baltic country. The EU countries which have a figure in bold in, say, Latvia's column, compete with Latvian exports in the EU market. Such countries are Denmark, Greece, Portugal and Austria. These four EU countries have similar RCA structures with all three Baltic countries. In addition to these, Estonia's revealed comparative advantage in the EU also corresponds to that of Germany, Finland and Sweden, while Lithuania's corresponds to that of Germany. The correspondence between the Baltic countries' RCA and the EU countries' RCA is clearly the widest in Estonia's exports to the EU.

[7] Kaitila and Widgrén (1998) used CN data at the two-digit level, which may have contributed to the difference in results.

Next, we analyse the dependence of the Baltic countries' RCA in the EU markets. We may thus study whether or not the Baltic countries compete with one another in the EU markets and whether the first-wave accession to the EU of one or two, but not all the Baltic countries, matters.

If we take the Baltic countries' aggregate revealed comparative advantage in the EU markets we find that they are highly dependent. We obtain χ^2 values 241.5 for comparison of Estonia's and Latvia's revealed comparative advantage, 236.1 for Estonia vs. Lithuania and 207.0 for Latvia vs. Lithuania. They are all highly significant, hence telling that, on average, the Baltic countries specialise similarly in the EU markets. This result is analogous to that given by the similarity indices above.

Next, let us briefly take a look at with which EU countries or fellow Baltic countries a Baltic country has a most similar revealed comparative advantage in its most important EU markets. For this we compare, say, Estonia's Balassa indices in its exports to Sweden with the Balassa indices of the EU countries and of Latvia and Lithuania in that market. This analysis gives an idea as to which countries compete the most with Estonia in the Swedish market.

The picture that emerges is fairly similar to the one we get from an aggregate EU analysis. Some interesting details arise, however. First of all the other Baltic countries remain the fiercest competitors of each Baltic country also at the individual export market level.

In Estonia's most important EU markets — Finland and Sweden — the EU countries with the most similar structure of revealed comparative advantage are Portugal, Denmark, Greece and Italy, and also Sweden and Finland, respectively. Consequently, the picture looks similar to that in Estonia's aggregate EU export market.

Table 21 **Chi square tests of the correspondence of comparative advantage in the Baltic countries' most important EU markets with the EU countries and other Baltic countries' comparative advantage there. (Values exceeding 6.64 are significant at the 1 % level.)**

	Estonian exports to …		Lithuanian exports to …	
	Finland	Sweden	Germany	United Kingdom
France	0.01	0.07	0.26	0.34
Belgium-Luxembourg	0.05	0.68	1.48	4.89
Netherlands	0.92	1.68	5.73	0.00
Germany	2.45	0.04	..	0.11
Italy	**16.84**	**21.82**	6.45	0.62
United Kingdom	0.60	2.13	4.59	..
Ireland	0.01	0.23	1.41	3.01
Denmark	**40.45**	**60.88**	**33.28**	0.06
Greece	**24.04**	**23.97**	**21.65**	0.89
Portugal	**85.32**	**78.31**	**16.50**	**33.88**
Spain	2.09	0.05	1.86	0.36
Sweden	**19.27**	..	1.46	0.76
Finland	..	**22.69**	0.10	3.15
Austria	**7.76**	4.62	**16.88**	0.01
Total EU15	1.50	**9.22**	**18.01**	0.18
Estonia	..	..	**213.53**	**177.81**
Latvia	**134.03**	**180.63**	**221.71**	**105.79**
Lithuania	**153.95**	**112.18**	..	..

	Latvian exports to …		
	Netherlands	Germany	United Kingdom
France	0.06	2.56	0.00
Belgium-Luxembourg	3.83	0.01	0.00
Netherlands	..	5.86	3.62
Germany	0.01	..	0.78
Italy	4.10	2.26	2.98
United Kingdom	3.01	0.83	..
Ireland	4.05	0.02	1.92
Denmark	0.11	**39.61**	0.06
Greece	0.02	**8.96**	0.28
Portugal	0.11	**16.33**	5.67
Spain	0.02	0.07	0.68
Sweden	0.32	0.94	**9.68**
Finland	**17.04**	4.44	**18.65**
Austria	0.09	**7.99**	0.01
Total EU15	0.30	3.55	0.54
Estonia	**136.51**	**262.43**	**171.56**
Latvia	..	..	..
Lithuania	**66.45**	**221.71**	**105.79**

In Lithuania's most important market, Germany, it faces the most similar structure of comparative advantage with that of Denmark, Greece, Portugal and Austria. Here what is most interesting is that the revealed comparative advantage of aggregate EU15 exports to Germany is fairly similar to Lithuania's exports there. In Lithuania's exports to the United Kingdom, it mainly competes with Portugal. That the other EU countries do not really compete with Lithuania in the UK market, is, among other things, due to importance of mineral

fuels and oils in Lithuanian exports to the UK. Oil excluded, the RCA structure is then most similar to that of Portugal.

Among EU countries, Latvia competes in its largest EU market, the Netherlands and the UK, most with Finland. In the German market the most similar revealed comparative advantage can be found in Denmark's, Portugal's and Greece's trade with Germany.

In sum, it seems that in terms of their revealed comparative advantage Baltic countries are very similar to one another in the EU markets. To a large extent this property also holds in their most important export markets. Among EU countries Baltic countries' specialisation corresponds most with the specialisation of Denmark, Portugal, Greece and Austria.

The results in tables 20 and 21 confirm that Baltic countries specialise similarly in their exports to the EU. In their most important export markets they also seem to compete with the same EU countries. There seems to be, however, geographical differences in the Baltic countries' specialisation as their most important markets are different. Latvia and Lithuania have the Netherlands and the UK among their most important trading partners but Estonia's trade is more concentrated towards its closest EU neighbours Finland and Sweden.

Note that revealed comparative advantage figures show a high degree of dependence between, say, Estonia's and Latvia's specialisation in the German market. As the latter, however, exports more to Germany than the former, we may have a situation where the latter also has a wider revealed comparative advantage in its major market area.

To test whether this is so, we compute Cochran's Q-test statistic for all three Baltic countries. This test takes into account the importance or size of the exports. Our null hypothesis is that the probability of revealed comparative advantage is the same for all Baltic countries in the EU. Cochran's Q-statistic can be written

$$Q = \frac{k(k-1)\sum_{j=1}^{k}(G_j - \bar{G})^2}{k\sum_{i=1}^{N} L_i - \sum_{i=1}^{N} L_i^2}$$

where G_j is the total number of "successes" in the j^{th} column, $\bar{G}$ is the mean of the G_j, L_i is the total number of "successes" in the i^{th} row. The test values are distributed approximately as χ^2 with $k-1$ degrees of freedom where k is the number of Baltic countries and N is the number of CN classes at the 4-digit level. Here, by successes we mean those product groups where Baltic countries have a revealed comparative advantage. Critical value with 2 degrees of free-

dom is 9.21 at the 1 per cent level of significance. Test statistics exceeding this level lead to a rejection of the null hypothesis. Consequently, revealed comparative advantage has country-specific differences in the EU country under consideration.

Table 22 Cochran's Q-test: values in bold show differences between Baltic countries' comparative advantage in separate EU markets

EU country	Value	EU country	Value
France	**12.50**	Denmark	3.55
Belgium-Luxembourg	4.19	Greece	1.18
Netherlands	**12.77**	Portugal	1.51
Germany	3.50	Spain	1.27
Italy	1.37	Sweden	**36.38**
United Kingdom	**12.04**	Finland	**305.04**
Ireland	2.67	Austria	1.27

Table 22 shows Cochran's Q-test statistics for the Baltic countries' revealed comparative advantage in different EU countries. Values higher than 9.21 indicate that there are country-specific differences between the Baltic countries' revealed comparative advantage in the EU market in question. The table shows that differences do exist. In particular one finds differences in the Baltic countries' trade with their largest trading partners. Of the Baltic countries' six largest trading partners within the EU only in their trade with Germany their comparative advantage patterns are similar.

The main conclusion that can be drawn on the basis of Cochran's test is that, although the patters of the Baltic countries' revealed comparative advantage in the EU market are highly dependent on average, there remain significant country-specific differences in their most important export markets, save Germany. Cochran's test investigates whether the probability of RCA is the same for all Baltic countries and the results indicate that it is not. Combined with earlier analysis it seems that the differences can be explained by Estonia's wider RCA in Sweden and especially in Finland and on the other hand Latvia's and Lithuania's wider RCA in the Netherlands and the UK.

Table 23 ranks the EU countries according to their importance for the Baltic countries. As a measure of importance we have used the exports and imports per GDP ratios. Similar rankings would tell that one of the Baltic countries is more closed towards the EU markets than the Baltic countries are on average. In exports, Friedman's χ^2 statistic is 0.571 and in imports 0.000. This indicates that in terms of their openness towards the EU there are no differences between the Baltic countries on average. Thus none of the Baltic countries systemati-

cally dominates in the EU markets. This also confirms the above-made conclusion that the patterns of geographical concentration in Baltic countries' exports and imports differ.

Table 23 EU countries importance to the Baltic countries in their exports and imports relative to their GDP (1 = export per GDP or import per GDP ratio of a Baltic country is the highest, 3 = lowest)

	Estonia to EU	Latvia to EU	Lithuania to EU	EU to Estonia	EU to Latvia	EU to Lithuania
France	2	1	3	2	3	1
Belgium-Luxembourg	3	2	1	2	1	3
Netherlands	2	1	3	2	1	3
Germany	3	1	2	3	2	1
Italy	2	3	1	2	3	1
United Kingdom	2	1	3	2	1	3
Ireland	3	1	2	2	1	3
Denmark	1	2	3	2	3	1
Greece	2	3	1	3	1	2
Portugal	3	2	1	1	3	2
Spain	3	2	1	2	3	1
Sweden	1	2	3	1	2	3
Finland	1	2	3	1	2	3
Austria	2	3	1	3	2	1
Sum of scores	30	26	28	28	28	28

The standard conclusion concerning the Baltic countries' trade is that Estonia is more open than Latvia and Lithuania. The results in table 23 indicate that this openness is partially illusory as it is highly concentrated on trade with Finland and Sweden.

4 Comparative Advantage and EU Enlargement: An Assessment

In this paper, we have analysed the Baltic countries' trade with the European Union. During the 1990s, the EU has risen from an insignificant trading partner to an important one for all three Baltic countries. In 1997, 48 per cent of Estonia's exports went to the EU, while the corresponding figure for Latvia was 49 and for Lithuania 33 per cent. Respectively, 55, 53 and 46 per cent of these countries' imports originated from the EU. As this major shift in the geographical orientation in trade was intersected by a change in internal economic regime, it is important to study the fundamentals of this trade and the direction it is taking.

The trade of the Baltic countries with the EU is mostly inter-industry trade, hence based on comparative advantage. This is due to huge differences between the EU countries and the Baltic countries in terms of their resource endowments and economic development. The other side of this is that intra-industry trade (IIT), which usually occurs between similarly developed countries, only accounts for 35 per cent of Estonia's trade with the EU, 17 per cent

of Latvia's trade with the EU and 19 per cent of Lithuania's trade with the EU. The Estonian figure corresponds to the lowest levels of IIT reached by EU countries in their intra-EU trade but Latvia and Lithuania are still lagging behind.

In all cases IIT is mostly vertical in nature, hence based on quality differences. Baltic countries' IIT with the EU can be explained by industry-specific factors, not by country-specific factors as mentioned above. Among the Central and Eastern European countries (CEECs), rapidly increasing vertical IIT has characterised trade development of the more integrated transition countries like the Czech Republic and Hungary, who have also gained the largest flows of foreign direct investments among the CEECs. Among Baltic countries Estonia seems to fit best to this picture.

In the case of Estonia vertical intra-industry trade accounts for nearly 30 per cent of its trade with the EU. Also this figure is very close to the levels reached by countries like Finland or Portugal. In the case of Estonia intra-industry trade is very concentrated in its trade with Finland and Sweden, which, as these countries are also the largest foreign investors in Estonia, confirms similar development as in the Czech Republic and Hungary, where foreign direct investment has boosted vertical intra-industry trade in general and especially with the investing countries. Latvia and Lithuania have both lower levels of IIT and of horizontal IIT than Estonia.

We find that all EU countries' revealed comparative advantage in the Baltic markets depend highly on their revealed comparative advantage in the EU markets. The only exception to this is Portugal in its exports to Lithuania. Furthermore, all EU countries' revealed comparative advantage in the intra-EU market is based on a wider range of product groups at the CN4 level than in their exports to the Baltic countries, save Finland's in its exports to all Baltic countries and Sweden's in its exports to Estonia.

The Baltic countries' revealed comparative advantage is two-fold in their most important export products. First they have a comparative advantage in oil, which is mainly transit trade from Russia, and thus based of the countries' favourable geographic position by the Baltic Sea and existing infrastructure. The weight of transit oil in the trade figures is strongly affected by the development of the world market price of oil. Another factor that may under some unlikely circumstances have an effect on the extent of transit trade are the political conditions in and around the Baltic countries. Second, the Baltic countries have a revealed comparative advantage in wood and wood products, clothing, and some scrap metals. In addition

to these, we should note the potential comparative advantage that may lie in processed agricultural goods, whose industry and exports to other transition economies are very important for all Baltic countries but whose trade is still restricted by the Europe Agreements.

In general, the Baltic countries' revealed comparative advantage in the EU markets seems to correspond most with the specialisation patterns of Denmark, Austria, Portugal and Greece. This holds for all three Baltic countries. Furthermore, Estonia's revealed comparative advantage corresponds with those of Finland and Sweden, which is at least partly due to the fairly high intensity of vertical intra-industry trade between these countries. This tendency has also supported Estonia's exports to Finnish and Swedish markets and, at the same time, it seems to somewhat divert Finland's and Sweden's imports of textiles and clothing from Southern European countries to Estonia.

The comparative advantage of the Baltic countries and the competitive pressures that arise from there need to be put into perspective, however. The aggregate population of the Baltic countries is some 7.6 million, i.e. about 50 per cent more than in Finland, while their aggregate gross domestic product measured with purchasing power parity is only a little over a third of Finland's. Productive capacity in the Baltic countries when compared to the EU is negligible, and also the competitive pressures arising from the former are mainly in fairly small product groups.

Furthermore, the Baltic countries' revealed comparative advantage patterns are most similar to each other in the *aggregate* EU market. This means that they compete first and foremost with each other (and perhaps with the other transition countries). Consequently, the current way to admit the Baltic countries into as EU in several phases would be harmful for the one(s) left to wait for their turn to join as they are deprived of full access to the Single Market. Estonia enjoys a surplus in its intra-Baltic trade.

A two-phased accession may also have an effect on the allocation of foreign direct investment in the Baltic region by favouring Estonia, the likely first entrant, and already the Baltic country most integrated with the EU.[8] If at such a time credible negotiations are under way for a quick entry of also Latvia and Lithuania into the EU there may not be any substantial effects on FDI flows.

In their major market areas, bar Germany, we find that the Baltic countries' revealed comparative advantage patterns differ, however. This is mainly due to Estonia being more focused in trading with Finland and Sweden and the vertical intra-industry nature of its trade with these countries, while Latvia and Lithuania trade more with Germany, the Netherlands and the UK. As to the export and import openness of the Baltic countries vis-à-vis the EU, our analysis shows that there are no systematic differences between them.

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[8] See Baldwin (1994) for the details of this argument.

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Appendix

In tables A1 to A6 we find comparisons of the number of product groups with Balassa indices below and above one. The first two tables are for Estonia, the next two for Latvia and the last two for Lithuania. In the first of the table-pairs we have a comparison of the Baltic country's Balassa index in its aggregate EU exports and the Balassa indices of its largest EU export countries in their intra-EU trade.[9] Comparing these two values we see whether the structure of the Baltic country's and the EU country's revealed comparative advantage in the aggregate EU markets corresponds and thus whether they are competing with each other.

In the latter table we find a comparison of an EU country's (the largest import countries of each Baltic country) Balassa index and that EU country's Balassa index in its intra-EU trade. Comparing these two, we can analyse whether the EU country in question has the same structure of revealed comparative advantage in its intra-EU exports and in its exports to the Baltic country in question. A statistical analysis of these tables is made in the text.

For example, looking at table A1 we find that in its exports to the EU, Estonia had a comparative advantage in 194 of the 1,242 possible product groups at the CN4 level. Of these 62 were groups where also the Netherlands had a comparative advantage in intra-EU exports. Consequently, these were goods where Estonia was competing with the Netherlands. All in all, the Netherlands had a comparative advantage in 407 product groups in intra-EU trade.

One should, however, note two things. First, a CN4 product group already entails quite a variety of different goods and therefore this analysis should probably be made at the more disaggregated eight-digit level. Second, to have an RCA in the same product does not necessarily mean that the products are of similar quality. If there is a difference in quality, they may not be complete substitutes for each other.

In table A2, say, Dutch exports to Estonia, the Netherlands has a revealed comparative advantage in 173 product groups. Of those, the Netherlands has an RCA in 96 cases also in intra-EU trade. Consequently, there are 77 product groups where the Netherlands has an RCA in its exports to Estonia but where such advantage does not exist in intra-EU exports.

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[9] For a Baltic country the Balassa index is calculated as the share of a product in its exports to the EU divided by the product's share in all intra-EU exports. If the value is greater than one, the Baltic country has a revealed comparative advantage in that product in the EU market. For an EU country the Balassa index is calculated as the share of the product in its intra-EU exports divided by the product's share in all intra-EU exports. If the value is greater than one, the EU country a revealed comparative advantage in that product in the EU market.

Table A1 Balassa indices in Estonia's exports to the EU in 1996 (CN4) compared with the EU country's Balassa indices in intra-EU exports, number of product groups

		Intra-EU exports of …								
		Netherlands			Germany			United Kingdom		
		< 1	≥ 1	Total	< 1	≥ 1	Total	< 1	≥ 1	Total
Estonian exports to the EU	< 1	703	345	1,048	593	455	1,048	690	358	1,048
	≥ 1	132	62	194	136	58	194	133	61	194
	Total	835	407	1,242	729	513	1,242	823	419	1,242
		Denmark			Sweden			Finland		
		< 1	≥ 1	Total	< 1	≥ 1	Total	< 1	≥ 1	Total
	< 1	809	239	1,048	837	211	1,048	907	141	1,048
	≥ 1	108	86	194	138	56	194	149	45	194
	Total	917	325	1,242	975	267	1,242	1,056	186	1,242

Table A2 Balassa indices in EU countries' exports to Estonia in 1996 (CN4) compared with their intra-EU Balassa indices, number of product groups

		EU countries' exports to Estonia								
		Netherlands			Germany			United Kingdom		
		< 1	≥ 1	Total	< 1	≥ 1	Total	< 1	≥ 1	Total
Intra-EU exports	< 1	758	77	835	605	124	729	733	90	823
	≥ 1	311	96	407	360	153	513	319	100	419
	Total	1,069	173	1,242	965	277	1,242	1,052	190	1,242
		Denmark			Sweden			Finland		
		< 1	≥ 1	Total	< 1	≥ 1	Total	< 1	≥ 1	Total
	< 1	851	66	917	766	209	975	780	276	1,056
	≥ 1	227	98	325	160	107	267	119	67	186
	Total	1,078	164	1,242	926	316	1,242	899	343	1,242

Table A3 Balassa indices in Latvia's exports to the EU in 1996 (CN4) compared with the EU country's Balassa indices in intra-EU exports, number of product groups

		Intra-EU exports of …								
		France			Netherlands			Germany		
		< 1	≥ 1	Total	< 1	≥ 1	Total	< 1	≥ 1	Total
Latvian exports to the EU	< 1	715	420	1,135	764	371	1,135	657	478	1,135
	≥ 1	73	34	107	71	36	107	72	35	107
	Total	788	454	1,242	835	407	1,242	729	513	1,242
		United Kingdom			Denmark			Sweden		
		< 1	≥ 1	Total	< 1	≥ 1	Total	< 1	≥ 1	Total
	< 1	753	382	1,135	858	277	1,135	893	242	1,135
	≥ 1	70	37	107	59	48	107	82	25	107
	Total	823	419	1,242	917	325	1,242	975	267	1,242

Table A4 Balassa indices in EU countries' exports to Latvia in 1996 (CN4) compared with their intra-EU Balassa indices, number of product groups

EU countries' exports to Latvia										
		Netherlands			Germany			United Kingdom		
		< 1	≥ 1	Total	< 1	≥ 1	Total	< 1	≥ 1	Total
Intra-EU Exports	< 1	791	44	835	573	156	729	736	87	823
	≥ 1	328	79	407	362	151	513	324	95	419
	Total	1,119	123	1,242	935	307	1,242	1,060	182	1,242
		Denmark			Sweden			Finland		
		< 1	≥ 1	Total	< 1	≥ 1	Total	< 1	≥ 1	Total
	< 1	842	75	917	838	137	975	905	151	1,056
	≥ 1	239	86	325	204	63	267	129	57	186
	Total	1,081	161	1,242	1,042	200	1,242	1,034	208	1,242

Table A5 Balassa indices in Lithuania's exports to the EU in 1996 (CN4) compared with the EU country's Balassa indices in intra-EU exports, number of product groups

Intra-EU exports of …										
		France			Belgium-Luxembourg			Netherlands		
		< 1	≥ 1	Total	< 1	≥ 1	Total	< 1	≥ 1	Total
Lithuanian exports to the EU	< 1	677	400	1,077	657	420	1,077	728	349	1,077
	≥ 1	111	54	165	91	74	165	107	58	165
	Total	788	454	1,242	748	494	1,242	835	407	1,242
		Germany			United Kingdom			Denmark		
		< 1	≥ 1	Total	< 1	≥ 1	Total	< 1	≥ 1	Total
	< 1	609	468	1,077	700	377	1,077	819	258	1,077
	≥ 1	120	45	165	123	42	165	98	67	165
	Total	729	513	1,242	823	419	1,242	917	325	1,242

Table A6 Balassa indices in EU countries' exports to Lithuania in 1996 (CN4) compared with their intra-EU Balassa indices, number of product groups

EU countries' exports to Lithuania										
		Germany			Italy			United Kingdom		
		< 1	≥ 1	Total	< 1	≥ 1	Total	< 1	≥ 1	Total
Intra-EU Exports	< 1	582	147	729	730	48	778	750	73	823
	≥ 1	352	161	513	349	115	464	332	87	419
	Total	934	308	1,242	1,079	163	1,242	1,082	160	1,242
		Denmark			Sweden			Finland		
		< 1	≥ 1	Total	< 1	≥ 1	Total	< 1	≥ 1	Total
	< 1	827	90	917	858	117	975	905	151	1056
	≥ 1	242	83	325	188	79	267	140	46	186
	Total	1,069	173	1,242	1,046	196	1,242	1,045	197	1,242

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THE RESEARCH INSTITUTE OF THE FINNISH ECONOMY
LÖNNROTINKATU 4 B, FIN-00120 HELSINKI

Puh./Tel. (09) 609 900 Telefax (09) 601753
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