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## 1999 • No. 8

**Ville Kaitila**

Trade and Revealed Comparative
Advantage: Hungary, the Czech
Republic, and  the European Union

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All opinions expressed are those of the author and do not necessarily reflect the views of the Bank of Finland.

Ville Kaitila

# Trade and Revealed Comparative Advantage: Hungary, the Czech Republic, and the European Union

## Abstract

This study analyses the trade of Hungary and the Czech Republic with the European Union in 1997. After a general introduction, the focus turns to the extent of intra-industry trade (IIT) and its horizontal and vertical components. The extent of IIT is also analysed in light of the flows of foreign direct investment (FDI) from the European Union to Hungary and the Czech Republic. This is followed by an analysis of revealed comparative advantage (RCA) in trade between the EU and the two Central European countries. The CN4-digit trade data is divided into two groups according to whether a country enjoys a revealed comparative advantage in a given market area or not. Statistical tests are performed to determine the extent to which the RCA structures of each pair of countries are dependent. The analysis also takes into account the volumes of trade flows.

# 1    Introduction

Hungary and the Czech Republic have a shared history in the post-World War II era. As of late, both countries joined NATO in 1999, and both are seeking membership in the European Union. There are other similarities between the two nations. Their populations are of the same magnitude, i.e. about 10.2 million, while Hungary covers an area about a sixth larger than that of the Czech Republic. In 1997 the Czech Republic's nominal GDP was 15 per cent higher than that of Hungary; adjusted for purchasing power parity, Czech GDP was 23 per cent higher.

In economic terms Hungary and the Czech Republic have been in the forefront of the Central and Eastern European emerging markets. Already during their years as members of the CMEA, they were among the wealthiest countries in the socialist block. Hungary initiated gradual economic reform in 1968, when it abandoned its strict centrally planned economic system. The establishment of companies with foreign participation was made possible in 1972. Further liberalisation and market reform took place throughout the 1980s. (Serni 1997, OECD Economic Surveys: Hungary 1999)

The Czech Republic, or Czechoslovakia as it was known before its separation from Slovakia in 1993, has a strongly rooted industrial tradition going back to the inter-World War years and beyond. After the Second World War, nationalised Czechoslovak industry was forced to specialise in heavy industry and no real economic reforms were carried out after the 1968 Warsaw Pact invasion and ensuing political stagnation. In 1989 only four per cent of Czechoslovak GDP was produced by the private sector; the figure for Hungary was 16 per cent. (Serni 1997)

During the 1990s Hungary and the Czech Republic have made radical economic reforms and have re-integrated themselves rapidly into western Europe in terms of foreign trade and foreign direct investment (FDI). The share of private sector is now around three quarters of GDP in both economies. In the first quarter of 1999, 79 per cent of Hungarian exports went to EU or EFTA countries, while 68 per cent of its imports originated from there. Accordingly, western Europe accounted for some 62 per cent of Czech exports and some 64 per cent of Czech imports in 1997. Both

countries' exports to the EU amounted to about ECU 11.5 billion in 1997.[1] The Czech Republic imported more than Hungary and thus its trade deficit with the EU was larger. The bulk of FDI flows into these two countries during the 1990s have originated from western Europe and the United States.

Both Hungary and the Czech Republic were among the first Central and Eastern European countries to sign the so-called Europe Agreements with the European Union. The Agreement with Hungary entered into force 1 February 1994, and that with the Czech Republic a year later, after some delay due to the country's separation from Slovakia. The trade-related parts of the agreements, aimed at creating a free trade area, had been put into force already in March 1992.

Both Hungary and the Czech Republic are in the so-called first wave of EU eastern enlargement. By mid-1999 Hungary is considered to be further than the Czech Republic in transforming its economy to accord with the *acquis communautaire* of the European Union, which is a requirement for EU membership. Hungary's economic restructuring also seems to have progressed further than that of the Czech Republic.

This paper analyses trade[2] between Hungary and the European Union and between the Czech Republic and the European Union in 1997 using Eurostat Combined Nomenclature[3] data at the four-digit level (CN4). In 1997 there remained some restrictions on the exports of industrial goods from Hungary to the EU, which were not abolished until 1 January 1998. There also remained some constraints on imports of industrial goods, mainly consumer goods, from the EU. These are not likely to have had a major impact on the results of this analysis. On the other hand, it should be noted that both the Hungarian and Czech economies remained effectively

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[1] Greece was the only EU country to export less to the EU area.

[2] Other studies analysing the issues discussed in this paper include Fidrmuc *et al.* (1999), Aturupane *et al.* (1999), Kaitila and Widgrén (1999) and Greenaway *et al.* (1994).

[3] Combined Nomenclature is the basic product classification used in the European Union for tariffs and statistical classification. It is available at the CN2, CN4, CN6 and CN8 digit levels. Up to CN6 the classification is the same as the Harmonised System (HS). Consequently, the data used in this study cover exports and imports of the member countries of the European Union and are not data collected by the authorities in Hungary or the Czech Republic.

under restructuring in 1997 even though privatisation itself had already reached a high level. The recession, which began in the Czech Republic in 1998 showed that manufacturing industry was still in need of restructuring.

The structure of the paper is as follows. After a brief description of Hungarian and Czech trade in general and with their closest Central European neighbours, Poland and Slovakia, a deeper description is made of the trade between the two countries and the European Union. This analysis incorporates calculations of intra-industry trade and its horizontal/vertical components in section 3. The results are analysed in the light of data on foreign direct investment flows to the two countries from the European Union in section 4.

In section 5 the issue of revealed comparative advantage is discussed. This is done by calculating Balassa indices for Hungary and the Czech Republic in the EU markets and the EU countries' Balassa indices in the two Central European markets, with an emphasis on the former. The results are then compared with EU countries' Balassa indices in intra-EU markets in order to examine the convergence of the structure of revealed comparative advantage of different countries. This is done by using two-by-two tables in which each country's trade is divided into two groups, based on whether it does or does not enjoy a revealed comparative advantage in the market, i.e. whether the Balassa index takes a value larger or smaller than unity. The statistical analysis is done with $\chi^2$ tests. Furthermore, the importance of the statistical dependence of the structures of revealed comparative advantage is assessed by calculating the trade volumes. The methodology follows Kaitila and Widgrén (1999) and Partanen and Widgrén (1999). The former analyses revealed comparative advantage in trade between the three Baltic countries and the European Union and the latter incorporates a similar analysis for Poland.

## 2      Hungarian and Czech Foreign Trade

The European Union dominates both Hungarian and Czech foreign trade, but marginally less that of the Czech Republic, which is engaged in extensive trade with Slovakia. They have a customs union, a link to a neighbouring ex-CMEA country which Hungary does not enjoy. The customs union promotes trade between the Czech Republic and Slovakia as do old economic, cultural and linguistic ties between the two nations. The

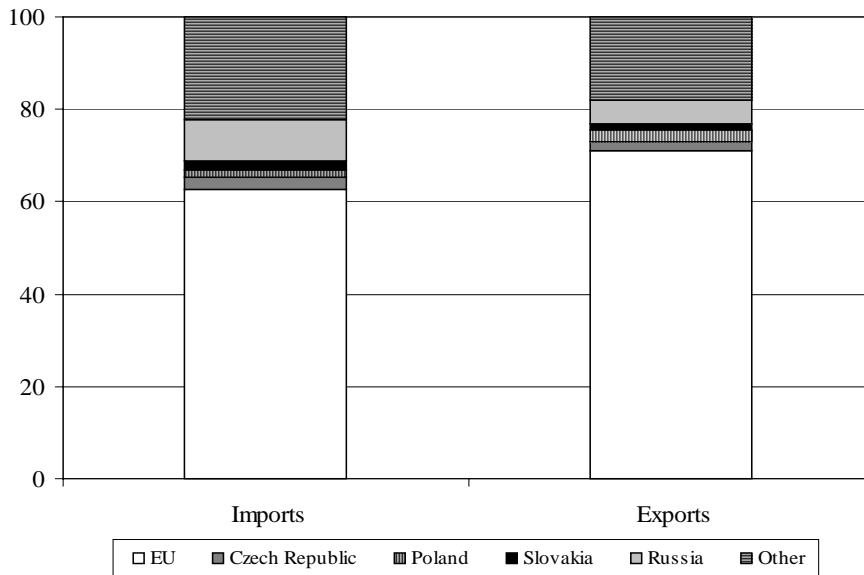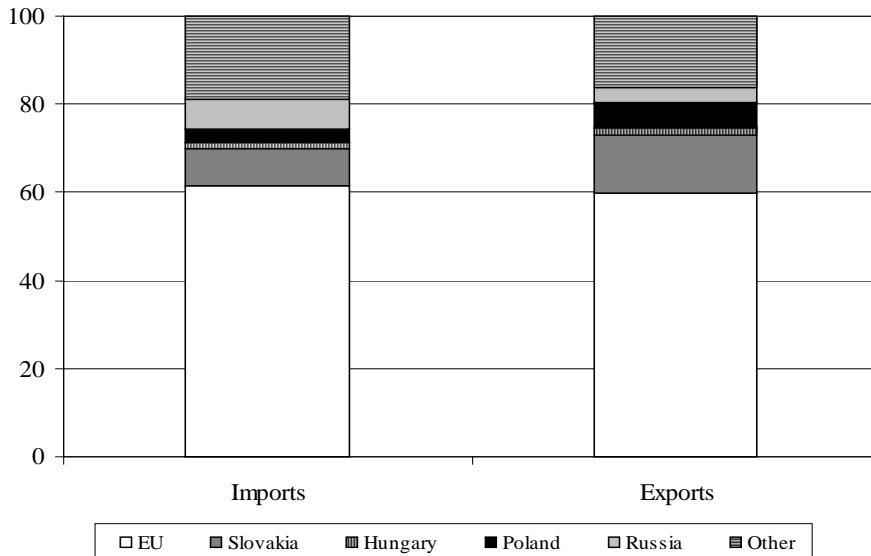*Chart 1. Hungary's trading partners in 1997, per cent of total*



*Chart 2. The Czech Republic's Trading Partners in 1997, per cent of total*

customs union will, however, have to be revoked in the future before either country joins the EU.

## 2.1    Trade With CEFTA Countries

Before analysing trade between the Czech Republic, Hungary and the EU, let us look briefly at trade between the Czech Republic, Hungary, Slovakia and Poland. These countries are all members of the Central European Free Trade Area.[4]

Hungary's exports to the other three CEFTA countries consist mainly of food and live animals, machinery and transport equipment, manufactured goods, and chemicals, which each account for about a fifth of the total. Compared with its exports to the EU, food and live animals account for a larger share of its CEFTA trade. Imports are led by manufactured goods (34 per cent), followed by mineral fuels and lubricants, and machinery and transport equipment. In Hungary's imports from the EU, this latter group accounts for a much larger share. Exports and imports to the three CEFTA countries account for only six per cent of Hungary's external trade. Hungary's fairly substantial imports from Russia consist of mineral fuels (69 per cent) and non-ferrous metals (14 per cent).

Compared with its exports to the EU, Hungary exports relatively more food and live animals to its neighbouring CEFTA countries (9 per cent of its exports to the EU) and chemicals (3 per cent), and less machinery and transport equipment (52 per cent). On the other hand Hungary imports relatively more machinery and transport equipment from the EU (45 per cent) and less chemicals (8 per cent). Overall EU-Hungarian trade is based more on intra-industry trade in machinery and transport equipment than is Hungarian-CEFTA trade. This is also the case for the Czech Republic.

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[4] Slovenia, Romania and, as of late, Bulgaria are also members of CEFTA, but they are not considered here.

*Table 1. Hungary's trade with other Central European countries in 1997*[5]

| | Trade with | | | | | |
|---|---|---|---|---|---|---|
| | Czech Republic | | Poland | | Slovakia | |
| | Imports | Exports | Imports | Exports | Imports | Exports |
| Total, HUF mill. | 95,044 | 60,097 | 67,102 | 95,428 | 74,982 | 49,318 |
| of which (%) | | | | | | |
| Food and live animals | 2.4 | 23.0 | 10.1 | 22.7 | 3.2 | 15.3 |
| Machinery and transport equipment | 19.7 | 21.0 | 13.9 | 18.7 | 10.0 | 15.9 |
| Manufactured goods | 25.7 | 21.3 | 44.4 | 16.1 | 35.1 | 22.1 |
| Chemicals | 13.7 | 18.7 | 10.7 | 25.6 | 12.4 | 23.1 |
| Mineral fuels, lubricants | 30.1 | 1.3 | 13.8 | 1.1 | 20.6 | 5.7 |
| Other | 8.3 | 14.6 | 7.2 | 15.7 | 18.7 | 17.9 |

*Source: Hungarian statistical authorities*

The Czech Republic exports mainly machinery and transport equipment and manufactured goods. A third of all exports to Slovakia are machinery and transport equipment. As regards imports, manufactured goods lead with a 34 per cent share, followed by machinery and transport equipment. Of Czech imports from Russia, 80 per cent are mineral fuels. For the Czech Republic, exports to Hungary, Poland and Slovakia account for a full fifth of total exports and 13 per cent of its total imports. Slovakia is by far the most important of these neighbouring markets.

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[5] There are some inconsistencies between Hungarian and Czech trade statistics. Hungarians find their trade deficit to be much larger than what the Czechs estimate their surplus to be. The discrepancy between the countries' statistics for their bilateral exports and imports of mineral fuels and lubricants is large. Hungary calculates that 30 per cent of its imports from the Czech Republic consist of mineral fuels and lubricants, while the Czechs calculate that 19 per cent of their exports to Hungary fall into this category. A discrepancy exists also in Hungary's exports, i.e. the Czech Republic's imports of these products. In general, there are often surprisingly large inconsistencies in trade statistics.

*Table 2. Czech Republic's trade with other Central European countries in 1997*

| | Trade with | | | | | |
|---|---|---|---|---|---|---|
| | Hungary | | Poland | | Slovakia | |
| | Imports | Exports | Imports | Exports | Imports | Exports |
| Total, mill. CZK | 11,273 | 13,564 | 27,628 | 41,447 | 72,091 | 93,301 |
| of which (%) | | | | | | |
| Food and live animals | 22.2 | 3.1 | 7.9 | 4.4 | 4.5 | 6.6 |
| Machinery and transport equipment | 21.9 | 25.3 | 19.7 | 29.9 | 20.5 | 33.1 |
| Manufactured goods | 20.1 | 27.9 | 27.0 | 32.2 | 38.5 | 25.2 |
| Chemicals | 17.0 | 15.2 | 12.2 | 18.7 | 15.7 | 12.5 |
| Mineral fuels, lubricants | 6.5 | 18.8 | 17.9 | 5.6 | 8.5 | 6.0 |
| Other | 12.3 | 9.7 | 15.3 | 9.3 | 12.3 | 16.5 |

*Source: Statistical Yearbook of the Czech Republic 1998*

Compared with its exports to the European Union, the Czech Republic's exports to its neighbouring CEFTA countries comprise relatively more of food and live animals (2 per cent of exports to the EU), chemicals (4 per cent) and mineral oils and lubricants, and relatively less of machinery and transport equipment (37 per cent).

Relative to its imports from the EU, the Czech Republic imports from Hungary more food and live animals (6 per cent of imports from the EU), and from the CEFTA countries in general more mineral oils and lubricants, and chemicals (9 per cent) and less machinery and transport equipment (46 per cent).

## 2.2    Hungary's Trade With the EU

Let us now consider the trade of Hungary and the Czech Republic with the European Union. For both countries, Germany is by far the most important export and import country, but less so in the case of Hungary. Of Hungary's total exports to the EU, 47 per cent goes to Germany, 16 per cent to Austria and 10 per cent to Italy. These same countries are the most significant import countries as well, with shares of 44, 19 and 11 per cent, respectively. Hungary has an overall trade deficit with the EU. The deficit is 13 per cent of its exports to the EU. Hungary's largest deficit in absolute

terms is with Austria, (almost ECU 578 million). The combined deficit in trade with Germany and Italy is slightly larger than this. Hungary does enjoy surpluses with some EU countries, notably the United Kingdom, the Netherlands, Spain and Greece.

*Table 3. Hungary's trade with the EU, ECU million*

| EU Country | Exports to the EU | % | Imports from the EU | % | Trade balance | Hungary's trade surplus, % of its exports to the EU |
|---|---|---|---|---|---|---|
| Germany | 5,399.0 | 46.8 | 5,793.0 | 44.3 | -394.0 | -7.3 |
| Austria | 1,880.7 | 16.3 | 2,459.1 | 18.8 | -578.4 | -30.8 |
| Italy | 1,150.7 | 10.0 | 1,462.4 | 11.2 | -311.7 | -27.1 |
| United Kingdom | 702.7 | 6.1 | 600.1 | 4.6 | 102.6 | 14.6 |
| France | 676.4 | 5.9 | 798.5 | 6.1 | -122.1 | -18.0 |
| Netherlands | 651.1 | 5.6 | 486.3 | 3.7 | 164.8 | 25.3 |
| Belgium and Luxembourg | 384.6 | 3.3 | 570.8 | 4.4 | -186.2 | -48.4 |
| Spain | 265.9 | 2.3 | 246.9 | 1.9 | 19.0 | 7.2 |
| Sweden | 164.8 | 1.4 | 222.0 | 1.7 | -57.1 | -34.7 |
| Greece | 76.6 | 0.7 | 49.8 | 0.4 | 26.8 | 35.0 |
| Finland | 72.8 | 0.6 | 174.2 | 1.3 | -101.4 | -139.4 |
| Denmark | 71.8 | 0.6 | 76.7 | 0.6 | -4.9 | -6.8 |
| Ireland | 25.1 | 0.2 | 75.3 | 0.6 | -50.2 | -200.3 |
| Portugal | 11.3 | 0.1 | 58.3 | 0.4 | -467.0 | -416.7 |
| Total EU | 11,533.4 | 100.0 | 13,073.2 | 100.0 | -1,539.8 | -13.4 |

We can analyse the most important trade goods of Hungary and the Czech Republic in their EU trade at the CN4 level of the Combined Nomenclature. A full 11 per cent of Hungary's exports to the EU consist of engines for cars and other motor vehicles. These are mainly exported to Germany (18 per cent of all Hungarian exports to this country), Belgium (30 per cent), the UK (13 per cent) and Spain (37 per cent). Hungary has indeed become a supplier of engines and other parts for the European automobile industry as well as a car producer in its own right.

Other major export items are automatic data processing machines (4.6 per cent of all Hungarian exports to the EU), insulated wires and cables (4.1 per cent) and video recording equipment (3.2 per cent). Overall, as we see from table 4, the eight most important commodity groups are different

kinds of machines and technical equipment. Only after these, come items such as meat and clothing.

The structure of Hungary's exports to Ireland is the most concentrated in that the ten most important CN4 product groups account for 97 per cent of the total. Ireland is followed by Spain (91 per cent), the UK (88 per cent) and the Netherlands (87 per cent). On the other hand, only 66 per cent of exports to Italy are in the ten most important product groups, followed by Denmark (72 per cent), Austria (73 per cent) and Finland (74 per cent). The average for all EU countries is 72 per cent. The figure for Germany, the most important single market, is 77 per cent.

Hungary's most important import goods start with an 8 per cent share of 'other products' and unfortunately even the CN8-digit classification does not reveal to us what these goods are. Next come parts for car and other motor vehicle engines, i.e. parts for Hungary's most important export goods. Of these parts, 72 per cent are imported from Germany and 24 per cent from Austria. The value of Hungarian engine exports is double the value of its imports of engine parts. The process does not end here. Hungary imports cars and vehicles, which constitute the third most important import goods from the EU. Of total imports of cars and other vehicles, 34 per cent come from Germany, 16 per cent from Spain, 12 per cent from France, and 10 per cent from Austria. Hungary also exports cars.

The same development can be seen in the case of video recording equipment: Hungary imports parts and exports finished products. Half of the parts are imported from Belgium and a quarter from Germany. A third of the finished video recording equipment is exported to Austria and about one-sixth each to France and Germany.

Hungary both exports and imports insulated wires and cables. If we look more closely at the data we find that Hungary exports wiring for ignition in vehicles. Consequently, this trade is also part of the European motor car industry. The imported wires and cables consist mostly of electric conductors. Hungary's top export products are human capital-intensive goods produced mainly with medium or high technology (Éltetö 1998). Indeed in Hungary, the exports of foreign-owned companies are increasingly concentrated in high-tech products. The Czech Republic, and also Poland, concentrate on labour and energy-intensive industries. (OECD Economic Surveys: Hungary 1999) In a way this may suggest that despite strong similarities in revealed comparative advantage as seen below in section 5, Hungary and the Czech Republic may not compete in the same

markets and products quite to the extent indicated by the data. The automobile industry is surely an exception.

*Table 4. Hungary's most important goods exports, ECU million*

| CN4 | Description | Total EU | % |
|------|-------------|----------|-----|
| 8407 | Spark-ignition reciprocating or rotary internal combustion piston engines | 1,272.0 | 11.03 |
| 8471 | Automatic data processing machines and units thereof; magnetic/optical readers | 525.4 | 4.56 |
| 8544 | Insulated wire, cable, electric conductors; optic fibre cable | 470.1 | 4.08 |
| 8521 | Video recording or reproducing apparatus | 367.6 | 3.19 |
| 8708 | Parts and accessories for motor vehicles | 312.4 | 2.71 |
| 8703 | Motor cars and vehicles for transporting persons (not public transport) | 250.6 | 2.17 |
| 8528 | Television receivers video monitors, video projection television receivers | 225.8 | 1.96 |
| 8473 | Parts and accessories for office machines and typewriters | 204.0 | 1.77 |
| 0207 | Meat and edible offal of poultry | 202.5 | 1.76 |
| 6204 | Women's or girls' outer clothing, not knitted or crocheted | 197.2 | 1.71 |
| 8539 | Electrical filament or discharge lamps; parts thereof | 172.9 | 1.50 |
| 6203 | Men's or boys' outer clothing, not knitted or crocheted | 166.6 | 1.44 |
| 6403 | Footwear, uppers of leather | 152.9 | 1.33 |
| 2710 | Oil (not crude) from petrol and bituminous minerals | 143.6 | 1.24 |
| 8418 | Refrigerators, freezers etc; heat pumps; parts thereof | 139.0 | 1.21 |
| 7606 | Aluminium plates, sheets and strip over 0.2 mm thick | 120.2 | 1.04 |
| 8536 | Electrical apparatus for switching or protecting electrical circuits | 116.7 | 1.01 |
| 8522 | Parts and accessories of sound/video recording or reproducing equipment | 115.1 | 1.00 |

Hungary's top ten import products from the EU together account for 69 per cent of its total imports. Thus its imports are slightly less concentrated than its exports. The most concentrated are imports from Portugal (95 per cent of Hungary's imports from there), Ireland (94 per cent) and Finland (91 per cent). The least concentrated are imports from the Netherlands (59 per cent) and Italy (62 per cent).

*Table 5. Hungary's most important goods imports, ECU million*

| CN4 | Description | Total EU | % |
|---|---|---|---|
| 9990 | Other products | 1,038.4 | 7.94 |
| 8409 | Parts for spark-ignition or compression-ignition engines | 529.8 | 4.05 |
| 8703 | Motor cars and vehicles for transporting persons (not public transport) | 411.9 | 3.15 |
| 8473 | Parts and accessories for office machines and typewriters | 368.2 | 2.82 |
| 8708 | Parts and accessories for motor vehicles | 281.5 | 2.15 |
| 8544 | Insulated wire, cable, electric conductors; optic fibre cable | 242.9 | 1.86 |
| 3004 | Medicament mixtures, put in dosage or packaged for retail | 222.4 | 1.70 |
| 8522 | Parts and accessories of sound/video recording or reproducing equipment | 200.8 | 1.54 |
| 8536 | Electrical apparatus for switching or protecting electrical circuits | 160.6 | 1.23 |
| 8471 | Automatic data processing machines and units thereof; magnetic/optical readers | 156.4 | 1.20 |
| 8704 | Motor vehicles for transport of goods | 140.4 | 1.07 |
| 4104 | Leather of bovine or equine | 138.3 | 1.06 |

Table 6 shows the largest trade surplus and deficit commodity groups in Hungary's EU trade. These follow closely the lines set by the above two tables, with engines, electrical machinery and equipment, and clothing constituting the bulk of net exports. On the net import side engine parts and finished cars are high on the list. These products also reveal something about comparative advantage, which is analysed in section 5.

At the CN2 level we can see how Hungarian-EU trade is dominated by only two product groups. Of Hungarian exports to the EU 24.4 per cent comprise nuclear reactors, boilers, machinery and mechanical appliances and related parts, and 21.1 per cent comprise electrical machinery and equipment and related parts. Of Hungary's imports from the EU, the respective figures for the two product groups are 20.3 and 16.7 per cent.

*Table 6. Hungary's largest trade surpluses and deficits by commodity group*

| CN4 | Description | Trade surplus, ECU million | % of exports to the EU |
|------|-------------|-----------------------------|--------------------------|
| 8407 | Spark-ignition reciprocating or rotary internal combustion piston engines | 1,256.8 | 10.90 |
| 8471 | Automatic data processing machines and units thereof; magnetic/optical readers | 369.0 | 3.20 |
| 8521 | Video recording or reproducing apparatus | 360.8 | 3.13 |
| 8544 | Insulated wire, cable, electric conductors; optic fibre cable | 227.1 | 1.97 |
| 8528 | Television receivers video monitors, video projection television receivers | 214.9 | 1.86 |
| 0207 | Meat and edible offal of poultry | 200.4 | 1.74 |
| 6204 | Women's or girls' outer clothing, not knitted or crocheted | 172.0 | 1.49 |
| 8539 | Electrical filament or discharge lamps; parts thereof | 148.1 | 1.28 |
| 6203 | Men's or boys' outer clothing, not knitted or crocheted | 141.3 | 1.23 |
| 6403 | Footwear, uppers of leather | 116.0 | 1.01 |
| 7606 | Aluminium plates, sheets and strip over 0.2 mm thick | 102.9 | 0.89 |
| … | | … | |
| 8525 | Transmission apparatus for radio and television | -101.4 | -0.88 |
| 4104 | Leather of bovine or equine | -115.1 | -1.00 |
| 8704 | Motor vehicles for transport of goods | -139.1 | -1.21 |
| 8703 | Motor cars and vehicles for transporting persons (not public transport) | -161.3 | -1.40 |
| 8473 | Parts and accessories for office machines and typewriters | -164.2 | -1.42 |
| 3004 | Medicament mixtures, put in dosage or packaged for retail | -203.4 | -1.76 |
| 8409 | Parts for spark-ignition or compression-ignition engines | -459.3 | -3.98 |
| 9990 | Other products | -951.9 | -8.25 |

## 2.3 The Czech Republic's Trade With the EU

Germany dominates Czech EU trade: three-fifths of its exports go to Germany and 53 per cent of its imports originate from there. The next two most important trading partners are Austria and Italy, i.e. the same countries as for Hungary. The Czech Republic had trade surpluses only with Greece and Portugal, neither of which is important in its foreign trade.

*Table 7. Czech trade with the EU, ECU million*

| EU Country | Exports to the EU | % | Imports from the EU | % | Trade balance | Czech trade surplus, % of its exports to the EU |
|---|---|---|---|---|---|---|
| Germany | 6,946.1 | 59.8 | 8,108.6 | 53.3 | -1,162.5 | -16.7 |
| Austria | 1,279.8 | 11.0 | 1,444.3 | 9.5 | -164.5 | -12.9 |
| Italy | 731.5 | 6.3 | 1,323.1 | 8.7 | -591.5 | -80.9 |
| United Kingdom | 648.6 | 5.6 | 970.3 | 6.4 | -321.6 | -49.6 |
| France | 557.3 | 4.8 | 1,038.4 | 6.8 | -481.0 | -86.3 |
| Belgium and Luxembourg | 373.2 | 3.2 | 541.3 | 3.6 | -168.0 | -45.0 |
| Netherlands | 335.4 | 2.9 | 552.5 | 3.6 | -217.1 | -64.7 |
| Sweden | 206.7 | 1.8 | 298.1 | 2.0 | -91.4 | -44.2 |
| Spain | 158.1 | 1.4 | 370.1 | 2.4 | -212.0 | -134.1 |
| Denmark | 121.0 | 1.0 | 131.8 | 0.9 | -10.4 | -8.6 |
| Finland | 90.3 | 0.8 | 253.3 | 1.7 | -163.0 | -180.6 |
| Greece | 87.4 | 0.8 | 43.7 | 0.3 | 43.7 | 50.0 |
| Ireland | 40.0 | 0.3 | 114.4 | 0.8 | -74.4 | -185.8 |
| Portugal | 33.5 | 0.3 | 19.7 | 0.1 | 13.8 | 41.2 |
| Total EU | 11,609.5 | 100.0 | 15,209.5 | 100.0 | -3,600.0 | -31.0 |

The Czech trade deficit with the EU was larger than the Hungarian deficit both in absolute figures and relative to the country's exports to the EU. The Czech currency, the koruna, had appreciated in 1996 against the Deutsche Mark from 18.5 to 16.9 by February 1997. It then depreciated for the remainder of 1997, to 19.6 in December. The country's overall trade balance improved in 1997 from 1996.

The most important export goods of the Czech Republic to the EU are cars and other vehicles, which together with CN groups 8704-8706 raise the motor car industry to at least 15 per cent of all Czech exports to the European Union. Of the exports of these four product groups, 55 per cent goes to Germany and between 5 and 8 per cent each to Italy, the UK, Austria, Belgium and France. In the case of CN group 8703, i.e. finished motor cars, only 30 per cent go to Germany, while 17 per cent go to Italy, 14 per cent to the UK and 9 per cent to Austria. Germany thus imports proportionally more intermediary goods. The Czech Republic's top export products are labour intensive to a larger extent than those of Hungary (Éltetö 1998). These are generally products of fairly low degree of value

added, such as wood, coal, and iron and steel structures. Using a CN2 classification, the Czech Republic's most important export goods are vehicles other than railway or tramway rolling-stock and related parts (13.0 per cent), electrical machinery and equipment and related parts (11.9 per cent) and nuclear reactors, boilers, machinery and mechanical appliances and related parts (11.6 per cent).

*Table 8. The Czech Republic's most important goods exports, ECU million*

| CN4 | Description | Total EU | % |
|------|-------------|----------|------|
| 8703 | Motor cars and vehicles for transporting persons (not public transport) | 812.6 | 7.00 |
| 8708 | Parts and accessories for motor vehicles | 455.6 | 3.92 |
| 9401 | Seats and parts for aircraft seats, car seats, swivel seats | 278.0 | 2.39 |
| 8544 | Insulated wire, cable, electric conductors; optic fibre cable | 244.2 | 2.10 |
| 8536 | Electrical apparatus for switching or protecting electrical circuits | 233.3 | 2.01 |
| 4407 | Wood sawn or chipped | 170.8 | 1.47 |
| 2701 | Coal and solid fuels manufactured from coal | 146.0 | 1.26 |
| 7308 | Structures and parts thereof of iron or steel constructions | 145.5 | 1.25 |
| 9403 | Other furniture and parts thereof of office and household furniture | 142.0 | 1.22 |
| 7326 | Other articles of iron or steel | 139.9 | 1.20 |
| 9990 | Other products | 126.9 | 1.09 |
| 8501 | Electric motors and generators | 123.6 | 1.06 |
| 8431 | Parts for lifting, handling, loading and unloading machinery | 119.6 | 1.03 |
| 4011 | New pneumatic tyres of rubber | 116.6 | 1.00 |

Czech exports to the EU are less concentrated than those of Hungary. The ten most important CN4 product groups account for 66 per cent of Czech exports to the EU.[6] The most concentrated this is with Ireland (95 per cent of exports there), Portugal (81 per cent) and Belgium-Luxembourg (80 per cent), and the least with the Netherlands (62 per cent), Germany (67 per cent) and Italy (67 per cent). The structure of Czech exports to two of its

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[6] Indeed, the revealed comparative advantage of the Czech Republic is wider than Hungary's. With a 'wider' RCA we mean that the number of product groups for which the Czech Republic enjoys a revealed comparative advantage is larger than that for Hungary.

most important national exports markets within the EU, Germany and Italy, are therefore on a fairly wide basis.

While the Czech Republic exports motor cars and related parts to the EU, it also imports them to a large extent. Other significant import goods are different kinds of machines and equipment. Using a CN2 classification the most important import goods are nuclear reactors, boilers, machinery and mechanical appliances and related parts (19.3 per cent), electrical machinery and equipment and related parts (16.1 per cent) and vehicles, other than railway or tramway rolling-stock and related parts (10.5 per cent), i.e. the same top three, albeit in a different order, as in Czech exports to the EU. As seen later, intra-industry trade between the Czech Republic and the EU is indeed extensive.

*Table 9. The Czech Republic's most important goods imports, ECU million*

| CN4 | Description | Total EU | % |
|------|-------------|----------|------|
| 8703 | Motor cars and vehicles for transporting persons (not public transport) | 621.9 | 4.09 |
| 8708 | Parts and accessories for motor vehicles | 541.2 | 3.56 |
| 3004 | Medicament mixtures, put in dosage or packaged for retail | 270.0 | 1.78 |
| 8536 | Electrical apparatus for switching or protecting electrical circuits | 221.2 | 1.45 |
| 8544 | Insulated wire, cable, electric conductors; optic fibre cable | 211.3 | 1.39 |
| 8538 | Parts for electrical switching apparatus | 200.6 | 1.32 |
| 8471 | Automatic data processing machines and units thereof; magnetic/optical readers | 197.8 | 1.30 |
| 8517 | Electric apparatus for line telephone sets | 184.6 | 1.21 |
| 2710 | Oil (not crude) from petrol and bituminous minerals | 173.0 | 1.14 |
| 9990 | Other products | 165.6 | 1.09 |
| 8481 | Taps, cocks, valves and similar appliances; parts thereof | 164.6 | 1.08 |
| 8704 | Motor vehicles for transport of goods | 160.7 | 1.06 |
| 3926 | Articles of plastics | 160.3 | 1.05 |
| 8532 | Electrical capacitors; parts thereof | 160.3 | 1.05 |
| 8525 | Transmission apparatus for radio and television | 155.4 | 1.02 |

The Czech Republic's ten most important import products at the CN4 level make up 67 per cent of all imports from the EU. Among the most concentrated, are again imports from Ireland (96 per cent) and Finland (91 per cent). The least concentrated are imports from the Netherlands (62 per

cent), Austria (65 per cent) and Belgium-Luxembourg (66 per cent). The figure for Germany is 68 per cent and for Italy 71 per cent.

On the basis of the above tables it is not surprising that the largest net exports are in motor cars and wood products, while the largest net imports are in different kinds of electronic equipment.

*Table 10. Czech Republic's largest trade surpluses and deficits by commodity group*

| CN4 | Description | Trade surplus ECU million | % of exports to the EU |
|------|------------|---------------------------|------------------------|
| 8703 | Motor cars and vehicles for transporting persons (not public transport) | 190.7 | 1.64 |
| 4407 | Wood sawn or chipped | 157.1 | 1.35 |
| 9401 | Seats and parts for aircraft seats, car seats, swivel seats | 156.9 | 1.35 |
| 2701 | Coal and solid fuels manufactured from coal | 146.0 | 1.26 |
| 4403 | Wood in the rough | 101.7 | 0.88 |
| … | | … | |
| 2710 | Oil (not crude) from petrol and bituminous minerals | -100.9 | -0.87 |
| 8481 | Taps, cocks, valves and similar appliances; parts thereof | -112.7 | -0.97 |
| 8525 | Transmission apparatus for radio and television | -150.3 | -1.29 |
| 8538 | Parts for electrical switching apparatus | -151.4 | -1.30 |
| 8517 | Electric apparatus for line telephone sets | -172.7 | -1.49 |
| 8471 | Automatic data processing machines and units thereof; magnetic/optical readers | -184.2 | -1.59 |
| 3004 | Medicament mixtures, put in dosage or packaged for retail | -263.3 | -2.27 |

# 3  Intra-Industry Trade

Intra-industry trade (IIT) refers to the exports and imports of similar goods between two countries. The extent of intra-industry trade is measured by a Grubel-Lloyd (1971) index. It measures the sum of absolute differences between exports ($x$) and 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 two countries. If the index takes the value zero, there is no intra-industry trade between the

countries. As the index approaches 100, the share of IIT in total trade approaches 100 per cent. More formally the index is given by

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

IIT is typically high between countries that are at a similar and relatively high level of economic development. This can be seen in the fourth column of table 11, which gives the levels of IIT in EU countries' intra-EU trade.

Especially the Czech Republic, but also Hungary, have relatively high levels of IIT, surpassing many of the current EU countries' levels. The highest level of IIT is found between the Czech Republic and Germany. The Czechs also have high levels in trade with France and the United Kingdom. Hungary's highest IIT levels are with Germany and Austria, its two most important trading countries.

*Table 11. Share of intra-industry trade in all trade*

|  | Hungary | Czech Republic | Intra-EU |
|---|---|---|---|
| France | 26.4 | 43.9 | 74.7 |
| Belgium-Luxembourg | 24.2 | 32.7 | 66.8 |
| Netherlands | 22.9 | 33.1 | 59.9 |
| Germany | 43.2 | 59.0 | 70.0 |
| Italy | 32.3 | 26.6 | 53.0 |
| United Kingdom | 27.8 | 39.8 | 65.5 |
| Ireland | 13.5 | 19.8 | 39.9 |
| Denmark | 17.6 | 15.3 | 52.9 |
| Greece | 6.1 | 4.9 | 20.1 |
| Portugal | 4.1 | 22.0 | 40.5 |
| Spain | 11.6 | 20.8 | 58.9 |
| Sweden | 20.3 | 19.0 | 55.0 |
| Finland | 17.5 | 9.0 | 38.2 |
| Austria | 41.2 | 33.9 | 59.1 |
| Total EU | 44.5 | 56.6 | .. |

In the following two tables we find those CN4 digit groups in which an EU country and either Hungary or the Czech Republic are engaged in trade worth more than ECU 100 million and where the share of IIT is greater than 70 per cent. In the case of Hungary these conditions are reached for Germany, the United Kingdom and Austria for at least one product group. For Germany the goods are mainly parts for office machines, motor cars and video recording equipment, but also motor cars in general and other machines. For the UK and Austria, the goods are products of the electronics industry.

*Table 12. Hungary-EU principal IIT trade groups with total trade (exports plus imports) exceeding ECU 100 million and IIT exceeding 70 per cent*

|  | CN4 | Description | Total trade, ECU million | IIT |
|---|---|---|---|---|
| Germany | 8473 | Parts and accessories for office machines and typewriters | 433.2 | 88.0 |
|  | 8708 | Parts and accessories for motor vehicles | 349.2 | 91.3 |
|  | 8703 | Motor cars and vehicles for transporting persons (not public transport) | 243.2 | 83.4 |
|  | 8536 | Electrical apparatus for switching or protecting electrical circuits | 186.5 | 88.2 |
|  | 8471 | Automatic data processing machines and units thereof; magnetic/optical readers | 127.4 | 78.3 |
|  | 8522 | Parts and accessories of sound/video recording or reproducing equipment | 114.0 | 83.5 |
|  | 8433 | Harvesting or threshing machinery | 102.4 | 98.4 |
| United Kingdom | 8471 | Automatic data processing machines and units thereof; magnetic/optical readers | 122.0 | 77.8 |
| Austria | 8544 | Insulated wire, cable, electric conductors; optic fibre cable | 199.7 | 74.0 |

In the case of the Czech Republic these conditions are reached for France, Germany and the UK. The goods in question are mostly like those for Hungary above, but we can see that the aggregate value of these goods exceeds that in Hungarian trade.

*Table 13. Czech Republic-EU principal IIT trade groups with total trade (exports plus imports) exceeding ECU 100 million and IIT exceeding 70 per cent*

|  | CN4 | Description | Total trade, ECU million | IIT |
|---|---|---|---|---|
| France | 8703 | Motor cars and vehicles for transporting persons (not public transport) | 161.8 | 79.7 |
| Germany | 8708 | Parts and accessories for motor vehicles | 738.8 | 93.3 |
|  | 8703 | Motor cars and vehicles for transporting persons (not public transport) | 519.4 | 93.7 |
|  | 8544 | Insulated wire, cable, electric conductors; optic fibre cable | 359.1 | 77.2 |
|  | 8536 | Electrical apparatus for switching or protecting electrical circuits | 344.9 | 97.7 |
|  | 9990 | Other products | 240.8 | 97.9 |
|  | 8413 | Pumps for liquids; liquid elevators; parts thereof | 175.2 | 91.1 |
|  | 3917 | Tubes, pipes and hoses and their fittings of plastics | 153.9 | 75.4 |
|  | 8507 | Electric storage batteries, separators; parts thereof | 152.2 | 98.0 |
|  | 3926 | Articles of plastics | 149.0 | 70.4 |
|  | 8504 | Electric transformers, static converters and inductors; parts thereof | 146.9 | 85.7 |
|  | 8503 | Parts for electric motors, generators, rotary converters | 125.6 | 98.6 |
|  | 4911 | Other printed matter, including printed pictures and photos | 119.4 | 90.7 |
|  | 8537 | Boards, panels, consoles, desks, cabinets with electrical switching apparatus | 115.3 | 75.8 |
| United Kingdom | 8532 | Electrical capacitors; parts thereof | 234.4 | 74.5 |
|  | 8103 | Tantalum and articles thereof | 142.2 | 86.7 |

The calculations for intra-industry trade do not tell us to what extent the countries are trading in goods of similar quality. To analyse this question, 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. Vertical intra-industry trade is positively correlated with product differentiation, economies of scale, labour intensity of production and inward flows of foreign direct investment (See e.g. Aturupane et al. 1999).

We adopt the approach by Greenaway et al. (1994) and define HIIT to include those goods where the ratio of unit export prices to unit import

prices is at par ±15 per cent. The ±15 per cent allows for the difference between fob and cif prices in trade.

The EU countries' unit export prices are higher than their unit import prices with Hungary and the Czech Republic. The difference is larger for the latter. Especially noticeable is the difference for Germany.

*Table 14. Ratio of EU unit export prices to EU unit import prices in trade between Czech Republic, Hungary and EU countries*

| EU country | Hungary | Czech Republic | EU country | Hungary | Czech Republic |
|---|---|---|---|---|---|
| France | 0.5 | 1.6 | Greece | 0.7 | 0.9 |
| Belgium-Luxembourg | 1.2 | 1.2 | Portugal | 3.6 | 1.7 |
| Netherlands | 0.6 | 1.8 | Spain | 0.9 | 1.2 |
| Germany | 1.5 | 3.7 | Sweden | 1.2 | 1.6 |
| Italy | 4.9 | 2.7 | Finland | 0.9 | 5.8 |
| United Kingdom | 1.4 | 2.3 | Austria | 3.8 | 5.9 |
| Ireland | 1.4 | 5.1 | Total EU | 2.2 | 3.9 |
| Denmark | 1.4 | 2.6 | | | |

Charts 3 and 4 give the results from the vertical IIT calculations.[7] Most of the IIT is indeed vertical in character. These results typical for emerging

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[7] *Share of trade used to calculate extent of vertical intra-industry trade*

| | Hungary | | Czech Republic | |
|---|---|---|---|---|
| | EU exports | EU imports | EU exports | EU imports |
| France | 78.0 | 96.6 | 89.1 | 91.6 |
| Belgium-Luxembourg | 75.8 | 89.1 | 75.2 | 95.1 |
| Netherlands | 80.7 | 96.5 | 81.3 | 90.6 |
| Germany | 96.5 | 99.5 | 97.4 | 98.5 |
| Italy | 88.8 | 86.5 | 85.5 | 90.7 |
| United Kingdom | 78.8 | 95.9 | 87.4 | 96.3 |
| Ireland | 52.2 | 56.5 | 62.0 | 41.3 |
| Denmark | 47.4 | 72.9 | 57.1 | 75.0 |
| Greece | 52.7 | 50.9 | 19.8 | 26.6 |
| Portugal | 58.7 | 29.7 | 61.8 | 31.6 |
| Spain | 64.6 | 52.8 | 64.7 | 78.7 |
| Sweden | 61.8 | 77.0 | 73.2 | 85.8 |
| Finland | 23.1 | 55.5 | 53.4 | 55.8 |
| Austria | 78.7 | 95.1 | 90.6 | 88.5 |
| Total EU | 98.9 | 99.2 | 98.4 | 98.2 |

The share of IIT in general is calculated from all export and import data, while vertical IIT has been calculated only for that trade data for which unit prices were available. These figures were then extrapolated to apply to all trade. The problem is

Central and Eastern European markets are confirmed, *inter alia*, by Aturupane et al. (1999) and Kaitila and Widgrén (1999).

In relative terms Hungary's intra-industry trade is based more on horizontal IIT than is Czech trade. This is a likely result of the significantly lower ratio of unit export price to unit import ratio price for the former. The highest levels of horizontal intra-industry trade as a percentage of total bilateral intra-industry trade for Hungary is with Spain (50 per cent) and the Netherlands (41 per cent), but the largest trading partner, Germany, is not far behind (38 per cent). Hungary's second and third most important EU trade partners, Austria and Italy, show a much lower level of horizontal IIT. On the other hand Austria and Italy are at the top, with Germany, when we measure the share of IIT in trade in general.

*Table 15. Share of horizontal component in all IIT*

| EU country | Hungary | Czech Republic | EU country | Hungary | Czech Republic |
|---|---|---|---|---|---|
| France | 20.3 | 13.4 | Greece | 21.0 | 20.0 |
| Belgium-Luxembourg | 26.0 | 14.5 | Portugal | 25.3 | 37.3 |
| Netherlands | 41.1 | 14.3 | Spain | 50.2 | 10.1 |
| Germany | 38.1 | 11.1 | Sweden | 19.3 | 15.2 |
| Italy | 8.8 | 14.4 | Finland | 19.8 | 9.2 |
| United Kingdom | 10.8 | 8.3 | Austria | 18.0 | 13.0 |
| Ireland | 18.2 | 3.5 | Total EU | 24.6 | 16.4 |
| Denmark | 3.4 | 40.6 | | | |

The level of IIT in Czech-EU trade, even though on average higher than in Hungarian-EU trade, is based proportionately more on vertical IIT than the latter. For the Czech Republic the highest levels of horizontal IIT of all

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that in some cases we had an ECU value for the trade but no tonnage, so unit prices could not be calculated. The table below tells to what extent the data for which unit prices could be calculated covers total trade. The calculations for the EU as a whole and e.g. for Germany are very reliable, but for countries such as Ireland, Denmark, Greece, Portugal and Finland the results should be seen as indicative only.

*Chart 3. Share of intra-industry trade and its vertical component for Hungary, per cent of total trade with the EU*
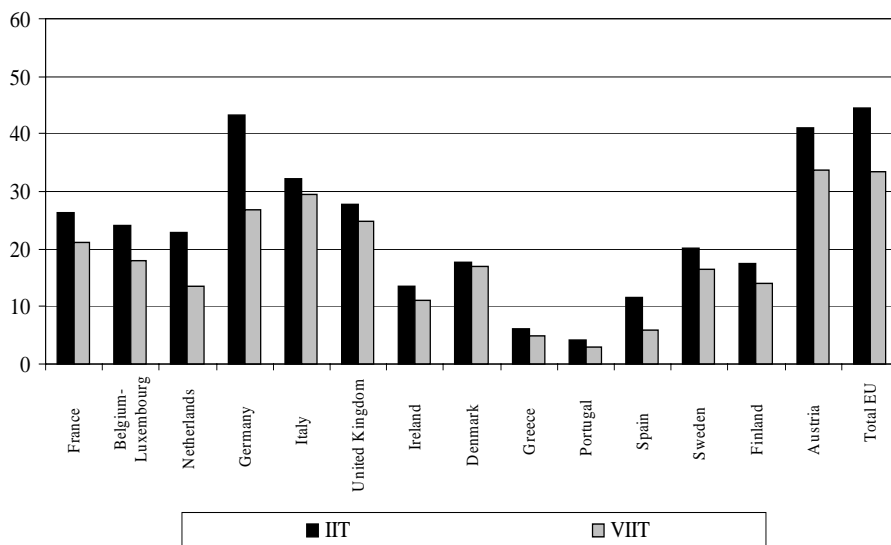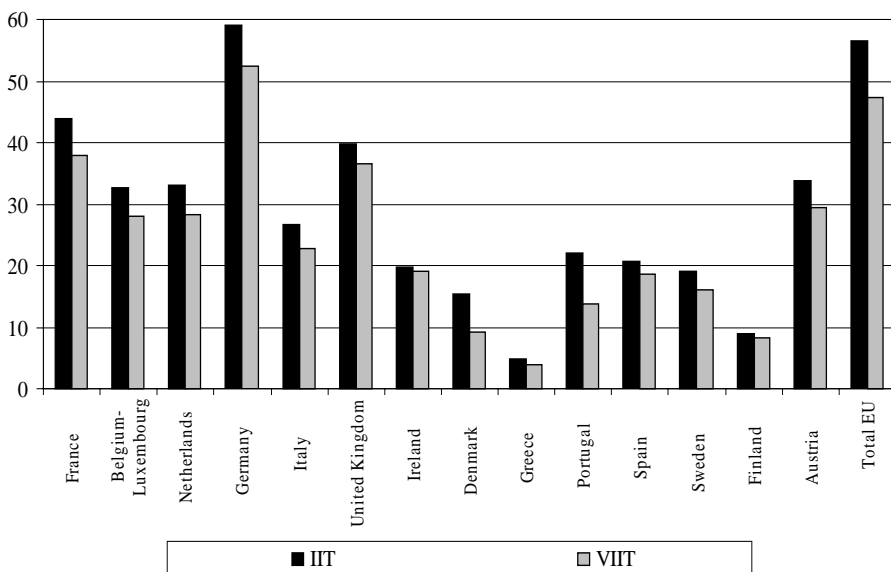


*Chart 4. Share of intra-industry trade and its vertical component for Czech Republic, per cent of total trade with the EU*

bilateral IIT are in its trade with Denmark (41 per cent) and Portugal (37 per cent). The most important trading partners, Germany, Austria and Italy, come far behind.

# 4    FDI Flows and Intra-Industry Trade

The above IIT figures should also be analysed in the light of the foreign direct investment flows into Hungary and the Czech Republic. High levels of FDI often correspond with relatively high levels of intra-industry trade. As noted by Aturupane et al. (1999) vertical IIT and FDI inflows are positively correlated. We have used aggregate IIT levels in the following, but as most of it is vertical by nature, the correlation is high. Furthermore, in the case of EU trade with Hungary the ratio of unit export prices to unit import prices is only 2.2 and for some EU countries it is very close to unity or even lower. Consequently, FDI does not always flow into the country with the lower ratio of unit export price to unit import price.

Overall, Hungary and the Czech Republic are the largest receivers of FDI per capita of the Central and Eastern European countries. As can be seen from chart 5, FDI per capita into Hungary far exceeds the flows into the Czech Republic, and also into Poland, which is included in the chart. One sees a clear jump in FDI inflows for Hungary and the Czech Republic in 1995, but no such change for Poland. These developments are partly linked to the countries' privatisation programmes. The aggregate stock of FDI into the Czech Republic during 1990-1998 amounted to USD 10,127 million, while it was USD 17,182 million in Hungary. Foreign-owned companies are very important. Of Hungary's gross exports, 72 per cent is produced by these companies (OECD Economic Surveys: Hungary 1999).

Of the stock of FDI into Hungary, 72 per cent had originated from the European Union by the end of 1996, with the United States contributing an additional 17 per cent of the total. Of the EU's share, one-third had come from Germany, one-fifth from Austria, 13 per cent from the Netherlands, 11 per cent from France and 8 per cent from the United Kingdom.

*Chart 5. Stock of foreign direct investment into the Czech Republic, Hungary and Poland in the 1990s, USD per capita*
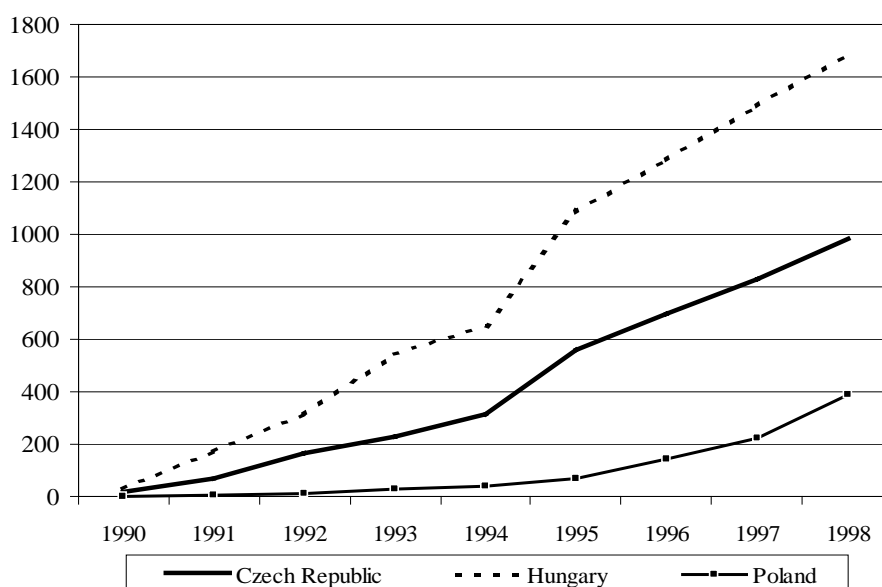


Some 51 per cent of all EU-Hungarian intra-industry trade is with Hungary's largest trading partner, Germany. In this sense it seems quite logical that Germany is also the largest contributor of FDI into Hungary. Some 21 per cent of all IIT between the EU and Hungary was with Austria, which also ranks high on the list for FDI. Italy came in third in the share of IIT with 10 per cent, which is however much higher than its five per cent share in EU-originated FDI. For the Netherlands and France the ratios are the other way around, as their shares in FDI far exceed their shares in IIT, which are some 3-4 per cent for both countries. Chart 6 plots combinations of shares of EU-originated FDI and shares in EU-Hungarian IIT on a logarithmic scale. Here the expected positive relationship between FDI inflows and IIT is clearly visible.

*Chart 6. Correlation of IIT and FDI stock, logarithmic scale*
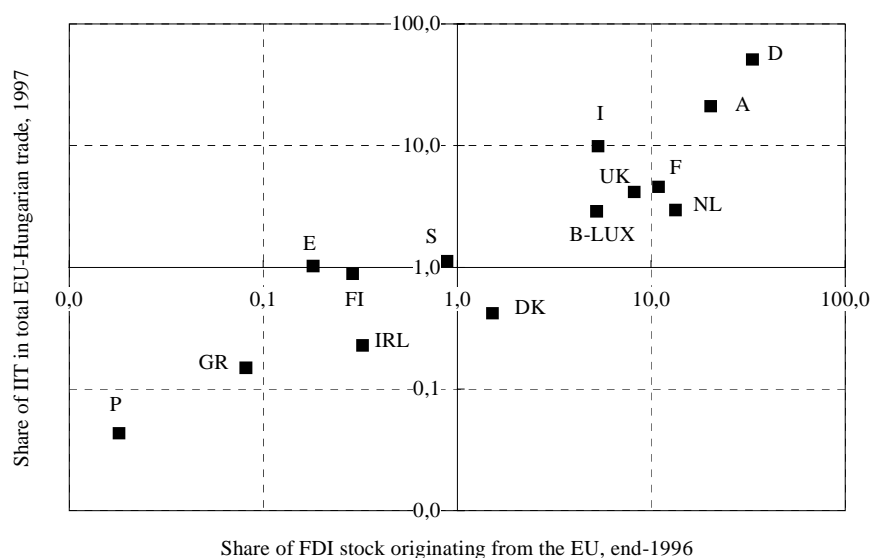


Share of FDI stock originating from the EU, end-1996

*Source: OECD International Direct Investment Statistics Yearbook 1998 and author's calculations*

A regression using OLS was made to explain the share of FDI flowing from a particular EU country to Hungary with two independent variables: the country's share in aggregate EU-Hungarian intra-industry trade and the distance between the nations' capitals[8] in thousands of kilometres[9]. The distance factor gives the regression a gravitational dimension. The regression turns out to be

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[8] Frankfurt was used for Germany and Bologna for Italy, because it was felt that using Berlin and Rome would not fully take into account the distribution of economic power in these countries.

[9] Taking logarithms of the distance variable made the results statistically less significant.

$$FDI = 6.489 + 0.591\ (IIT) - 2.776\ (Distance)$$
$$(1.878)\quad (6.373)\qquad\quad (-1.230)$$

with $R^2 = 0.86$ (t-statistics in parentheses).

This simple regression should be thought of as illustrative only,[10] but it does confirm clearly what can also be seen from the (logarithmic) chart. The share in FDI corresponds positively with the share in IIT and negatively with the distance factor. Both signs are as anticipated. Distance is not statistically significant, but the share in aggregate IIT is all the more so.

*Table 16. Inflow of foreign direct investment to the Czech Republic, CZK million*

| Country of origin | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | Stock at end-1997 |
|---|---|---|---|---|---|---|---|---|
| Total | 16,567 | 28,379 | 16,553 | 24,819 | 67,894 | 38,775 | 41,251 | 234,239 |
| of which (%) | | | | | | | | |
| EU | .. | .. | .. | .. | .. | .. | .. | 70.9 |
| Germany | 74.5 | 15.8 | 14.4 | 48.4 | 22.2 | 17.5 | 30.1 | 27.9 |
| Netherlands | 1.3 | 0.5 | 5.3 | 0.7 | 28.8 | 18.2 | 10.3 | 13.8 |
| France | 2.6 | 22.3 | 5.9 | 8.9 | 6.5 | 1.4 | 7.8 | 7.8 |
| Austria | 6.3 | 4.0 | 9.7 | 9.2 | 3.4 | 14.6 | 7.3 | 7.3 |
| Belgium | 5.6 | 8.8 | 5.7 | 3.8 | 1.0 | 4.0 | 4.3 | 4.0 |
| Italy | 0.2 | 6.6 | 2.1 | 1.3 | 1.7 | 6.3 | -2.8 | 2.1 |
| Other EU | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 8.0 |
| United States | 9.2 | 28.8 | 44.9 | 4.6 | 4.0 | 17.7 | 7.6 | 13.2 |
| Switzerland | 0.3 | 8.0 | 2.4 | 4.6 | 26.5 | 3.9 | 3.6 | 10.6 |
| Other | 0.0* | 5.2* | 9.6* | 18.5* | 6.0* | 16.6* | 31.7* | 5.3 |
| Total | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |

\* including 'Other EU'
*Source: Czech National Bank*

Germany is by far the most important source of FDI to the Czech Republic. Of the stock of FDI cumulated in 1991-1997, 28 per cent was from Germany. Of the other EU countries, the Netherlands had a 14 per cent share and France and Austria each about 7 to 8 per cent. The third largest

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[10] A more comprehensive statistical analysis of FDI flows can be found in e.g. Garibaldi *et al.* (1999).

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trading partner, Italy, had a mere two per cent share, and it actually contributed negatively in 1997. Of the non-EU countries the United States had contributed 13 per cent of the total FDI inflow and Switzerland 11 per cent.

From chart 7 we see that the positive correlation between the FDI stock and IIT is visible also in the Czech case.

*Chart 7. Correlation of IIT and FDI stock, logarithmic scale*
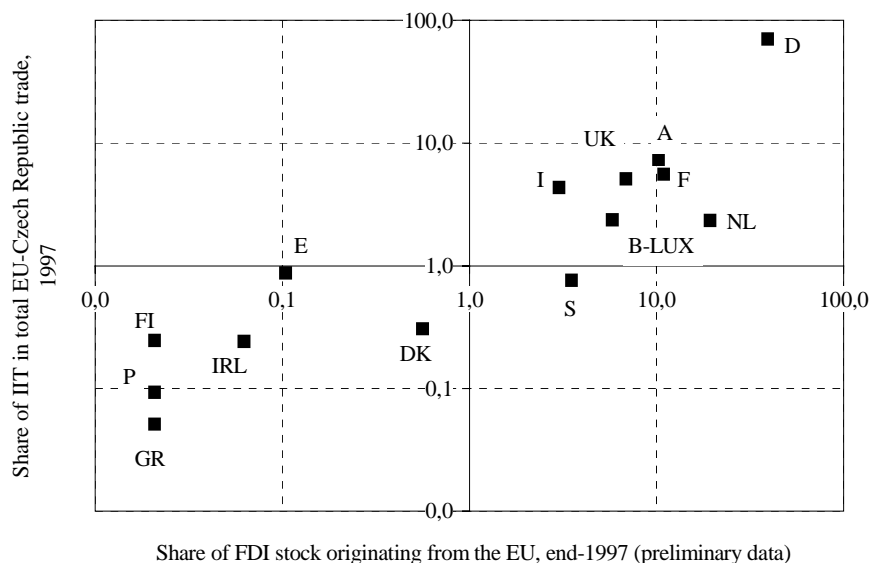


Share of FDI stock originating from the EU, end-1997 (preliminary data)

*Source: OECD International Direct Investment Statistics Yearbook 1998 and author's calculations*

An OLS regression to explain FDI was done also for the Czech Republic:

$$FDI = 9.000 + 0.464 \ (IIT) - 4.947 \ (Distance)$$
$$(2.741) \quad (5.886) \quad \quad (-1.881)$$

with $R^2 = 0.84$. The results are similar to those obtained for Hungary except that the statistical significance of the constant and of the distance variable is more pronounced. They are also larger in absolute terms.

However, the coefficient of the IIT variable is smaller as is its statistical significance.

*Table 17. FDI stock in Hungary (end-1996) the Czech Republic (end-1997, preliminary data), per cent of total stock*

| Sector | Hungary | Czech Republic |
|---|---|---|
| Agriculture and Fishing | 1.2 | 0.1 |
| Mining and quarrying | 1.3 | 1.0 |
| Manufacturing | 38.8 | 41.9 |
|    Food products | 9.5 | 11.6 |
|    Textile and wood activities | 4.4 | 5.2 |
|    Petroleum, chemical, rubber and plastic products | 8.5 | 7.7 |
|    Metal and mechanical products | 4.6 | 4.9 |
|    Office machinery, computers, radio, TV and communication equipment | 5.1 | 0.0 |
|    Vehicles and other transport equipment | 2.5 | 12.5 |
| Electricity, gas and water | 14.8 | 8.9 |
| Construction | 3.9 | 7.4 |
| Trade and repairs | 11.9 | 8.9 |
| Hotels and restaurants | 2.4 | 0.0 |
| Transport and communication | 9.2 | 18.2 |
| Financial activities | 9.3 | 9.4 |
| Real estate and business activities | 7.1 | 0.0 |
| Other services | 0.5 | 0.0 |
| Other | -0.3 | 4.1 |
| Total | 100.0 | 100.0 |

*Source: OECD International Direct Investment Statistics Yearbook 1998*

From table 17 we see that some two-fifths of the FDI stock in both Hungary and the Czech Republic went into manufacturing. Also the division between sectors of manufacturing is fairly similar except that investment in the Czech car industry stands out. Volkswagen bought into Škoda Auto in 1990. Škoda produced some 200,000 cars *per annum* up until 1995 but had doubled this level to 400,000 by 1998. These cars are largely assembled in the Czech Republic from imported components (Business Central Europe July/August 1999). Audi, GM-Opel, Suzuki, and

Ford Motor have invested in Hungary. A total of 73,000 passenger cars were produced in 1997. Of these 51,000 were exported (OECD Economic Survey: Hungary 1999).

Otherwise, FDI into Hungary has gone proportionately more into electricity, gas and water, trade and repairs, and real estate and business activities than in the Czech Republic, where construction, and transport and communications are proportionally more important. Remember, however, that the FDI stock in Hungary is almost 70 per cent larger than in the Czech Republic.

# 5　　Revealed Comparative Advantage

The Balassa (1965) index has become a standard measurement of revealed comparative advantage. The idea is that trade flows reveal the comparative advantage of nations. It does not, however, explain what is behind the comparative advantage. A simple index could not explain an issue as complex as why one nation has a comparative advantage in a given product while another nation does not. The approach taken here seeks to determine to what extent the revealed comparative advantages of two countries in any one market converge.

For this purpose a 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, i.e.

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

where　　$x_{ij}^{k}$　　is exports of country $i$ to country/area $j$ of product $k$,

　　　　　$X_{ij}$　　is total exports of country $i$ to country/area $j$,

　　　　　$x^{k}$　　is intra-EU exports of product $k$,

　　　　　$X$　　is total intra-EU exports.

Using this equation we get an index value for all 1,242 commodity groups in the CN4 classification and all possible country-market pairs. We then divide the results into two groups, depending on whether the Balassa index is greater or smaller than unity, i.e. whether the country in question enjoys

or does not enjoy a revealed comparative advantage (RCA) in the respective market for the given good. We then proceed to construct two-by-two tables in the manner presented below.

| Hungarian exports to the EU vs French exports to the EU | | From Hungary to EU | |
|---|---|---|---|
| | | BI < 1 | BI > 1 |
| From France to EU | BI < 1 | *A* | *B* |
| | BI > 1 | *C* | *D* |

Cells *A*, *B*, *C* and *D* each contain a number of product groups. Cell *A* gives the number of product groups for which neither France nor Hungary enjoys a revealed comparative advantage in the EU market, cell *B* the number of product groups for which Hungary does but France does not enjoy an advantage in the EU market, cell *C* the number of product groups for which Hungary does not but France does enjoy an advantage and, finally, cell *D* the number of product groups for which both Hungary and France have a revealed comparative advantage.

In order to determine the extent of similarity in the structures of revealed comparative advantage in the exports of two countries to a given market area, we carry out a $\chi^2$ test for the values of Balassa indices smaller or greater than unity. The test is performed on the basis of the kind of two-by-two tables shown above. In this case, the null hypothesis is that comparative advantages are independent. The test statistic can be written as

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

where *N* denotes the number of 4-digit CN classes (1,242 in all). After an analysis of the $\chi^2$ test values, we will examine how significant the volume of a country's trade falling into each of the *A*, *B*, *C* and *D* cells is for that country's exports.

We first analyse Hungarian RCA in the EU markets, followed by Czech RCA and finally EU countries' RCA in the Central European markets.

## 5.1 Hungary's Revealed Comparative Advantage in the EU

First, we examine which are the most important CN4 export product groups for which both Hungary and an EU country enjoy a comparative advantage in the EU market. The variety of such product groups is much larger for Hungary than for the Czech Republic. Note however that the aggregate number of product groups for which the Czech Republic has a revealed comparative advantage is larger than in the case of Hungary.

Piston engines are Hungary's most important export product group that faces a revealed comparative advantage in several EU countries. Other important products are various types of electronic equipment and insulated wires. As regards EU countries, automatic data processing machines stand out for Ireland, the Netherlands and the UK. It has often been assumed that Central and Eastern European countries compete most with the south of Europe and not so much with the north, where the work force is more expensive but, especially in respect of Hungary, this does not reveal the whole truth. Hungary does compete in high-tech products also with northern Europe. Moreover, it shares a revealed comparative advantage in products, such as wood (Finland and Sweden) and pork (Denmark), that are not high-tech products.

Next we move on to establish the extent to which the RCA structures converge. The structure of Hungarian and Czech revealed comparative advantage in the overall EU market is calculated using two methods. First, it is calculated with either Hungary's or the Czech Republic's exports to all EU countries, which is then compared with each EU country's Balassa index in its intra-EU exports. This method (results in the sixth column of tables 19 and 21), does not of course take into account e.g. that French exports go to the non-French EU while Hungarian or Czech exports go to all of the EU countries including France itself. Using the second method (results shown in the last column of the same tables), this bias is eliminated by subtracting Hungarian and Czech exports to the EU country under comparison from their total exports to the EU. Removal of the bias does not materially affect the results, albeit there are two notable exceptions, which will be examined after a broader discussion of the tables.

*Table 18. Products for which both Hungary and an EU country have a revealed comparative advantage and whose share in exports to the EU by either country exceeds 3 per cent*

| | CN4 | Description | Share in exports, % | |
|---|---|---|---|---|
| | | | intra-EU | Hungary to EU |
| France | 8407 | Spark-ignition reciprocating or rotary internal combustion piston engines | 0.66 | 11.03 |
| Netherlands | 8471 | Automatic data processing machines and units thereof; magnetic/optical readers | 8.37 | 4.56 |
| | 8473 | Parts and accessories for office machines and typewriters | 3.25 | 1.77 |
| Germany | 8521 | Video recording or reproducing apparatus | 0.19 | 3.19 |
| Italy | 8544 | Insulated wire, cable, electric conductors; optic fibre cable | 0.51 | 4.08 |
| United Kingdom | 8471 | Automatic data processing machines and units thereof; magnetic/optical readers | 6.85 | 4.56 |
| | 8407 | Spark-ignition reciprocating or rotary internal combustion piston engines | 0.65 | 11.03 |
| | 8521 | Video recording or reproducing apparatus | 0.38 | 3.19 |
| Ireland | 8471 | Automatic data processing machines and units thereof; magnetic/optical readers | 17.93 | 4.56 |
| | 8473 | Parts and accessories for office machines and typewriters | 6.88 | 1.77 |
| | 8544 | Insulated wire, cable, electric conductors; optic fibre cable | 0.71 | 4.08 |
| Denmark | 0203 | Meat of swine, fresh, chilled or frozen pork, ham | 4.15 | 0.66 |
| Greece | 8544 | Insulated wire, cable, electric conductors; optic fibre cable | 1.25 | 4.08 |
| | 6109 | T-shirts, singlets, tank tops etc, knitted or crocheted | 6.72 | 0.43 |
| Portugal | 6403 | Footwear, uppers of leather, outer soles of rubber, plastic, leather or composition leather | 7.08 | 1.33 |
| | 8544 | Insulated wire, cable, electric conductors; optic fibre cable | 4.62 | 4.08 |
| Spain | 8407 | Spark-ignition reciprocating or rotary internal combustion piston engines | 1.39 | 11.03 |
| | 8544 | Insulated wire, cable, electric conductors; optic fibre cable | 0.79 | 4.08 |
| Sweden | 4407 | Wood sawn or chipped | 4.54 | 0.47 |
| | 8407 | Spark-ignition reciprocating or rotary internal combustion piston engines | 0.49 | 11.03 |
| | 8544 | Insulated wire, cable, electric conductors; optic fibre cable | 0.64 | 4.08 |
| Finland | 4407 | Wood sawn or chipped | 5.32 | 0.47 |
| Austria | 8407 | Spark-ignition reciprocating or rotary internal combustion piston engines | 3.67 | 11.03 |
| | 8544 | Insulated wire, cable, electric conductors; optic fibre cable | 0.87 | 4.08 |

Table 19 gives a comparison of Hungary's revealed comparative advantage in the total EU market relative to EU countries' revealed comparative advantage in their intra-EU exports. We first analyse the results given in the last two columns. These columns show whether the Hungarian revealed comparative advantage is independent of individual EU countries' revealed comparative advantage in the total EU market. If the value is larger than 6.64, this assumption is rejected and the revealed comparative advantages are dependent at the statistically significant 1 per cent level with one degree of freedom. Such values are highlighted with two asterisks. We see that Hungary's RCA structure corresponds to that of Denmark, Greece, Portugal and Austria. This is interesting because these are the same countries that arise when the respective analysis is done for the Baltic countries and Poland. Moreover, at the 5 per cent level the critical value is 3.84 (highlighted with one asterisk).

The results in the last two columns are of the same magnitude except in the case of Italy, which is almost significant at the 1 per cent level when Hungary's exports to Italy are not taken into consideration. This means that the structure of Hungary's revealed comparative advantage is fairly similar to that of Italy, but what Hungary exports to Italy is quite different from what it and Italy export to the EU. Indeed, Hungary's exports to Italy are very heterogeneous. While typically the most important CN2 product group account for some 30-40 per cent of Hungarian exports to individual EU countries, in the case of Italy this is only 9 per cent. Also for Austria, the $\chi^2$ test value is reduced by almost a half, but it is still well above the 6.64 limit.

Columns 2-5 indicate how many product groups fall into the categories where (n)either Hungary (n)or the first-column EU country has a revealed comparative advantage in the EU markets. These are cells $A$, $B$, $C$ and $D$ in the above table, rearranged slightly. In the cases where only one of the two countries has a revealed comparative advantage (cells $B$ and $C$), the country with the wider revealed comparative advantage is underlined. This is usually the EU country in question. Only Ireland, Finland, Greece, Portugal and Sweden have a narrower RCA structure in their intra-EU exports than Hungary. The common denominator for these countries is that they are small with populations not larger than that of Hungary. A small domestic economy typically corresponds with specialisation in international trade and a narrower comparative advantage.

*Table 19. $\chi^2$ tests for independence of Balassa indices in Hungarian exports to the EU vs intra-EU exports (CN4)*

| | EU – Hungary: Advantage | | | | $\chi^2$ test value | |
|---|---|---|---|---|---|---|
| | Neither country (A) | Hungary (B) | EU Country (C) | Both countries (D) | Whole EU ('biased') | Less 1st column EU country ('unbiased') |
| France | 613 | 180 | <u>344</u> | 105 | 0.04 | 0.00 |
| Belgium-Luxembourg | 575 | 166 | <u>382</u> | 119 | 0.24 | 0.21 |
| Netherlands | 644 | 181 | <u>313</u> | 104 | 1.25 | 0.20 |
| Germany | 563 | 169 | <u>394</u> | 116 | 0.01 | 2.25 |
| Italy | 601 | 164 | <u>356</u> | 121 | 2.35 | 6.31* |
| United Kingdom | 635 | 197 | <u>322</u> | 88 | 0.64 | 1.26 |
| Ireland | 822 | <u>241</u> | 135 | 44 | 0.22 | 0.19 |
| Denmark | 752 | 186 | <u>205</u> | 99 | 20.35** | 19.34** |
| Greece | 830 | <u>206</u> | 127 | 79 | 32.10** | 31.68** |
| Portugal | 793 | <u>189</u> | 164 | 96 | 35.34** | 36.82** |
| Spain | 697 | 193 | <u>260</u> | 92 | 2.58 | 1.59 |
| Sweden | 743 | <u>230</u> | 214 | 55 | 1.04 | 0.97 |
| Finland | 800 | <u>248</u> | 157 | 37 | 1.70 | 1.70 |
| Austria | 695 | 160 | <u>262</u> | 125 | 27.05** | 14.90** |

Austria and Italy have the largest number of mutual RCA product groups with Hungary, 125 and 121 respectively. Next is Germany with 116 product groups. Probably not by coincidence, these are also Hungary's most important EU trading partners. At the other end, Finland, Ireland and Sweden have only 37, 44 and 55 product groups respectively with mutual RCA with Hungary.

This point of view only tells us how many product groups coexist in each cell. It does not reveal how large or small a share of these countries' EU exports fall into the cells in question. Below we have two charts that show how important the correlation of RCA structures is. In these charts Hungary's exports go to the whole EU area and therefore the above-mentioned bias exists. The trade in products found in cells *A* and *D* are based on intra-industry trade at the EU level, while those found in *B* and *C* are based on comparative advantage, or specialisation, of either of the countries under scrutiny. The EU countries whose exports to the EU are

based the most on specialisation relative to Hungary's exports to the EU are Finland (73 per cent), Germany (68 per cent), Sweden (67 per cent), Spain (66 per cent) and France (65 per cent).

In chart 8 we can see for example that 21 per cent of French intra-EU exports are in products for which neither France nor Hungary enjoy a revealed comparative advantage, 12 per cent of French exports are in products for which only Hungary has an advantage, 53 per cent in products for which only France has an advantage, and 14 per cent in products for which both countries have a revealed comparative advantage. For cell $D$, we could expect French and Hungarian exports to compete the most.

If we examine the chart more closely we find that Portugal has the largest portion (42 per cent) of its EU exports in products for which it shares a revealed comparative advantage with Hungary. Other large proportions are found in respect of Greece (36 per cent), Ireland (34 per cent) and Austria (28 per cent). The significance of cell $D$ is particularly small for Spain (12 per cent), Germany (13 per cent), France (14 per cent), Finland (14 per cent) and Sweden (16 per cent). These results are roughly in line with the $\chi^2$ test results above. Ireland is, however, an exception, which is explained by the fact that in table 18 we find that 25 per cent of Irish exports to the EU are in two product groups for which it shares RCA with Hungary. Consequently, even though there are not many product groups in cell $D$, they are all the more important for Ireland. This does not take into account that exports represent a varying share of GDP for different EU countries.

In chart 9 the situation is considered from the Hungarian point of view. Here, oddly enough, 34 per cent of Hungarian exports are in products for which it and France have a revealed comparative advantage, even though the $\chi^2$ test above produced a zero value. Only in the case of Austria do Hungarian exports share a more common ground (42 per cent). Other relatively high figures are found for Spain (29 per cent) and Sweden (27 per cent), which did not have significant $\chi^2$ test values for similar RCA structures with Hungary. France, Spain and Sweden all share an RCA with Hungary in exports of piston engines, but vis-à-vis Hungary their exports account for 11 per cent of all exports to the EU. These countries are highly rated even though the $\chi^2$ test values were not significant.

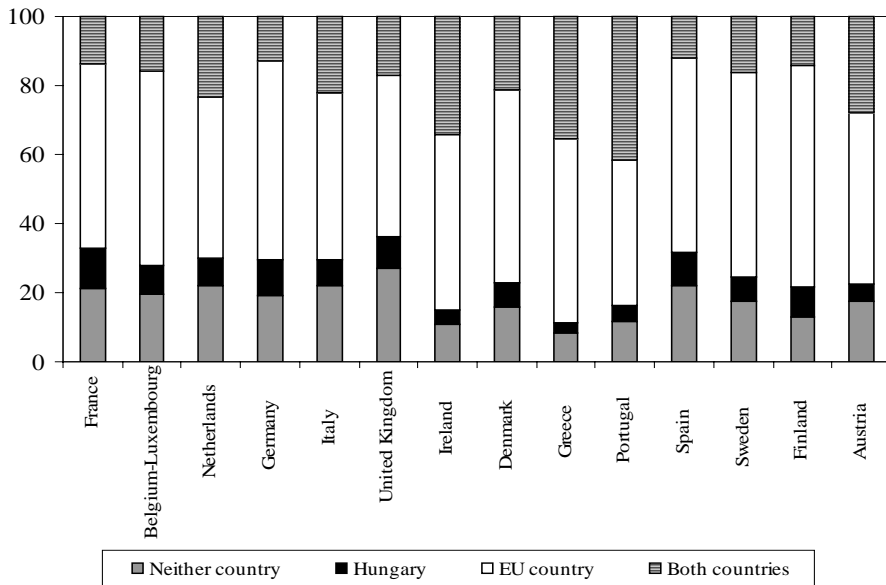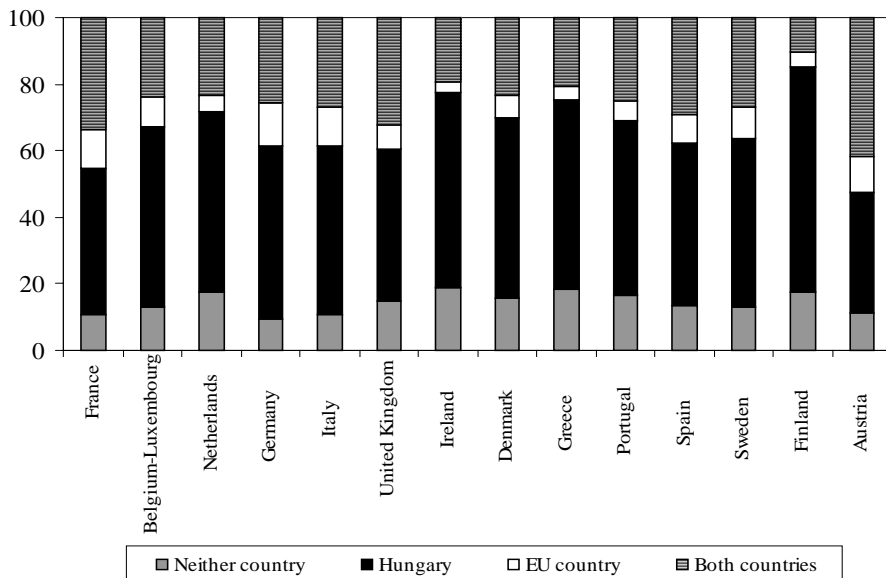*Chart 8. Composition of EU countries' intra-EU exports in terms of RCA structure vs Hungary*



Legend: ☐ Neither country ■ Hungary ☐ EU country ☐ Both countries

*Chart 9. Composition of Hungary's EU exports in terms of RCA structure vs individual EU countries*



Legend: ☐ Neither country ■ Hungary ☐ EU country ☐ Both countries

The lowest levels for the *D* cells are found for Finland (10 per cent of Hungary's exports to the EU), Ireland (19 per cent) and Greece (21 per cent). The latter two are again intriguing because a much more significant share of Ireland's and Greece's exports to the EU are included in the *D* cell than is the share of Hungary's exports there.

Overall, Ireland, Portugal, Greece, Finland and the Netherlands have larger shares of EU exports in product groups for which Hungary has a comparative advantage than vice versa. Of all EU countries only Greece exports less to the EU than Hungary does, as measured in ECUs.

## 5.2    The Czech Republic's Revealed Comparative Advantage in the EU

Table 20 shows those CN4 product groups that are both important for individual EU countries and/or the Czech Republic and for which both countries enjoy revealed comparative advantage. The results are much more straightforward than those for Hungary in table 18. The key product groups consist mainly of parts and accessories for motor vehicles and, for Sweden and Finland, sawn or chipped wood. Also note that the largest share of exports to the EU is about five per cent, while in the Hungarian case above we find much higher levels than this for certain EU countries and for Hungary.

As for Hungary is table 19, for the Czech Republic, we start with the results in the last two columns in table 21. Austria, Portugal and Denmark are again among the countries with statistically dependent RCA structures with an emerging market, but this time Greece is not included in the group. Instead, Italy and the Netherlands show $\chi^2$ test values that are very significant at the 1 per cent level.

Another interesting phenomenon regarding the two columns is that Germany is not at all correlated when it is dropped from Czech exports, but becomes statistically significant at the 5 per cent level for Czech exports to the whole of the European Union. The change is to a different direction than in the case of Italy and Hungary above. Consequently, the Czech Republic exports to Germany goods that Germany exports to the rest of the European Union. In fact the $\chi^2$ test value in the comparison of Czech exports to Germany to German exports to the EU is 11.56, which is statistically very significant. This therefore provides rationale for arguing that German companies use the Czech Republic as a production basis for

goods that are re-exported, perhaps after some further processing, to the rest of the EU. However, at the CN4-digit level these goods remain in the same product groups and thus the $\chi^2$ test value rises.

*Table 20. Products for which both the Czech Republic and an EU country have a revealed comparative advantage and whose share in exports to the EU by either country exceeds 3 per cent*

|  | CN4 | Description | Share in exports, % | |
|  |  |  | intra-EU | Hungary to EU |
|---|---|---|---|---|
| France | 8708 | Parts and accessories for motor vehicles | 4.08 | 3.92 |
| Germany | 8708 | Parts and accessories for motor vehicles | 3.48 | 3.92 |
| Italy | 8708 | Parts and accessories for motor vehicles | 2.94 | 3.92 |
| United Kingdom | 8708 | Parts and accessories for motor vehicles | 3.04 | 3.92 |
| Denmark | 9403 | Office and household furniture and parts thereof | 3.68 | 1.22 |
| Portugal | 8544 | Insulated wire, cable, electric conductors; optic fibre cable | 4.62 | 2.10 |
| Spain | 8708 | Parts and accessories for motor vehicles | 5.28 | 3.92 |
| Sweden | 8708 | Parts and accessories for motor vehicles | 5.02 | 3.92 |
|  | 4407 | Wood sawn or chipped | 4.54 | 1.47 |
| Finland | 4407 | Wood sawn or chipped | 5.32 | 1.47 |
| Austria | 8708 | Parts and accessories for motor vehicles | 3.24 | 3.92 |

We note that the RCA structure of the Czech Republic is very wide. Only those of Germany, Belgium-Luxembourg, Italy and France are wider. Italy, Austria, Belgium-Luxembourg and France have the largest number of product groups for which both countries enjoy a revealed comparative advantage, namely 220, 196, 175 and 156 respectively. On the other hand, Ireland, Greece and Finland, as was the case above with Hungary, have the smallest number of such product groups, i.e. 52, 70 and 77 respectively.

The EU countries whose intra-EU exports are most based on specialisation relative to Czech exports to the EU are Ireland (81 per cent), the Netherlands (74 per cent), Greece (73 per cent), Belgium-Luxembourg (68 per cent) and United Kingdom (67 per cent).

*Table 21. Chi square tests for independence of Balassa indices in Czech exports to the EU vs intra-EU exports (CN4)*

| | EU - Czech Republic: Advantage | | | | $\chi^2$ test value | |
|---|---|---|---|---|---|---|
| | Neither country (A) | Czech Republic (B) | EU country (C) | Both countries (D) | Whole EU ('biased') | Less 1st column EU country ('unbiased') |
| France | 518 | 275 | <u>293</u> | 156 | 0.00 | 0.01 |
| Belgium-Luxembourg | 485 | 256 | <u>326</u> | 175 | 0.01 | 0.00 |
| Netherlands | 496 | <u>329</u> | 315 | 102 | 28.38** | 25.76** |
| Germany | 495 | 237 | <u>316</u> | 194 | 4.01* | 0.01 |
| Italy | 554 | 211 | <u>257</u> | 220 | 43.75** | 47.18** |
| United Kingdom | 532 | <u>300</u> | 279 | 131 | 1.87 | 2.76 |
| Ireland | 684 | <u>379</u> | 127 | 52 | 2.66 | 2.74 |
| Denmark | 633 | <u>305</u> | 178 | 126 | 7.69** | 7.32** |
| Greece | 675 | <u>361</u> | 136 | 70 | 0.03 | 0.01 |
| Portugal | 684 | <u>298</u> | 127 | 133 | 38.37** | 38.79** |
| Spain | 581 | <u>309</u> | 230 | 122 | 0.00 | 0.00 |
| Sweden | 649 | <u>324</u> | 162 | 107 | 3.62 | 3.09 |
| Finland | 694 | <u>354</u> | 117 | 77 | 2.27 | 2.27 |
| Austria | 620 | <u>235</u> | 191 | 196 | 62.05** | 64.73** |

The following two charts again give us a picture of the relative importance of matching RCA structures in these countries' EU exports. The share of EU countries' exports that fall into cell *D*, i.e. the cell for which both the EU country in question and the Czech Republic have a revealed comparative advantage, is the largest for Austria (33 per cent), Italy (33 per cent) and Portugal (32 per cent). On the other hand, it is the smallest for the Netherlands (7 per cent), Ireland (9 per cent) and the United Kingdom (9 per cent). Of these, the Netherlands scores a statistically significant $\chi^2$ test value. Consequently, even though there are many product groups in cell *D* for the Dutch-Czech pair, these products are not very important for the Netherlands in its intra-EU exports.

*Chart 10. Composition of EU countries' intra-EU exports in terms of RCA structure vs Czech Republic*



Legend: Neither country | Czech Republic | EU country | Both countries
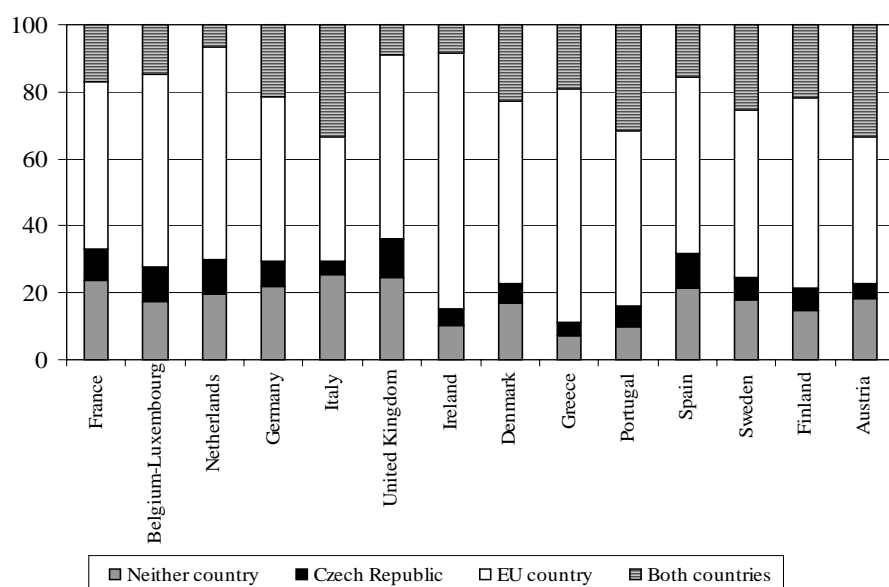
For the Czech Republic, it is vis-à-vis Italy that 44 per cent of its exports face the most similar RCA structure. This is followed by Germany (39 per cent), France (31 per cent) and Sweden (31 per cent). These are all countries with strong car industries. The smallest values the Czech Republic scores with Ireland (10 per cent) and Portugal (11 per cent). The $\chi^2$ test value was significant for the latter.

Greece and Finland are the only EU countries with larger shares of EU exports in product groups for which the Czech Republic has a comparative advantage than vice versa.

*Chart 11. Composition of Czech EU exports in terms RCA structure vs individual EU countries*
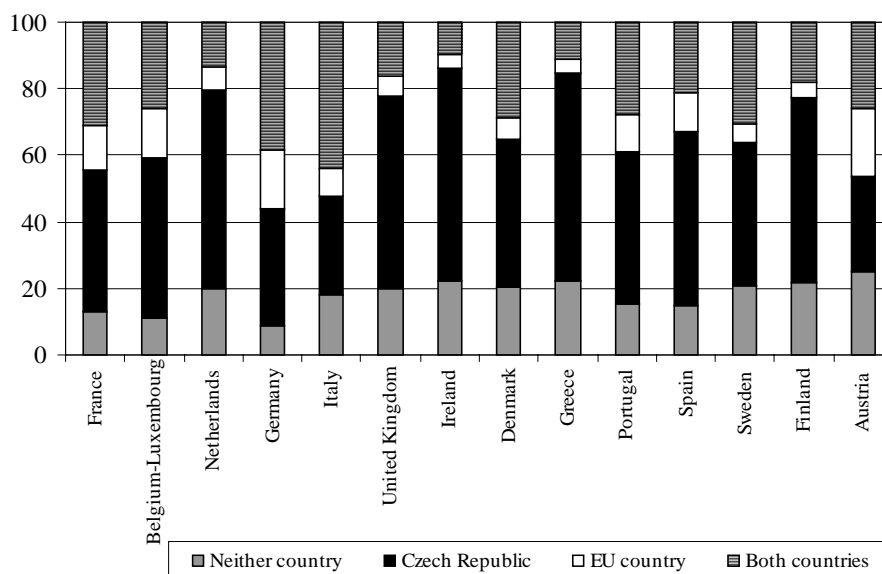


## 5.3    Hungarian vs  Czech RCA in the EU

Given that there are many similarities between Hungary and the Czech Republic, it may be a reasonable assumption that they are competitors in the EU markets. Table 22 incorporates those products that account for over three per cent of either Hungary's and the Czech Republic's exports to an individual EU country and for which both countries have a revealed comparative advantage. The purpose is to see where and in what products the two countries compete with one another.

In the German export market, Hungary and the Czech Republic have important exports and share a position of revealed comparative advantage in insulated wires and parts and accessories for motor vehicles, i.e. technical semi-finished products. The situation is quite different in the next most important markets. In the Austrian market such products are oil for both Hungary and the Czech Republic. In addition to this, wood is important for the Czech Republic and insulated wires for Hungary. In the

*Table 22. Products for which both Hungary and the Czech Republic have a revealed comparative advantage in a given EU market and whose share in exports to this market by either country exceeds 3 per cent*

| EU Country | CN4 | Description | Share of imports from | |
|---|---|---|---|---|
| | | | Hungary | Czech Republic |
| France | 4011 | New pneumatic tyres, of rubber | 1.42 | 3.95 |
| Belgium-Luxembourg | 8537 | Boards, panels, consoles, desks, cabinets, etc | 4.70 | 2.74 |
| | 9401 | Seats and parts thereof | 0.52 | 17.27 |
| Netherlands | 8418 | Refrigerators, freezers etc; heat pumps; parts thereof | 1.49 | 3.22 |
| Germany | 8544 | Insulated wire, cable, electric conductors | 5.91 | 3.17 |
| | 8708 | Parts and accessories for motor vehicles | 3.52 | 4.96 |
| Italy | 6406 | Parts of footwear | 4.68 | 1.96 |
| | 7204 | Ferrous waste and scrap | 3.69 | 2.19 |
| United Kingdom | 6203 | Men's or boys' outer clothing | 4.06 | 1.06 |
| | 8539 | Electrical filament or discharge lamps; parts thereof | 8.48 | 0.30 |
| Ireland | 4011 | New pneumatic tyres, of rubber | 0.72 | 4.99 |
| | 8418 | Refrigerators, freezers etc; heat pumps; parts thereof | 1.99 | 25.97 |
| | 8471 | Automatic data processing machines and units thereof ; magnetic or optical readers | 18.42 | 4.49 |
| | 8524 | Recorded sound media records, tapes, cassettes | 3.77 | 2.75 |
| | 8539 | Electrical filament or discharge lamps; parts thereof | 11.82 | 0.19 |
| | 8703 | Motor cars and vehicles, not public transport | 10.35 | 20.82 |
| Denmark | 3406 | Candles, tapers and the like | 5.25 | 0.02 |
| | 7604 | Aluminium bars, rods and profiles | 6.04 | 0.44 |
| | 9990 | Other products | 15.50 | 2.38 |
| Greece | 0102 | Bovine animals, live cows, bulls, heifers | 7.37 | 3.79 |
| | 4011 | New pneumatic tyres, of rubber | 0.99 | 3.08 |
| | 4407 | Wood sawn or chipped | 1.27 | 11.23 |
| | 7013 | Glassware for table, kitchen, toilet, office, etc. | 0.16 | 3.77 |
| | 7208 | Hot rolled flat-rolled products of iron or non-alloy steel | 6.89 | 0.69 |
| | 8703 | Motor cars and vehicles, not public transport | 22.23 | 13.36 |
| Portugal | 4011 | New pneumatic tyres, of rubber | 7.28 | 1.80 |
| Spain | 4011 | New pneumatic tyres, of rubber | 1.56 | 6.30 |
| | 8539 | Electrical filament or discharge lamps; parts thereof | 4.96 | 0.50 |
| Sweden | 6203 | Men's or boys' outer clothing | 4.20 | 0.78 |
| | 8539 | Electrical filament or discharge lamps; parts thereof | 10.67 | 0.35 |
| Finland | 4011 | New pneumatic tyres, of rubber | 3.15 | 1.94 |
| Austria | 2710 | Oil (not crude) from petrol and bituminous minerals | 5.64 | 2.56 |
| | 4403 | Wood in the rough, | 1.06 | 5.92 |
| | 4407 | Wood sawn or chipped | 0.42 | 4.05 |
| | 8544 | Insulated wire, cable, electric conductors; optic fibre cable | 6.69 | 0.61 |
| Total EU | 8544 | Insulated wire, cable, electric conductors; optic fibre cable | 4.08 | 2.10 |

Italian market we find parts of footwear and ferrous waste and scrap. Both Hungary and the Czech Republic seem to be supplying the strong Italian footwear industry with parts and accessories. Rubber tyres are an important product group in a number of EU markets. The mutual RCA position seems to be the most pronounced in the Irish market, which is however a negligible market for both Hungary and the Czech Republic. Greece is another such market. For the whole EU, only insulated wires fulfil the criteria set in the table.

On the basis of table 23 we argue that the RCA structures of Hungary and the Czech Republic are dependent in all national EU markets except that of Portugal. Interestingly the highest $\chi^2$ value is for the countries' most important export market, Germany. Germany is also the market with the largest number of product groups for which both Hungary and the Czech Republic have a revealed comparative advantage. This is a result of the importance of the German market for both countries. Austria and Italy, the next two most important trading countries have the next most such product groups. Note, however, that in all national EU markets the Czech Republic has more product groups in which it alone has a revealed comparative advantage.

Again we should ask how important the results of the $\chi^2$ test are for Hungary and the Czech Republic. Table 22 already gave us some indication, but let us also analyse charts 12 and 13. From the former chart we see for example that 19 per cent of Hungarian exports to France were in products for which both Hungary and the Czech Republic had a revealed comparative advantage, 6 per cent were in products for which only the Czech Republic had an advantage, 69 per cent were in products for which only Hungary had an advantage, and 6 per cent were in products for which neither country had an advantage. The Balassa index is again calculated with respect to intra-EU exports.

The most striking results are perhaps to be found in two of the most important export markets, Germany and Italy. Some 41 per cent of Hungarian exports to these markets are in products for which both Hungary and the Czech Republic had a revealed comparative advantage. High values are also to be found for Ireland (50 per cent), Greece (46 per cent) and Denmark (41 per cent), but for total Hungarian exports to the EU these three countries are of lesser significance. The high figures for Ireland and Greece are explained by table 22.

*Table 23. Independence of Hungarian and Czech RCA structures in national EU markets*

| | Hungary – Czech Republic: Advantage | | | | $\chi^2$ test value |
|---|---|---|---|---|---|
| | Neither country | Hungary | Czech Republic | Both countries | |
| France | 893 | 107 | <u>192</u> | 50 | 16.62** |
| Belgium-Luxembourg | 978 | 74 | <u>153</u> | 37 | 29.09** |
| Netherlands | 885 | 82 | <u>220</u> | 55 | 27.79** |
| Germany | 732 | 99 | <u>271</u> | 140 | 85.40** |
| Italy | 878 | 121 | <u>157</u> | 86 | 74.59** |
| United Kingdom | 962 | 91 | <u>152</u> | 37 | 19.56** |
| Ireland | 1159 | 28 | <u>46</u> | 9 | 30.99** |
| Denmark | 988 | 80 | <u>140</u> | 34 | 24.63** |
| Greece | 1031 | 61 | <u>118</u> | 32 | 44.97** |
| Portugal | 1072 | 61 | <u>98</u> | 11 | 3.22 |
| Spain | 1006 | 61 | <u>154</u> | 21 | 8.63** |
| Sweden | 964 | 83 | <u>149</u> | 46 | 41.66** |
| Finland | 991 | 85 | <u>130</u> | 36 | 29.54** |
| Austria | 836 | 133 | <u>177</u> | 96 | 63.68** |
| Total EU | 694 | 117 | <u>263</u> | 168 | 94.57** |

In the whole EU market, exactly one-third of Hungarian exports were in products for which both Hungary and the Czech Republic had a revealed comparative advantage, 45 per cent were in products for which only Hungary had an advantage, 8 per cent were in products for which only the Czech Republic had an advantage, and 14 per cent were in products for which neither country had an advantage.

For the Czech Republic, 37 per cent of its total exports to the EU were in products for which both it and Hungary had a revealed comparative advantage, 37 per cent were in products for which only the Czech Republic had an advantage, 5 per cent were in products for which only Hungary had an advantage, and 22 per cent were in products for which neither country had an advantage.

*Chart 12. Hungary's EU exports in terms of RCA structure relative to Czech RCA structure in individual EU countries*
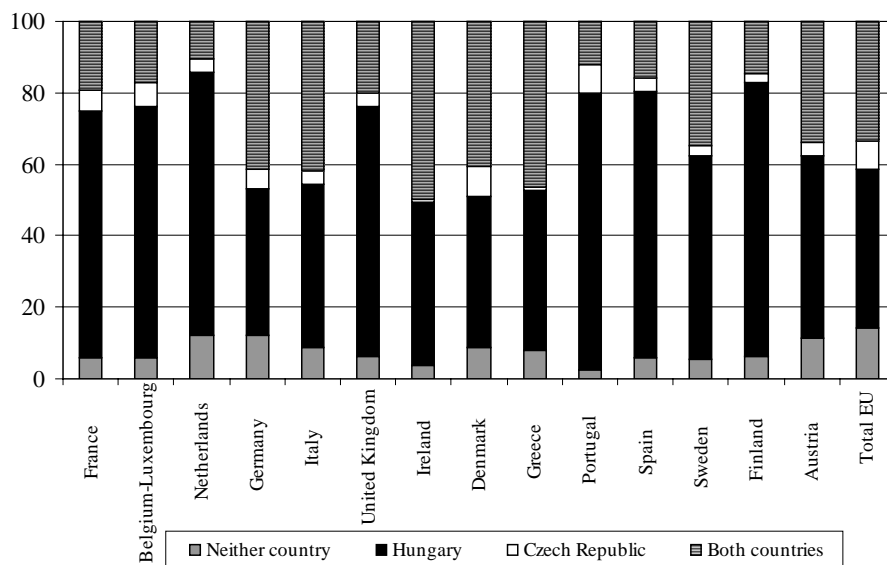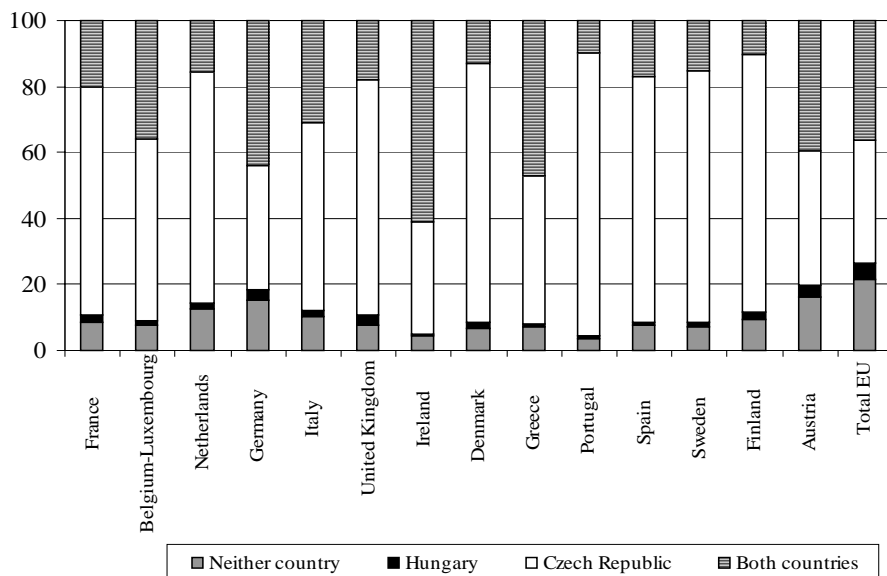


*Chart 13. Czech Republic's EU exports in terms of RCA structure relative to Hungarian RCA structure in individual EU countries*

In the German market, 44 per cent of Czech exports are in goods for which Hungary also has a revealed comparative advantage. Values greater than this are again to be found for Ireland (61 per cent) and Greece (47 per cent). For the Austrian market, the figure is a full 40 per cent.

## 5.4 EU Countries' RCA in Central Europe

We should also glance at the situation in the Hungarian and Czech markets from the EU countries' point of view. Table 24 combines results on the question as to whether the revealed comparative advantage of the EU countries in the Central European markets is dependent on their RCA structures in intra-EU exports. The results show quite clearly that they are. Consequently, the EU countries' RCA structure in Hungary and the Czech Republic is statistically dependent on their revealed comparative advantage in the EU market. We do not pursue further the issue of EU countries' revealed comparative advantage in Central Europe.

*Table 24. Chi2 tests for the independence of EU countries' Balassa indices in the EU market relative to their Balassa indices in Czech Republic and Hungary*

|  | Hungary | Czech Republic |  | Hungary | Czech Republic |
|---|---|---|---|---|---|
| France | 44.75** | 45.58** | Denmark | 116.13** | 154.63** |
| Belgium-Luxembourg | 52.07** | 59.25** | Greece | 82.51** | 139.22** |
| Netherlands | 68.17** | 70.36** | Portugal | 57.61** | 87.71** |
| Germany | 130.70** | 105.56** | Spain | 72.84** | 33.50** |
| Italy | 215.18** | 273.66** | Sweden | 190.40** | 214.04** |
| United Kingdom | 62.78** | 90.81** | Finland | 120.22** | 187.20** |
| Ireland | 85.33** | 119.49** | Austria | 82.58** | 119.47** |

# 6    Conclusions

Hungary and the Czech Republic are two Central European countries of similar size going through a similar transition process from socialist economy to market economy. This study has analysed these countries' trade with the European Union and how their exports to the area fared in 1997 compared with EU countries' intra-EU exports.

The European Union is by far the most important trading partner of both Hungary and the Czech Republic. Over 70 per cent of Hungarian exports went to the EU in 1997 and over 60 per cent of its imports originated from there. For the Czech Republic some 60 per cent of both exports and imports were accounted for by the EU. Within the European Union, Germany is by far the most important trade partner for both Hungary and the Czech Republic, accounting for 45 per cent of EU trade with the former and 56 per cent with the latter. For both countries, Austria and Italy are the next two most important trade countries. The geographic composition of these two Central European countries' trade is therefore quite similar.

Hungary's and the Czech Republic's most important EU export and import products are different kinds of machines, electrical equipment, and transport vehicles and related parts. Both countries are for example highly intertwined in the European car industry. As these goods travel east as well as west, it is no wonder that intra-industry trade is at a fairly high level for both countries. Some 45 per cent of Hungary's EU trade is based on IIT while the figure is 57 per cent for the Czech Republic. In their most important single market, Germany, the figures are 43 and 59 per cent, respectively. Especially the Czech IIT level is at a satisfactory level when compared with the levels reached by EU countries in their intra-EU trade. It is interesting to note, however, that even though the Czech Republic is more engaged in IIT than Hungary, a larger share of Hungary's IIT is horizontal in character than is the case for Czech IIT. A quarter of Hungary's IIT is horizontal compared with a sixth for the Czech Republic. In the Hungarian case it is especially noticeable that of its IIT with Germany, a full 38 per cent is horizontal, i.e. of the same quality.

A statistically significant positive correlation is found between the flows of foreign direct investment and intra-industry trade between the EU countries and both Hungary and the Czech Republic. Furthermore there is a negative correlation between geographic distance and FDI flows.

Consequently, the more there is intra-industry trade and the closer the countries are geographically, the more FDI has flown from the EU into the two Central European countries.

$\chi^2$ tests were used to determine the statistical significance of the independence of the structures of revealed comparative advantage (RCA) between any two countries. We found that the structure of Hungarian RCA in its EU exports corresponds to that of Denmark, Greece, Portugal and Austria. Also the Italian RCA structure becomes dependent when Hungarian exports to Italy are subtracted from the analysis. Overall Hungary's RCA structure is relatively wide. Hungary shares the largest number of revealed comparative advantage product groups with Austria, Italy and Germany. These are also Hungary's most important export markets, albeit in a different order. Over 40 per cent of Hungary's exports to the EU are in products for which it shares RCA with Austria. Shares exceeding 30 per cent can also be found for France and the UK. These are the countries that Hungary's exports seem to be competing most with in the EU. On the other hand, over 40 per cent of Portugal's and about 35 per cent of the exports of Greece and Ireland to the EU share RCA with Hungary. These are the countries that seem to face most competition from Hungarian exports. Ireland, Portugal, Greece, Finland and the Netherlands have larger shares of EU exports in product groups for which Hungary has a comparative advantage than does Hungary exporting products for which these EU countries have a revealed comparative advantage.

The $\chi^2$ test values indicate that the Czech RCA structure in the EU market is highly correlated with that of the Netherlands, Italy, Denmark, Portugal and Austria. Furthermore, the German RCA structure is significant at the 5 per cent level when Czech exports to the whole EU area are compared with German exports to the non-German EU area. Consequently, the Czech Republic exports to Germany goods that Germany exports to other EU countries. This is evidence that German companies use the Czech Republic as a manufacturing base for goods imported to Germany and then re-exported to the rest of the European Union. Overall the Czech RCA structure is very wide, wider than that of Hungary. One-third of Austria's, Italy's and Portugal's intra-EU exports are in products for which they share a revealed comparative advantage with the Czech Republic. On the other hand, 44 per cent of Czech exports to the EU are in products for which it shares an RCA with Italy. This is followed by Germany (39 per cent of Czech exports to the EU). Greece and Finland

are the only EU countries with larger shares of EU exports in product groups for which the Czech Republic has a comparative advantage than the latter having exports in products for which these EU countries have a comparative advantage.

We also find that the RCA structures of Hungary and the Czech Republic are statistically very dependent on each other. This dependence is the most pronounced in their most important export market, Germany. In their exports to Germany, Hungary and the Czech Republic share RCA in important products such as insulated wires and parts and accessories for motor vehicles. In Austria such products are oil for both Hungary and the Czech Republic and also for the Czech Republic wood and for Hungary insulated wires. In the Italian markets the products are footwear and ferrous waste and scrap.

Around 40-50 per cent of Hungarian exports to Germany, Italy, Ireland, Denmark and Greece are in products for which both Hungary and the Czech Republic have a revealed comparative advantage. In addition to this, the figure is about 35 per cent in the important Austrian market. For the Czech Republic the same applies to its exports to Germany, Ireland, Greece and Austria. Overall almost 40 per cent of Hungary's and the Czech Republic's exports to the EU are in products for which they both have a revealed comparative advantage. These are relatively high figures and imply that Hungary and the Czech Republic compete with each other in the EU and in their most important national EU export markets. This competitive pressure seems to be stronger than the pressure they inflict upon the current EU countries.

The importance of the EU for Hungarian and Czech overall exports, the extent of intra-industry trade, and also its non-negligible horizontal component as well as the large flows of foreign direct investment from the EU suggest that Hungary and the Czech Republic have succeeded relatively well in transforming their economies from socialist structures ten years ago into competitive private ownership today. FDI flows from western Europe and the United States have been very important in modernising the manufacturing industry. Hungary's exports to the EU seem to be based more on human-capital intensive medium to high-technology products while those of the Czech Republic are relatively more labour intensive. On the other hand, the Czech car industry is strong. The structure of both countries' revealed comparative advantage is wide, which protects them from possibly adverse sector-specific shocks. Perhaps most

notable is the fact that Hungary and the Czech Republic have become a part of the European automotive industry and important producers of electronic equipment such as VCRs.

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