Piazolo, Daniel

Working Paper

Trade integration between Eastern and Western Europe: Politics follows the market

Kiel Working Papers, No. 745

Provided in cooperation with:
Institut für Weltwirtschaft (IfW)

Kieler Arbeitspapiere
Kiel Working Papers

Kiel Working Paper No. 745

TRADE INTEGRATION BETWEEN EASTERN AND WESTERN EUROPE: POLITICS FOLLOWS THE MARKET

by

Daniel Piazolo

Institut für Weltwirtschaft an der Universität Kiel
The Kiel Institute of World Economics

ISSN 0342 - 0787

Institut für Weltwirtschaft
an der Universität Kiel
Düsternbrooker Weg 120
D-24105 Kiel
Fax: ++49.431.85853
e-mail: dpiazolo@ifw.uni-kiel.de

Kiel Working Paper No. 745

TRADE INTEGRATION BETWEEN EASTERN AND WESTERN EUROPE: POLITICS FOLLOWS THE MARKET

by

Daniel Piazolo

May 1996

Abstract

This paper examines to what extent Eastern Europe trade reorientation towards the West has been driven by market forces versus policies for regional integration. Hierarchical cluster analysis based on bilateral trade intensity reveals the convergence of regional trade structures to the pre-World-War II pattern. Estimates of the expected trade pattern of Eastern Europe with a gravity model predict continuing rising importance of the EU. Furthermore, the assessment of the welfare implications of preferential access to EU markets shows that beneficial effects of trade expansion are likely to outweigh possible distortions. Hence integration policies follow the facts created by the market.

JEL Classification: F14, F15.

Key Words: Trade Integration; Eastern Europe; EU Enlargement; Hierarchical Cluster Analysis; Gravity Model

Contents

List of Tables

List of Figures

List of Appendix Tables

List of Appendix Figures

I. The Issue

The transformation of the Central and Eastern European economies has eliminated the preference for intra-COMECON trade and many barriers to trade between Eastern and Western Europe.* As a result, Central and Eastern European countries (CEECs) have reoriented their foreign trade towards Western Europe. Simultaneously, the institutional integration between the EU and Eastern Europe may also have driven the process of reorientation. The purpose of this research is to investigate whether this process has been primarily driven by market forces or institutional integration. The focus is on the following countries: Bulgaria, the Czech Republic, Hungary, Poland, Romania and the Slovak Republic.

First, I examine the occurred regional regrouping of countries within Europe by using hierarchical cluster analysis and dendrograms (tree diagrams) to identify functional regions characterised by the intensity of bilateral trade. This statistical approach reveals profound changes in trade orientation of the CEECs from East towards the West since 1989 and allows a comparison with trade orientation before World War II.

Second, an estimate of the „normal" regional pattern of trade of the CEECs is determined with a gravity model that expresses bilateral trade as a function of economic size of the countries (as a proxy of trade promoting factors) and the distance between them (as a proxy of trade restricting factors).

Third, different indices are applied to ascertain whether EU membership of the CEECs would have distortionary trade effects. The analysis reveals that trade in-

---

* *This paper on the trade integration between Eastern and Western Europe is part of the project „Perspectives for the Division of Labour between Germany and Eastern Europe". Financial support from the Volkswagen Foundation is gratefully acknowledged. Special thanks are due to Rolf J. Langhammer and Matthias Lücke for helpful suggestions and to Dieter Schumacher from the German Institute of Economic Research in Berlin for providing data on distance between countries used in the gravity model. Angela Husfeld and Michela Rank provided excellent research assistance.*

tegration between Eastern and Western Europe has already progressed so far that regional integration due to political reasoning will not cause substantial trade distortions. Politics will only give an institutionalised framework to trade structures created by dynamic market activities. Therefore, it can be concluded that the political plans about the integration of the European nations are only late arrivals to the reality of economic integration based on trade flows.

II. Trade Reorientation of the CEECs Since 1989

II.1. The Geographical Composition of CEEC Trade

The year 1989 brought the artificial trade isolation of Central and Eastern Europe from Western Europe to an end. Since then, trade barriers have been dismantled (not completely yet) and East-West trade has increased dramatically. There has been a distinct regional shift of the trade of the CEECs to Western Europe as revealed in the trade statistics. This shift is also due to the collapse of trade between the CEECs since the Council for Mutual Economic Assistance (CMEA) disintegrated and the decreasing GNP level during the early period of transformation reduced import demand for goods.

The geographical composition of export flows of the CEECs is listed in Table 1 for three years: 1928 as representative of the pre World War II period, 1989 as representative of the time of the Iron Curtain and 1994 as the most current year with available data.[1] In 1989, the share of the 15 countries of the EU in the total trade of the CEECs was only 23 percent. In the same year the countries of the Eastern bloc were the important purchasers of goods and services of the CEECs, with the Soviet Union as the most important trading partner. This had changed drastically by 1994. The Soviet Union vanished as the main destination of the

---

[1] The geographical composition of the import flows of the CEECs is generally similar to that of the export flows. Import flows for the three years are presented in Appendix Table 1.

CEECs products. The succeeding 15 republics have attracted only a fraction of the former trade flows. For each Eastern European country, the other CEECs also lost in importance.

As a point of reference for the present trading pattern, a suitable historical trading pattern can shed light on the extent of the occurred changes. The trading pattern of the CEECs before World War II mirrors cultural affinity with the Western European Countries as all CEECs were characterised by market economies. Only the USSR followed a planned economy system. CEEC trade before World War II was subject to many of the same determinants as today: differences in natural resource and factor endowments, production complementarities, cultural and language links and geographical proximity.[2] However, the time before World War II was not distortion-free and a comparison to the eighties and nineties requires caution. In the twenties and thirties, the Soviet Union still suffered from the effects of the civil war and was isolated from the other countries. The borders of the Soviet Union, Poland and Germany have changed in the wake of World War II. Furthermore, the relative strength of Western countries has changed over the decades, most noticeable for the UK and Japan. Given these qualifications, the year 1928 was selected for a snapshot of trading before the Great Depression of 1933.

Table 1 shows that there is an astonishing correlation in the geographical composition of trade of the CEECs between the year 1928 and 1994. In 1994 as in 1928, the 15 countries of the EU accounted for two thirds of the exports of the six CEECs. The extent of the reorientation to the pre World War II pattern varies for

---

[2] Collins and Rodrik (1991) combine trade data from the pre World War II period and a regression on comparator countries to derive an estimation of the potential geographical composition of trade of the CEECs. Some of the following discussion and tables draw on ideas and data from Collins and Rodrik. Laaser and Schrader (1992) also use the inter-war period as a bench-mark case to assess the integration prospects of the Baltic States into the global economic system.

the different Eastern European countries, but the overall conclusion for the CEECs is the same.

II.2. Reshaping of Functional Regions in Europe

The reorientation of CEEC trade as described in the preceding section has reshaped the regional trading patterns in Europe. In this context, regions are defined to include countries whose trade links to other members of the group are stronger than their links to non-members. In regional science, this is described as the concept of functional regions.[3] Regions matter since their configuration often determines the political decision making. The relative intensity of bilateral merchandise trade reflects the degree of the mutual dependence of the goods markets and can be used as a criterion for the identification of regions.

A suitable measure for trade intensity is the share of country i's exports destined to country j, $X_{ij} / X_{i,}$ with X_{ij} as country i's exports to country j and X_i as country i's total exports. The trading relationship between two countries is characterised by two values: (X_{ij} / X_i) and (X_{ji} / X_j), of which the minimum is chosen

---

3 This differs from the concept of a homogenous regions. Areas or countries constitute a homogeneous region if they reveal a high degree of similarity concerning a set of characteristics, like natural resource endowments, climate, topography or GNP per capita. For a discussion of these concepts see Amelung (1992). Different methodologies to measure bilateral and multilateral integration are discussed in Haass and Peschel (1982).

Table 1 — CEECs: Geographical Composition of Exports, 1928, 1989, 1994 (percentage of total)

CEECs	Bulgaria			Czech Rep./ Slovak Rep.				Hungary			Poland			Romania			all 6 CEECs[2]		
	1928	1989	1994	1928	1989	1994		1928	1989	1994	1928	1989	1994	1928	1989	1994	1928	1989	1994
Partner countries						Cz[3]	SL[3]												
Eastern Europe	**11.8**	**75.5**	**15.9**	**21.9**	**59.6**	**14.5**	**8.4**	**34.0**	**42.7**	**25.5**	**18.3**	**39.1**	**13.8**	**22.4**	**39.6**	**13.4**	**21.7**	**51.3**	**15.3**
Ex Soviet Union	0.0	58.1	11.3	1.3	43.1	6.5	7.2	0.4	28.3	15.1	1.7	25.0	9.3	0.0	30.4	6.6	0.7	37.0	9.3
EU (15)[1]	**78.9**	**8.6**	**48.3**	**60.5**	**20.5**	**72.6**	**82.9**	**59.4**	**31.5**	**60.7**	**73.7**	**37.2**	**68.8**	**65.2**	**18.4**	**48.2**	**67.6**	**23.2**	**63.6**
Germany	27.6	2.3	14.0	26.8	7.8	42.6	43.5	11.9	11.6	28.0	34.7	13.6	35.7	24.9	5.2	16.0	25.2	8.1	30.0
France	6.6	1.0	4.7	1.3	1.6	3.0	4.0	0.8	2.7	3.3	1.7	3.0	4.0	4.0	2.9	5.1	2.9	2.2	4.0
UK	2.6	0.7	3.3	7.0	1.5	3.7	2.7	2.9	1.5	3.1	8.8	5.4	4.5	3.7	1.2	3.2	5.0	2.1	3.4
Italy	11.8	1.6	9.9	3.8	2.2	5.8	11.7	6.6	4.5	8.1	1.9	2.5	5.0	12.8	5.8	13.0	7.4	3.3	8.9
Greece	7.9	0.8	7.1	0.7	0.6	0.8	0.8	0.8	0.8	0.5	0.0	0.4	0.4	4.4	0.4	2.3	2.8	0.6	2.0
Austria	14.5	0.5	1.9	14.7	2.7	8.6	11.6	34.0	5.4	9.9	12.4	3.2	2.2	11.4	0.4	1.6	17.4	2.4	6.0
US	**1.3**	**0.9**	**7.3**	**5.6**	**0.6**	**2.9**	**4.5**	**0.8**	**2.8**	**4.0**	**0.8**	**2.7**	**3.4**	**0.4**	**2.5**	**3.1**	**1.8**	**1.9**	**4.2**
Asia	**0.0**	**3.5**	**4.5**	**2.1**	**4.4**	**2.9**	**0.9**	**0.4**	**2.9**	**1.5**	**0.8**	**4.2**	**3.1**	**0.0**	**5.2**	**6.8**	**0.7**	**4.0**	**3.3**
Other	**7.9**	**11.6**	**13.9**	**10.0**	**15.0**	**7.0**	**3.2**	**5.3**	**20.1**	**8.3**	**6.3**	**16.7**	**10.8**	**12.1**	**34.4**	**28.5**	**8.3**	**19.5**	**13.6**

Eastern Europe: Bulgaria, Czech Republic, Slovak Republic, Hungary, Poland, Romania, Ex-Soviet Union and Ex-Yugoslavia.
Asia: Japan, Korea, Taiwan, China, India, Burma, Sri Lanka.
[1]EU (15): without Ireland; - [2]unweighted average; - [3]Total trade for 1994 excludes Czech-Slovak trade.

Sources: Collins and Rodrik (1991) and International Monetary Fund (1995).

to represent the relationship. A high value means that bilateral trade influences the allocation of resources in both economies (Amelung, 1992).[4]

A hierarchical cluster analysis can be used to identify regions based on the intensity of bilateral trade links. The first step of hierarchical cluster analysis is the calculation of the „similarity matrix" which gives the values of (X_{ij} / X_i) and (X_{ji} / X_j), labelled a_{ij} and a_{ji} ; for each pair of countries.

The second step links the countries into „clusters" or „strong components" through a single-linkage algorithm.[5] The procedure starts by linking the countries with the largest a_{ij} or a_{ji} value. A threshold t for $\min(a_{ij}, a_{ji})$ is progressively reduced and a link between countries is inserted when both values a_{ij} and a_{ji} are larger than t. With decreasing t, a cluster of countries will be linked to single countries or other clusters until all countries are united into one cluster. It is important to note that the similarity of groups is determined only by their closest members.

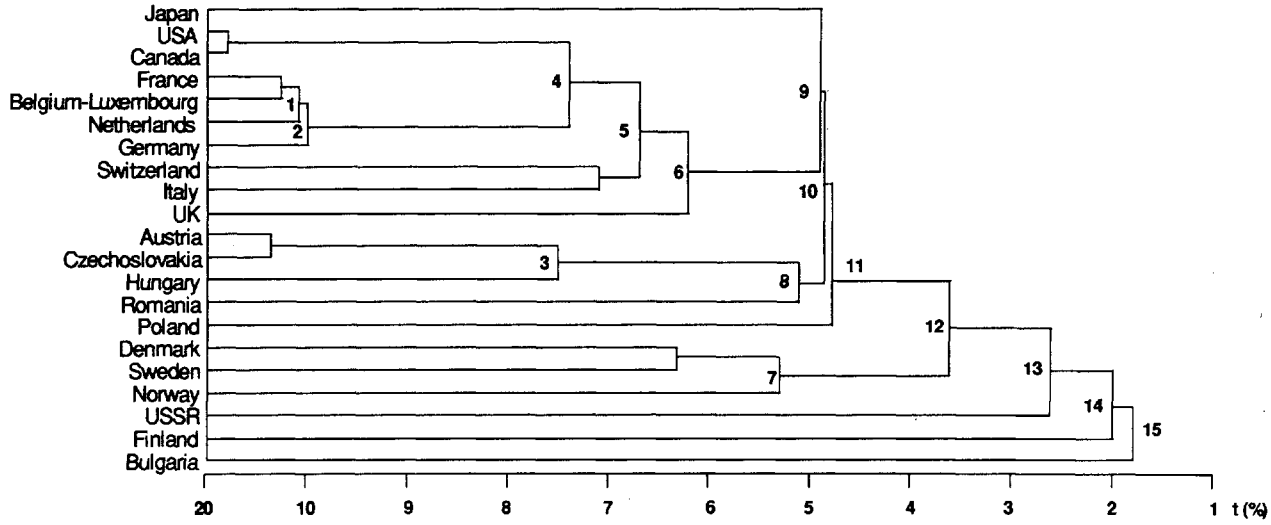
The results of the hierarchical cluster analysis of bilateral trade flows for 1929, 1984 and 1994 are described by Dendrograms (tree diagrams) (Figures 1 to 3). At the x-axis, the magnitude of the threshold value t is depicted. Additionally, the pairs of countries that lead to links between existing clusters are listed below the dendrograms. In 1984, three functional regions could be identified within Europe: First, five members of the Council of Mutual Economic Assistance (East

---

[4] Implicit in this approach is a bias against smaller countries because the export shares are unweighted. Kojima (1964) developed an alternative index by normalising with the share of the importing country world imports. However, this introduces a bias against large countries. Kojima's procedure is set out and applied in the Appendix to facilitate the comparison of different trade indices.

[5] In their discussion of cluster analysis techniques, Seleka and Henneberry (1991) explain the different hierarchical clustering algorithm. An alternative to the single-linkage algorithm is applied to the data in the Appendix.

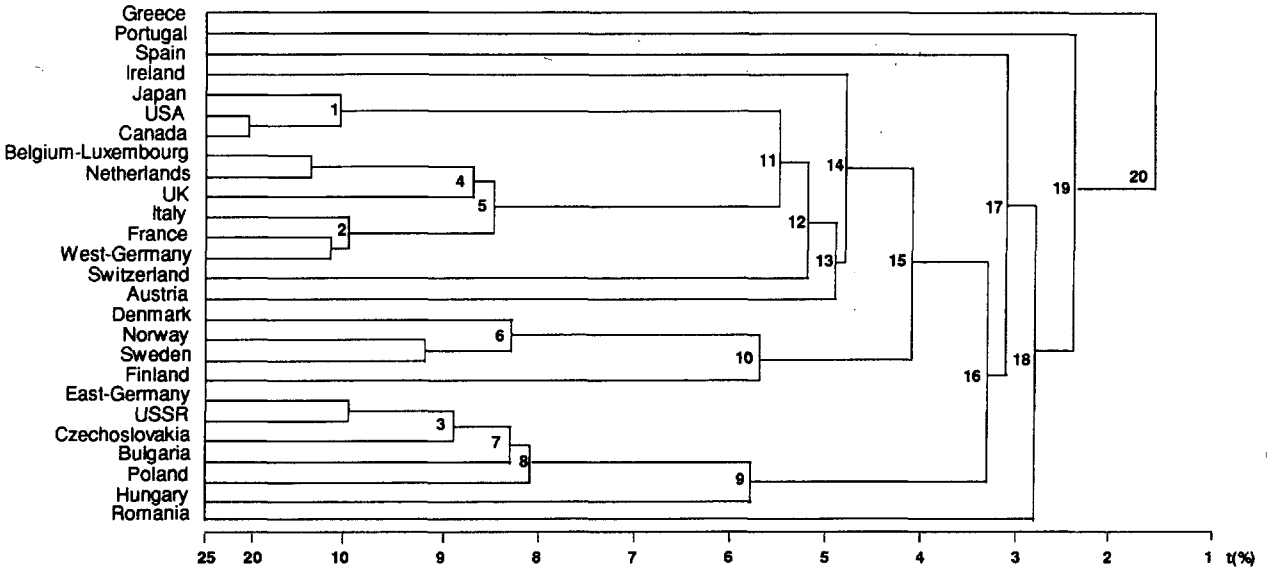
Figure 1: Dendrogram of Functional Regions 1929



The following countries are united as strong components:

1. Belgium - Netherlands
2. Germany - Netherlands
3. Austria - Hungary
4. Germany - USA
5. France - Switzerland
6. United Kingdom - USA
7. Norway - Sweden
8. Austria - Romania
9. Japan - USA
10. Czechoslovakia - Germany
11. Austria - Poland
12. Denmark - Germany
13. Germany - USSR
14. Finland - Sweden
15. Bulgaria - Germany

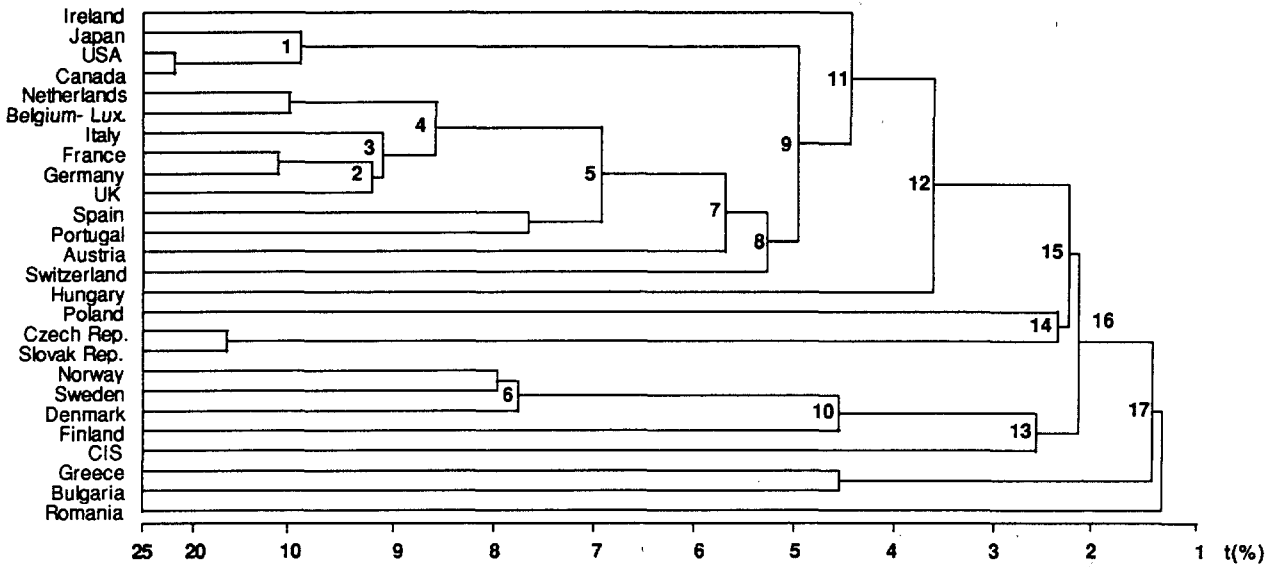
Figure 2: Dendrogram of Functional Regions 1984



The following countries are united as strong components:

1. Japan - USA
2. France - Italy
3. Czechoslovakia - USSR
4. Netherlands - United Kingdom
5. W. Germany - Netherlands
6. Bulgaria - Sweden
7. Bulgaria - USSR
8. Poland - USSR
9. Hungary - USSR
10. Finland - Sweden
11. United Kingdom - USA
12. W. Germany - Switzerland
13. Austria - W. Germany
14. Ireland - United Kingdom
15. Sweden - United Kingdom
16. Finland - USSR
17. France - Spain
18. Poland - Romania
19. Portugal - Spain
20. Greece - Italy

Figure 3: Dendrogram of Functional Regions 1994



The following countries are united as strong components:

1. Japan - USA
2. France - United Kingdom
3. France- Italy
4. Belgium-Lux. - France
5. France - Spain
6. Denmark - sweden
7. Austria - Germany
8. Germany - Switzerland
9. United Kingdom - USA
10. Finland - Sweden
11. Ireland - United Kingdom
12. Austria - Hungary
13. Finland - CIS
14. Czech Rep. - Poland
15. Austria - Czech Rep.
16. Sweden - United Kingdom
17. Greece - Italy
18. Bulgaria - Romania

Germany, USSR, Czechoslovakia, Bulgaria, Poland and Hungary),[6] second, the four Scandinavian countries (Sweden, Norway, Finland and the EC-member Denmark), third, the core members of the EC (Benelux, the UK, Italy, France and West Germany). Japan, the USA and Canada are linked to the functional bloc of the Western European countries before a link is established between Western and Northern Europe or between Western and Eastern Europe. The USA and Canada are very closely linked and can serve as a point of reference for functional regions in Europe.

The shape of the dendrogram from 1994 shows the effects of the break-down of trade between the Eastern European countries. The functional region of Eastern Europe - clearly apparent in the dendrogram from 1984 - has disintegrated. While the Czech and the Slovak Republic are of course closely linked, these two countries, Poland and Hungary join the extended functional bloc of Western European countries at a low level of economic integration. Russia is first linked to Finland rather than to another CEEC.

The core EU members are still closely integrated, and are linked to Spain, Portugal, Austria, Switzerland, USA, Canada, Japan and Ireland before any of the Eastern European or Scandinavian countries. Sweden, Norway, Finland and Denmark constitute a distinct Scandinavian functional region and are linked to the Western Europe bloc only after the Eastern European countries.

The situation in 1929 broadly resembles that of 1994. A core region consists of France, Belgium-Luxembourg, the Netherlands and Germany, and a larger region includes this core region, Switzerland, Italy, the UK, the USA, Canada and Japan. Austria, Czechoslovakia, Hungary and Romania are linked to this functional

---

[6] The similarity matrix is calculated by dividing the elements of row i of the trade matrix with the total exports of country i given in the last column. The similarity matrix shows therefore the share of bilateral trade in total trade. The trade matrices and similarity matrices for 1984 and 1994 and the similarity matrix for 1929 are supplied in the Appendix Tables. Romania is not part of this functional region and joins in only at a low value of t - representing a weak functional integration - through the linkage with Poland.

region before the Scandinavian countries. In 1929, the Scandinavian functional region included Denmark, Sweden and Norway, but not Finland. Thus, the dendrograms reveal a convergence of the pattern of functional regions within today's Europe to the one which held for Europe before World War II. The dendrogram of 1984 differs through the pronounced existence of a functional region of the Eastern European countries from the dendrograms of 1929 and 1994. Hierarchical cluster analysis therefore exposes the renaissance of the old functional regions within Europe.

III. Expected Long-Term Pattern of Trade of the CEECs

The trading pattern of the pre-World War II period provides a useful point of reference for intra-European trade under market economy conditions, but given substantial differences in political mapping between the two periods such comparison should not be overinterpreted. A gravity model – based on current economic data – can better approximate the expected or „normal" pattern of trade of the CEECs once the adjustment problems of the transformation period have been overcome.

III.1. Estimates Based on a Gravity Model

The gravity model[7] explains bilateral trade as a function of the "size" of the two countries and "distance". "Size" is reflected in the national product and GNP per capita of both the supplier country and of the destination country and captures

---

[7] The model derives its name from the analogy of trade flows to gravitational forces between objects depending on their mass and the distance between them. Gravity models were developed in the early 1960s as a framework for the empirical analysis of trade phenomena (Tinbergen, 1962; Pöyhönen, 1963; Linnemann, 1966). Although the theoretical foundation of the gravity model were sometimes called into question, its robustness and high explanation power in empirical applications are undisputed (c.f. Deardorff, 1984). Recently, Deardorff (1995) showed that even a simple gravity equation can be derived from standard trade theories. Gravity models have been widely used to test a host of hypotheses and have not lost their attraction over the decades (c.f. Langhammer, 1989; Havrylyshyn and Pritchett, 1991; Gros and Dautrebande, 1992; Winters and Wang, 1994 and Frankel, Stein and Wei, 1995).

supply potential and absorptive capacity. "Distance" captures all factors that restrict (or stimulate) trade by increasing (or reducing) transaction costs of trade between the two countries. Trading restricting factors include transport costs and protectionist measures; trade stimulating factors include regional preference zones, a common border, a common language, cultural similarities and historical links.

Our estimates of the potential trade of the CEECs are based on recent work by Schumacher (1995a). Schumacher's coefficient estimates are derived from bilateral trade data among 22 OECD countries and between the 22 OECD countries and 48 additional partner countries.[8] The coefficient estimates are then combined with the explanatory variables of the CEECs to derive the expected "normal" trade flows between the CEECs and all partner countries. Besides GNP and geographical distance, Schumacher's full model includes various regression variables like a shared language, colonial ties, membership of a preference zone and a common border. Schumacher concludes, however, that these variables provide little additional explanatory power. His preferred regression includes only national product, per capita income and geographical distance.

For the exports of OECD countries, the following equation is derived:

$$\ln X_{ij} = -13.07 + 0.92 \ln Y_i + 0.38 \ln \frac{Y_i}{P_i} + 0.79 \ln Y_j + 0.17 \ln \frac{Y_j}{P_j} - 0.89 \ln D_{ij}$$

For the imports of OECD countries, the corresponding equation is:

$$\ln X_{ij} = -13.14 + 1.00 \ln Y_i + 0.18 \ln \frac{Y_i}{P_i} + 1.20 \ln Y_j - 0.24 \ln \frac{Y_j}{P_j} - 0.90 \ln D_{ij}$$

---

8 The coefficients of the equation are derived with the OLS estimation procedure. To obtain consistent estimates, observations with zero values are replaced by very small figures. Since the data are based on the trade of the OECD countries with partner countries there are only few observations with zero value and the OLS estimation is an appropriate procedure. Apart from the estimates of the coefficients for total trade reported in this section, Schumacher also estimates the coefficients for trade in goods of the manufacturing sector as a whole and of individual branches of the manufacturing sector.

with:

X_{ij}	Exports from country i to country j
Y_i	GNP of supplier country i
P_i	Population of supplier country i
Y_j	GNP of destination country j
P_j	Population of destination country j
D_{ij}	Distance in miles between the economic centre of country i and j

All estimated coefficients except for Y_j / P_j in the import equation are significant at the 99 per cent level.[9] They confirm the analogy to the gravitational law of physics: Exports or imports between two countries are larger, the higher their national products and the smaller the distance between them. A higher level of per capita income results also in higher bilateral trade flows (c.f. Schumacher, 1995a). The negative coefficient on Y_j / P_j in the import equation may reflect collinearity between total and per capita income (the coefficient on total GNP is greater than unity).

Table 2 reports the resulting estimates of the expected long-term trade pattern of the CEECs. It is important to note that Schumacher's coefficient estimates were derived through a regression analysis of the trade of the OECD countries with other OECD and developing countries. In using these estimates, it is assumed that the trading relationships of the CEECs are determined by the same factors of the OECD countries. Employing these coefficient estimates, long-term equilibrium exports and imports of each CEEC in trade with 84 partner countries

---

9 For the export equation, R^2 is 0.82 instead of 0.84 for the equation with all variables; for the import equation, it is 0.49 instead of $R^2 = 0.50$ for the equation with all variables. The regression equation is also applied to individual countries to reflect better the characteristics of a country in the coefficients (Schumacher, 1995a and 1995b). The explanatory power for the regression of the trade of Germany as an individual country is very high on the export ($R^2 = 0.93$) and import ($R^2 = 0.84$) side. For France as an individual country R^2 numbers 0.83 for the exports and R^2 numbers 0.82 for the imports. Schumacher estimates Germany's potential trade with the CEECs with the results from the regression for the individual country's foreign trade as well as with the regression results for all the OECD countries. The estimated amount of trade of these two approaches leads to roughly similar results for the different CEECs.

are estimated.[10] Table 2 and Appendix Table 2 list total exports and imports for each CEEC and the shares of the main trading partner.

The analysis indicates that we should expect a continuing shift of the CEECs' trade orientation towards the EU. As the summary columns for the 6 CEECs reveal, the expected EU share is on average almost 71 per cent of the total CEEC exports and 72 per cent of total imports (Appendix Table 2). In 1994, the actual share was almost 64 per cent exports and around 60 per cent of the imports. The expected percentage share of Eastern Europe (consisting of the CEECs, the successor states of the Soviet Union and Slovenia) is less than 8 per cent for CEEC exports and less than 5 per cent for imports. In 1994, the actual shares were around 15 per cent for the exports and almost 23 per cent of the imports.

However, some qualifications are necessary. The gravity model predicts an average share of less than 3 per cent of total CEECs' imports for the successor states of the Soviet Union. Considering the present volume of energy imports from the Russian Federation, this value is probably too low. The omission of an important variable (natural resource endowment) inevitably restricts the predictive power of the gravity model.

---

[10] The 84 countries consist of the 70 countries used by Schumacher for his regression estimates, the CEECs, the Baltic Republics, the Russian Federation, Belarus, Ukraine, Kazakstan and Slovenia. The regression was estimated with data on GNP per capita and population for the years 1988 to 1990 taken from the World Bank's Development reports. To capture the actual weight of the countries' GNP, the latest World Bank's GNP figures of the year 1994 from the World Bank Atlas 1996 were adjusted to the price level of 1990 and employed for the estimation of the trading pattern of the CEECs. The inflation adjustment is necessary to maintain the relative weight of GNP and distance on bilateral trade flows. Bikker (1987) stated that a gravity model will exhibit money illusion unless predictions are made at the same prices as used in the estimations. The estimated volumes of trade are subsequently „inflated" from the price level of 1990 to the level of 1994 to facilitate the comparison to the actual trade of 1994. This approach will underestimate the growth of trade potential through increased GNP. The gravity model yields the prediction of strong income effect on trade with elasticities exceeding unity. With increased GNP in the CEECs and the partner countries we should expect an at least proportional increase in the trading potential. The distance between the countries was computed by Schumacher as the shortest line between their commercial centres according to the degrees of latitude and longitude. The data file with the derived distances between the countries was kindly provided by Schumacher.

Table 2 — "Normal" Geographical Composition of Trade - Exports

CEECs	Bulgaria		Czech Rep./ Slovak Rep.				Hungary		Poland		Romania		all 6 CEECs[1]	
	1994	expected	1994[2]	expected	1994[2]	expected	1994	expected	1994	expected	1994	expected	1994	expected
Partner countries			Cz		SL									
Eastern Europe	**15.9**	**8.6**	**14.5**	**5.5**	**8.4**	**7.8**	**25.5**	**8.2**	**13.8**	**8.2**	**13.4**	**8.9**	**15.3**	**7.9**
Ex Soviet Union	11.3	3.9	6.5	2.3	7.2	2.5	15.1	3.4	9.3	5.2	6.6	4.8	9.3	3.7
EU (15)	**48.4**	**66.3**	**72.8**	**77.2**	**83.0**	**75.4**	**60.7**	**71.5**	**69.2**	**69.0**	**48.2**	**64.3**	**63.7**	**70.6**
Germany	14.0	16.0	42.6	30.3	43.5	18.9	28.0	19.8	35.7	19.9	16.0	15.8	30.0	20.1
France	4.7	8.8	3.0	9.6	4.0	8.0	3.3	8.9	4.0	9.2	5.1	8.7	4.0	8.9
UK	3.3	6.4	3.7	6.8	2.7	5.6	3.1	6.4	4.5	7.0	3.2	6.4	3.4	6.4
Italy	9.9	12.9	5.8	7.7	11.7	9.0	8.1	10.2	5.0	8.0	13.0	11.1	8.9	9.8
Greece	7.1	2.1	0.8	0.5	0.8	0.6	0.5	0.8	0.4	0.7	2.3	1.9	2.0	1.1
Austria	1.9	4.0	8.6	6.1	11.6	19.5	9.9	9.2	2.2	4.5	1.6	3.8	6.0	7.8
US	**7.3**	**7.4**	**2.9**	**4.9**	**4.5**	**4.8**	**4.0**	**6.0**	**3.4**	**6.9**	**3.1**	**7.9**	**4.2**	**6.3**
Asia	**5.1**	**6.5**	**2.2**	**3.8**	**0.5**	**3.9**	**1.9**	**5.0**	**3.6**	**5.8**	**5.7**	**7.2**	**3.2**	**5.4**
Other	**23.9**	**11.2**	**7.0**	**8.6**	**3.2**	**8.1**	**8.3**	**9.3**	**10.8**	**10.1**	**28.5**	**11.7**	**13.6**	**9.8**

Eastern Europe: Bulgaria, Czech Republic, Slovak Republic, Hungary, Poland, Romania, Ex-Soviet Union and Ex-Yugoslavia.
Asia: Japan, Pakistan, Bangladesh, India, Sri Lanka, Thailand, Malaysia, Singapore, Indonesia, Philippines, Korea, Hong Kong.
[1]Unweighted average. - [2]Total actual trade for 1994 excludes Czech-Slovak trade.

Sources: International Monetary Fund (1995), own calculations.

Another qualification concerns the relative GNP level among the countries. The estimates for the potential volume of trade are biased downwards due to the presently depressed levels of the GNP of the CEECs during the transformation period. Schumacher (1995a) accounts for the high skill level of CEEC population by increasing their GNP threefold, based on a regression of per capita income on human capital in market economies. The adjustment of per capita GNP to reflect expected income convergence especially affects the relative importance of trade among the CEECs. We use three different scenarios to gauge the trade impact of the CEECs' expected catching up in per capita income.

Scenario I assumes that the GNP of the Eastern European countries doubles whereas the GNP of all other countries remains constant. Under this assumption, the average share of CEEC exports to Eastern Europe is 14 per cent compared to 8 per cent under the assumption of current GNP levels. The 15 countries of the EU attract 64 per cent rather than 69 per cent of CEEC exports. In Scenario II the GNP of the Eastern European countries is tripled whereas the GNP of all other countries is kept constant. In the final Scenario III, the GNP of the Eastern European countries is tripled, the GNP of the developing countries is doubled, and the GNP of the developed countries remains constant. Scenario III models the hypothesis of the global convergence. Scenarios II and III lead to very similar shares of different regions in CEEC exports: Eastern Europe accounts for roughly 19 per cent, and the EU for 57 per cent (Scenario III) to 60 per cent (Scenario II).

These experiments with different relative GNPs indicate that the EU will also maintain its predominant position in trade of the CEECs in the case of a „rapid catching up" of the CEECs and of the developing countries. A trebling of the GNP requires a growth rate of 6 per cent for almost 20 years. If EU countries continue to grow at a moderate rate of 2 per cent, say, then even higher growth rates are required for the CEECs to close the income gap.

Other recent studies also use gravity models to estimate the potential volume and pattern of trade between Eastern and Western Europe (Havrylyshyn and Pritchett, 1991; Gros and Dautrebande, 1992; Winters and Wang, 1994). Regardless of the selection of comparator countries and base years, these studies support our finding that the EU will play a predominant role in CEEC trade in the long run.

III.2. A Special Role for Trade With Germany?

One puzzling finding of the analysis in the preceding section is that the share of Germany in CEECs exports in 1994 was substantially larger than predicted by the gravity model. It has been suggested that special cultural and historical links between the CEECs and Germany might have led to lower transaction and information costs for partners of these countries.

Herrmann et al. (1982) analyse the different types of communication costs and the effects on international trade. Following the approach of Herrmann et al., the special German position may be explained by comparatively low communication costs. Communication costs in this context consist of the costs related to all the activities required to send and receive information needed about products, companies and markets in order to sell goods. A company that wants to export its product to a foreign market needs information about the characteristics and preferences of the target group as well as about the level competition and supply structure in the country. This set of information has to include knowledge about commercial customs, cultural norms and personal value systems. A high level of cultural affinity between the home country of the exporter and the target country will lead to lower communication costs.

It is difficult to identify communication costs that are substantially lower in trade between the CEEC and Germany than in trade between the CEECs and other West European countries. One possible candidate would be language barri-

ers. German was the only „Western" language that could be learnt and practised freely in Eastern Europe before 1989 because the German Democratic Republic was a socialist country. However, no evidence is detected in a recent survey of Hungarian exporters of manufactures (Szalavetz and Lücke, 1996). Similarly, special links between East German and CEEC enterprises had been severed by 1991 and cannot have contributed to the prominent role of trade with Germany in recent years.

At least in part, the prominent position of Germany may be explained by Germany serving as a country of first destination for CEEC exports ultimately destined for other EU countries. Circumstancial evidence of such export marketing patterns has been found in the survey of Szalavetz and Lücke (1996). With intra-EU trade fully liberalised, the distinction may have become blurred and the figures of exports to the entire EU should well represent the actual exports to the EU.

IV. Trade Effects of EU Membership for the CEECs

The preceding sections have demonstrated that the reorientation of CEEC trade towards Western Europe is largely due to the elimination of politically motivated barriers to East-West trade and of the preference for trade among CMEA member countries under the central planning system. This suggests that CEEC trade reorientation is essentially market-driven and represents a return to normalcy.

However, from a very early stage, market-driven trade reorientation has been complemented by trade policy measures that promoted regional integration between the European Union and the CEECs. The Europe Agreements between the EU and the CEECs have provided a framework for a progressive liberalisation of industrial imports from the CEECs with the long-term option of EU membership. The integration of the CEECs into a regional trading bloc of the size of the EU may well influence their trade flows both with EU members and non-members.

Customs union theory assesses the world welfare effects of a regional bloc in terms of trade creation (through efficiency gains inside the bloc) and trade diversion (efficiency loss through displacing efficient external suppliers). Besides the static effects of economic integration that are analysed with the standard customs union theory, dynamic effects may represent additional gains for the member countries (c.f. Hine, 1994). Dynamic effects are defined as changes in the growth rate following the removal of trade barriers and are based on intensified competition and economies of scale. However, empirical verifications and a framework for the quantification of these effects are still missing. Nevertheless, the analysis based on the static effects can act as suitable proxy for all effects of integration.

Several indicators have been suggested to assess whether countries constitute a so-called "natural" regional grouping where trade diversion is likely to be low compared with trade creation. A very rough, but simple and widely used rule of thumb relates to the share of intraregional trade in the bloc's total trade prior to integration. Following Krugman (1991a, 1991b) a group of countries with a large share of intra-bloc trade (often referred to as a share of at least 50 per cent) is called a „natural" free trade area. The six CEECs trade on average around 60 per cent of their exports and imports with the EU. From the perspective of the CEECs, these countries are part of the natural grouping with the EU. However, this rough rule of thumb is fairly vague and cannot be used from the perspective of the EU, since the CEEC share of EU trade is less than five per cent.

IV.1. Complementarity of Trade Structure

The expectations of the CEECs about the benefits of joining the EU rest on the hope for increased export and employment opportunities through secure unrestricted access to a large market.[11] These hopes can only be fulfilled if the

---

[11] Further economic benefits of EU membership like the increased attractiveness to foreign investors (like in the case of Spain in the second half of the eighties) are set out in Baldwin (1995).

CEECs offer a competitive supply in goods facing an income-elastic demand in the EU. Furthermore, commodity complementarity between CEEC and EU supply would ensure that both groups gain from the regional arrangement and that protectionist vested interests can be contained. Therefore, a measure of trade complementarity can provide some indication about the odds of successful integration.

Michaely (1996) proposes the index

$$C_{jk} = 1 - (\sum |m_{ik} - x_{ij}|) / 2$$

with x_{ij} as the share of good i in total exports of country j

and m_{ik} as the share of good i in total imports of country k.

The index is zero when goods exported by country j are not imported by country k. The index is one when the commodity shares in country k's imports correspond exactly to those in country j exports. The higher the index, the more likely is an envisaged regional trading arrangement to accomplish the stimulation of trade between the members. The index builds on the assumption that existing trade barriers do not heavily distort the structure of trade between the countries. Otherwise the index cannot yield a reasonable indication of the likelihood of successful integration. A further caveat is necessary for the case of a small country with a limited range of traded goods. If this country can sell all its exports under more favourable terms to a large partner country, a regional free trade agreement might be successful even though the structure of the exports of the small country does not fit well the structure of the imports of the larger country.

The index has been calculated for Bulgaria, the Czech Republic, Hungary, Poland and the Slovak Republic in relation to the EU for 1990 through 1994.[12] For each bilateral relationship, two index values have been computed: one for the complementarity of the exports of each CEEC with EU imports (Table 3) and the

---

[12] Due to lack of suitable data the Michaely index could not be calculated for Romania.

other for the complementarity of the imports of each CEEC with EU exports (Table 4). The index values for CEEC exports and EU imports remain relatively stable over the years except for Bulgaria with a slightly decreasing value. The index values for CEEC imports and the EU exports increase gradually over the years (from an already high level). With progressing transformation, the CEECs increasingly demands sophisticated capital goods as exported by the EU.

It is interesting to compare the Eastern integration into the EU with other regional integration schemes. Michaely (1996) calculated the index for several proposed agreements like the extension of NAFTA to the rest of Latin America (AFTA) and Asia Pacific Economic Co-operation (APEC) as well as for existing successful and unsuccessful arrangements at the time when they were formed. The index values in Table 5 show a marked difference between successful and unsuccessful trading agreements. The six founding members of the EEC had an average trade complementarity index of 0.53, and the free trade area between Canada and the USA an value even of 0.64. By contrast, unsuccessful arrangements had much lower values, such as for LAFTA (0.22) and the Andean pact (Bolivia, Colombia, Ecuador, Peru and Venezuela) 0.07.

The corresponding average value for the Eastern enlargement of the EU is the order of 0.61 (as the average of 0.51 for the trade complementarity of CEECs exports and EU imports and of 0.71 for the trade complementarity of EU exports and CEECs imports).

Table 3 – Trade Complementarity Index: Exports of the CEECs, Imports of the EU

	1990	1991	1992	1993	1994	1990-1994 average
Bulgaria	0.49	0.44	0.45	0.43	0.42	0.45
Hungary	0.56	0.54	0.55	0.55	0.54	0.55
Poland	0.49	0.45	0.46	0.47	0.48	0.47
Czechoslovakia	0.53	0.56	0.58			0.56
Czech Rep.				0.57	0.60	0.59
Slovak Rep.				0.47	0.46	0.46
CEEC average	0.52	0.50	0.51	0.50	0.50	0.50

Source: Own calculations.

Table 4 – Trade Complementarity Index: Imports of the CEECs, Exports of the EU

	1990	1991	1992	1993	1994	1990-1994 average
Bulgaria	0.66	0.65	0.68	0.68	0.69	0.67
Hungary	0.72	0.75	0.77	0.79	0.77	0.76
Poland	0.68	0.71	0.73	0.74	0.75	0.77
Czechoslovakia	0.62	0.68	0.72			0.68
Czech Rep.				0.73	0.77	0.75
Slovak Rep.				0.72	0.73	0.72
CEEC average	0.67	0.70	0.72	0.73	0.74	0.71

Source: Own calculations.

Table 5 – Trade Complementarity Indices for Selected Trade Arrangements

Trading arrangement	Index	Trading arrangement	Index
Successful arrangements		*Recent arrangements*	
EEC (6)	0.53	NAFTA	0.56
Canada-US FTA	0.64	Mercosur	0.29
Unsuccessful arrangements		*Potential arrangements*	
LAFTA	0.22	Americas "AFTA" (NAFTA+5)[a]	0.31
Andean Pact	0.07	Asia-Pacific "APEC" (17)	0.35
		Sub-Saharan Africa (20)	0.09

[a]The Americas' free trade area is proxied by NAFTA plus the next five biggest economies, Argentina, Brazil, Chile, Colombia, and Venezuela.

Source: Michaely (1996).

Thus, the complementarity of the commodity composition of CEECs and EU trade is broadly comparable to the original EEC of 6 and the Canada-US free trade area. However, there is the possibility of indices to be biased upwards due to data problems since the trade statistics from important partner countries (like the republics of the former USSR) are not included in the used COMTRADE database. On the other hand, unrestricted access to the large EU market will allow the CEECs to market their limited range of export products under more favourable conditions than today. On balance, therefore, the accession of the CEECs to the EU will provide opportunities for trade expansion and will benefit both the CEECs and the EU.

IV.2. Is CEEC-EU Integration Harmful for Third Countries?

The commodity composition of trade prior to integration has also been used to define a "natural" regional grouping differently as Krugman does (Kreinin and Plummer, 1994). If the composition of trade remains largely unchanged after integrating, the new economic bloc is a "natural" one. The composition of trade is expected to remain unchanged if the ranking of a country's industries by revealed comparative advantage (RCA) in trade with members of the proposed economic bloc (which would tend to increase because of its preferential status) does not differ substantially from the ranking of RCA in trade with all partners. This would support the view of bloc formation which is not trade-diverting.

This analysis is applied here from the perspective of the CEECs.[13] RCA indices are calculated for 260 commodity groups at the three-digit level of the Standard

---

[13] This approach could be also applied for the existing EU countries to analyse the effects of an eastern enlargement of the EU on their comparative advantage. However, the method of Kreinin and Plummer is appropriate for the analysis of whether joining a regional bloc would distort the comparative advantage of a country. Due to the small size of each of the CEECs compared to the existing EU bloc, there will be only a relative modest influence of the CEECs on the issue, whether the enlarged EU will be „natural" from the perspective of a present EU member-country.

International Trade Classification (SITC).[14] For each CEEC, commodity groups are ranked, first by their RCA values in trade with all partners, and second by their RCA values with respect to the regional bloc that would include the CEECs and the EU. It is assumed that the ranking of the industries by their export performance indicates their ranking by the country's comparative advantage. If the RCA ranking in regional trade differs substantially from that in total trade, bloc formation is expected to lead to trade diversion.

Revealed comparative advantage is defined as:

$$RCA_1 = \frac{\frac{X_{ij}}{X_j}}{\frac{X_{iw}}{X_w}} = \frac{\text{exports of commodity i by country j}}{\text{total exports by country j}} \Big/ \frac{\text{world exports of commodity i}}{\text{total world exports}}$$

with respect to all trading partners, and as

$$RCA_2 = \frac{\frac{X_{ij-to(EU+CEECs)}}{X_{j-to(EU+CEECs)}}}{\frac{X_{i(EU+CEECs)-to(EU+CEECs)}}{X_{(EU+CEECs)-to(EU+CEECs)}}} = \frac{\text{exports of commodity i by country j into (EU + CEECs)}}{\text{total exports by country j into (EU + CEECs)}} \Big/ \frac{\text{(EU + CEECs) exports of commodity i into (EU + CEECs)}}{\text{total (EU + CEECs) exports into (EU + CEECs)}}$$

with respect to the proposed regional grouping, consisting of the EU and the

CEEC.An RCA_1 of unity implies that the share of a commodity in a country's total exports equals the share of the commodity in total world exports. An RCA_1 above 1 states that the commodity has a higher proportion in a country's export than in its world exports and suggests that the country has a comparative advantage in this product. In the following, the proposed regional bloc consisting of the present 15 EU countries and the CEECs is termed „EUplus". An RCA_2 above unity implies that this commodity accounts for a larger share in the country's exports to EUplus than in the exports to all the member countries of EUplus together.

---

[14] Kreinin and Plummer developed this approach for the analysis of "natural" economic blocs within Asia. The calculations for the RCA values in trade with all partners are based on the 106 countries of the COMTRADE database.

The similarity between the commodity rankings in terms of RCA_1 and RCA_2 is measured by the Spearman rank correlation coefficient (Table 6). The coefficients have been calculated for the years 1990 to 1994, with only modest fluctuations in the results. All CEECs have correlation coefficients above 0.65 and Bulgaria, Poland and the Slovak Republic even above 0.75, well in excess of the critical value of 0.5 suggested by Kreinin and Plummer. Hence, commodity composition of intraregional trade, which would be privileged, does not differ substantially from that of total trade. Therefore, regional integration benefiting intra-group trade is unlikely to lead to substantial distortions. In this sense, Bulgaria, the Czech Republic, Hungary, Poland and the Slovak Republic and the present 15 countries of the EU constitute a natural grouping.

Table 6 – Spearman Rank Correlations Coefficients for the CEECs Between RCAs Relative to Total World and Relative to an Extended EU

	Bulgaria	Czechoslovakia		Hungary	Poland
1990	0.80	0.78		0.78	0.77
1991	0.82	0.77		0.77	0.80
1992	0.76	0.67		0.70	0.76
	Bulgaria	Czech Rep.	Slovak Rep.	Hungary	Poland
1993	0.76	0.72	0.78	0.70	0.75
1994	0.79	0.68	0.82	0.72	0.76
t tests reveal that all estimates are significant at the 1 per cent level of probability.					

Source: Own calculations.

V. Conclusions

As a consequence of their economic transformation, the CEECs have substantially redirected their foreign trade from Central and Western Europe towards Western Europe and specially the EU. Judging by the intensity of their bilateral trade flows, Hungary, Poland, the Czech Republic and the Slovak Republic are already part of the economic region of Western Europe. Estimates of the expected „normal" trade patterns of the CEECs under market economy conditions suggest that the EU may become even more important, especially to Bulgaria and Romania whose reforms lag behind the other four CEECs.[15]

Policies for integration between the EU and the CEECs have started with the Europe agreements providing a framework for stepwise liberalisation and are ultimately directed towards EU membership. Our analysis has found that third countries' trade has little to fear from full EU liberalisation of CEECs-EU trade.

The high share of intra-regional trade in total trade, the complementarity of trade structures in terms of CEEC exports (imports) with the EU imports (exports) and the conformity between the RCA structure of trade with the EU on the one hand and the world on the other suggest the existence of a „natural" trading partnership including the EU and the CEECs. In this sense, integration policies follow the facts created by the market. Although the factual economic integration is less impressive for Bulgaria and Romania, the intensity of trade links makes Hungary, Poland, the Czech Republic and the Slovak Republic already „natural" trading partners of the EU.

---

[15] The tasks ahead for the individual CEECs (as well as the tasks accomplished) are discussed in Aldcroft and Morewood (1995). The authors set out how Romania still suffers from the handicap of having had the most centralised economy in Eastern Europe and how Bulgaria still has to manage the shift from energy-intensive industries to a more diversified and productive economy.

VI. Bibliography

Aldcroft, D. H. and S. Morewood (1995). *Economic Change in Eastern Europe Since 1918*. Edward Elgar Publishing Limited. Aldershot.

Amelung T. (1992). Regionalization of Trade in the Asia-Pacific: A Statistical Approach. *ASEAN Economic Bulletin*. Vol. 9, No. 2, pp 133-148.

Baldwin, R.E. (1995). The Eastern Enlargement of the European Union. *European Economic Review*. Vol. 39, Nos. 3/4, pp. 474-481.

Bikker, J. A. (1987). An International Trade Flow Model with Substitution: An Extension of the Gravity Model. *Kyklos*. Vol. 40, pp 315-337.

Collins, S.M. and D. Rodrik (1991). *Eastern Europe and the Soviet Union in the World Economy*. Institute for International Economics. Washington. D.C.

Deardorff, A. (1984). Testing Trade Theories and Predicting Trade Flows. In R.W. Jones and P.B. Kenen (eds.) *Handbook of International Economics*. Elsevier Science Publishers, pp. 467-517.

Deardorff, A. (1995). Determinants of Bilateral Trade: Does Gravity Work in a Neoclassical World? National Bureau of Economic Research Working Paper, No. 5377, Cambridge, MA.

Frankel, J., E. Stein and S. Wei (1995). Trading Blocs and the Americas: The Natural, the Unnatural, and the Super-natural. *Journal of Development Economics*. Vol. 47, pp 61-95.

Gros, D. and B. Dautrebande (1992). International Trade of Former Republics in the Long Run. An Analysis based on the 'Gravity' Approach. Centre for European Policy Studies Working Document No. 71. Brussels.

Haass, J. and K. Peschel (1982) *Räumliche Strukturen im internationalen Handel: Eine Analyse der Außenhandelsverflechtung westeuropäischer und nordamerikanischer Länder 1900-1977*. Schriften des Instituts für Regionalforschung der Universität Kiel. München.

Havrylyshyn, O. and L. Pritchett (1991). European Trade Pattern after the Transition. PRE Working Paper 748. World Bank, Washington. D.C.

Herrmann, H. et al. (1982). Kommunikationskosten und internationaler Handel. Schriften des Instituts für Regionalforschung der Universität Kiel. München.

Hine, R. (1994). International Economic Integration. In: Greenaway, D. and L.A. Winters (eds.), Surveys of International Trade. Oxford, pp. 234-272.

International Monetary Fund (various issues). *Direction of Trade Statistics Yearbook*. Washington, D.C.

Kojima K. (1964). The Pattern of International Trade Among Many Countries. *Hitosubashi Journal of Economics*, Vol. 5 No. 1, pp. 16-36.

Kreinin M. and M. Plummer (1994). „Natural" Economic Blocs: An Alternative Formulation. *International Trade Journal*, Vol. VIII, No. 2, Summer 1994, pp. 193-205.

Krugman, P. (1991a). Is Bilateralism Bad? In: E. Helpman and A. Razim (eds.) International Trade and Policy. Cambridge, MIT Press, pp. 9-23.

Krugman, P. (1991b). The Move Towards Free Trade Zones. In: Symposium on the Policy Implications of Trade and Currency Zone. Federal Reserve Bank of Kansas City, Jackson Hole, pp. 5-25.

Laaser C. and K. Schrader (1992). Zur Reintegration der baltischen Staaten in die Weltwirtschaft. *Die Weltwirtschaft*, Heft 2, pp. 189-211.

Langhammer, Rolf J. (1989), Trade in Manufactures Between Asian Pacific Rim Countries. *ASEAN Economic Bulletin*, Vol. 6, No. 1, pp. 94-109.

League of Nations (1939). *International Trade Statistics 1938*. Geneva.

League of Nations (1942). *The Network of World Trade*. Geneva.

Linnemann, H. (1966). *An Econometric Study of International Trade Flows*. North-Holland. Amsterdam.

Michaely M. (1996). Trade-Preferential Agreements in Latin America: An Ex-Ante Assessment. Policy Research Working Paper 1583. World Bank. Washington, D.C.

Norusis M. (1990). SPSS Base System User's Guide. Chicago.

Pöyhönen, P. (1963). A Tentative Model for the Volume of Trade Between Countries. *Weltwirtschaftliches Archiv*, 90 (1), pp. 93-99.

Schumacher, D. (1995a). Impact on German Trade of Increased Division of Labour with Eastern Europe. German Institute for Economic Research (DIW). Discussion Paper No. 116.

Schumacher, D. (1995b). Transformation in Eastern Europe. Impact on Trade and Employment in France and Germany. German Institute for Economic Research (DIW). Mimeo.

Seleka, T. and D. Henneberry (1991). Cluster Analysis Techniques for Export Market Selection. Oklahoma State University.

Szalavetz, A. and M. Lücke (1996). West-to-East Transfer of Technology and Know-How and Export Reorientation in Central Eastern Europe. Institute of World Economics, Working Paper (forthcoming).

Tinbergen, J. (1962). *Shaping the World Economy: Suggestions for an International Economic Policy*. New York.

United Nations (1951). Yearbook of International Trade Statistics 1950. New York.

United Nations (various issues). *International Trade Statistics Yearbook*. New York.

Winters, L. Alan and Wang, Z. K. (1994). Eastern Europe's International Trade. Manchester University Press. Manchester.

World Bank (1996). The World Bank Atlas 1996. Washington, D.C.

VII. Appendix

The results of the analysis presented in Section II.2. on the Reshaping of Functional Regions in Europe depend on the index applied to derive the similarity matrix and on the algorithm used to link the countries in the cluster analysis. This Appendix discusses alternatives to the approaches employed in the main body of this paper.

VII.1. An Alternative Trade Index

The so-called „actual trade intensity index" was developed by Kojima (1964). The index is defined as the share of country i's exports destined to country j relative to the share of country j's imports in total world imports net of country's i imports. The actual trade intensity index is expressed as:

$$I_{ij} = (X_{ij} / X_i) / [M_j / (M_w - M_i)]$$

with X_{ij} as country i's exports to country j, X_i as country i's total exports and M_i, M_j, M_w as the imports of countries i and j and of the world. Kojima's index has the advantage of correcting for the size of country j. A certain ratio of X_{ij} to X_i renders a higher index value, the smaller the share of country j in world import.

However, this approach distorts the extent of economic integration through trade intensity. For example, Kojima's index would indicate that Germany and Liechtenstein are highly integrated. While it is true that the performance of the German economy determines the economic well-being of Liechtenstein, the reverse is not true. Both economies are not integrated to the extent that the factor allocation in one country affects the factor allocation of the other one *and vice versa*. The interlinkage through factor allocation is an important criterion for economic integration, though it leads to a bias against smaller countries. The values (X_{ij} / X_i) and (X_{ji} / X_j) as used in the text are more appropriate criteria for eco-

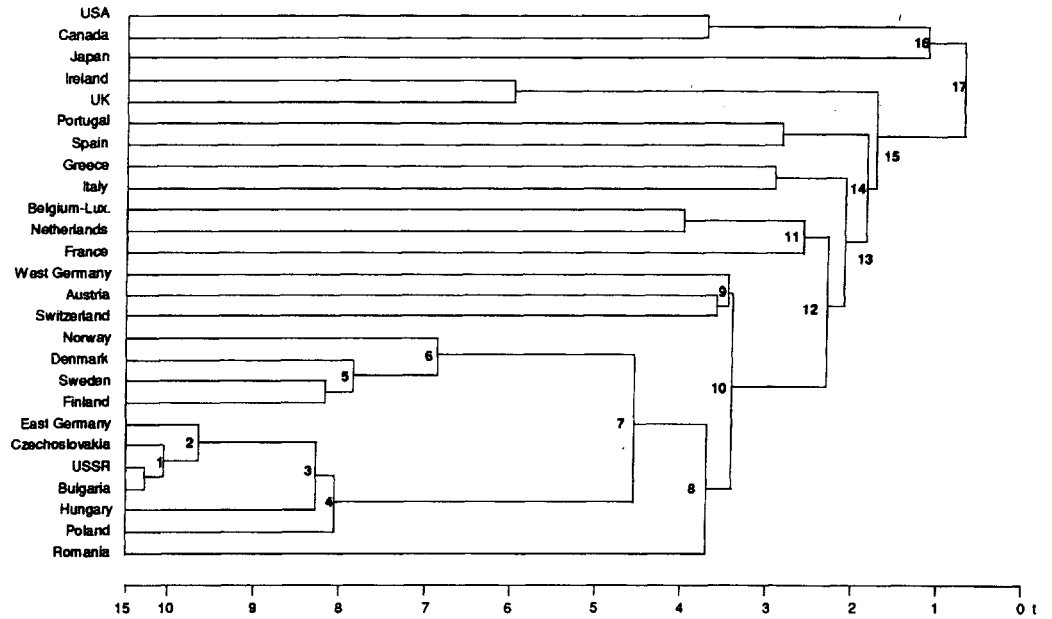
nomic integration to ensure that bilateral trade influences the allocation of resources in both economies.

Nevertheless, Kojima's actual trade intensity index has been applied to the trade data of 1984 and 1994 to examine how the findings of Section II.2. depend on the measure of trade intensity. With the actual trade intensity index, new similarity matrices have been calculated from the trade matrices for the years 1984 and 1994. The resulting dendrogram of functional regions for 1984 (Appendix Figure 1) displays the Eastern Bloc and the Scandinavian bloc clearly. However, no functional regions seem to exist that includes mainly countries of the European Community. There are pairs of Western European countries like Ireland and the UK, Greece and Italy, Portugal and Spain. The difference between the two indices is most clearly disclosed in the performance of the country pair USA-Canada. The dendrogram based on the values (X_{ij} / X_i) and (X_{ji} / X_j) of 1984 shows the USA and Canada linked as a functional region at a very early stage of the cluster analysis. By contrast, Kojima's actual trade intensity index leads to a country pair USA - Canada at a later stage, indicating a comparatively weaker functional region. The actual trade intensity index adjusts for the size of the trading partner, but introduces a bias against large countries: Once a country's share in world trade is large, it cannot achieve such a high I_{ij} value in trade with another country like a country could with a small share in world trade.

The comparison of the dendrograms based on the actual trade intensity index of 1984 and 1994 (Appendix Figure 2) is also characterised by the bias against large countries. The countries of the EU with their large share in world trade join functional regions relatively late compared to the smaller economies of the CEECs.

The dendrogram for 1994 still identifies a Scandinavian region, but the Eastern European region has disintegrated. While these results are broadly in accordance with those in the main body of the test, with the Kojima index, there is no clearly defined West European region any longer.

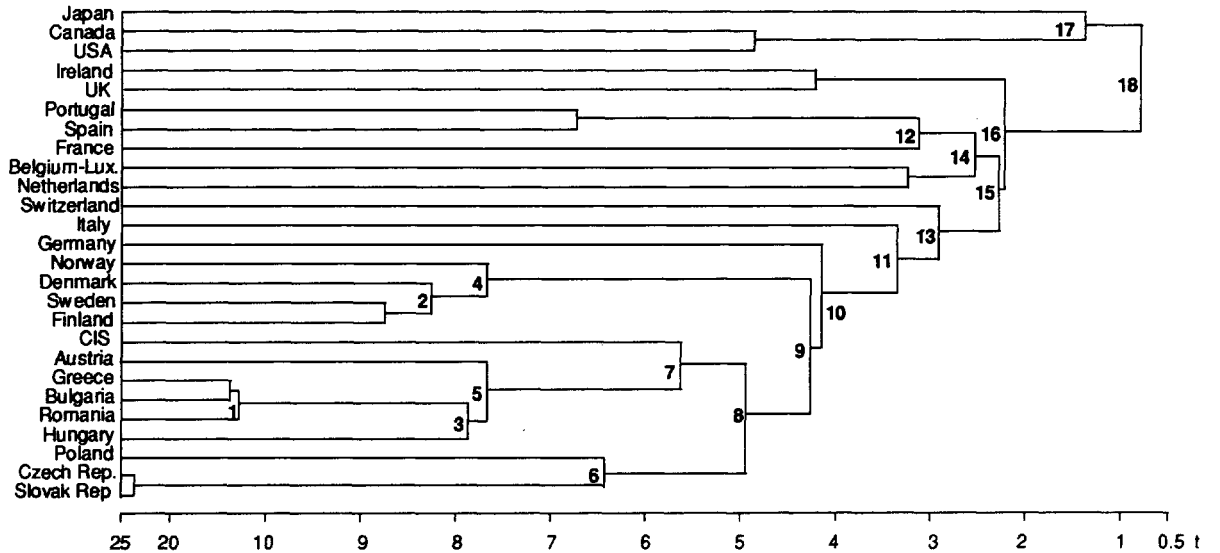
Appendix Figure 1:
Dendrogram of Functional Regions 1984 - Actual Trade Intensity Index



The following countries are united as strong components:

1. Czechoslovakia - USSR
2. East Germany - USSR
3. Hungary - USSR
4. Poland - USSR
5. Denmark - Sweden
6. Norway - Sweden
7. Finland- USSR
8. Poland - Romania
9. Austria - West Germany
10. Austria - Hungary
11. Belgium-Lux. - France
12. West Germany - Netherlands
13. France - Italy
14. France - Spain
15. Sweden - United Kingdom
16. Japan - USA
17. United Kingdom - USA

Appendix Figure 2:
Dendrogram of Functional Regions 1994 - Actual Trade Intensity Index



The following countries are united as strong

1. Bulgaria - Romania
2. Denmark - Sweden
3. Hungary - Romania
4. Norway - Sweden
5. Austria - Hungary
6. Czech Rep. - Poland
7. Bulgaria - CIS
8. Austria - Czech Rep.
9. Finland - CIS
10. Austria - Germany
11. Greece - Italy
12. France - Spain
13. Austria - Switzerland
14. Belgium - Lux. - France
15. France - Italy
16. Norway -United Kingdom
17. Japan - USA
18. United Kingdom - USA

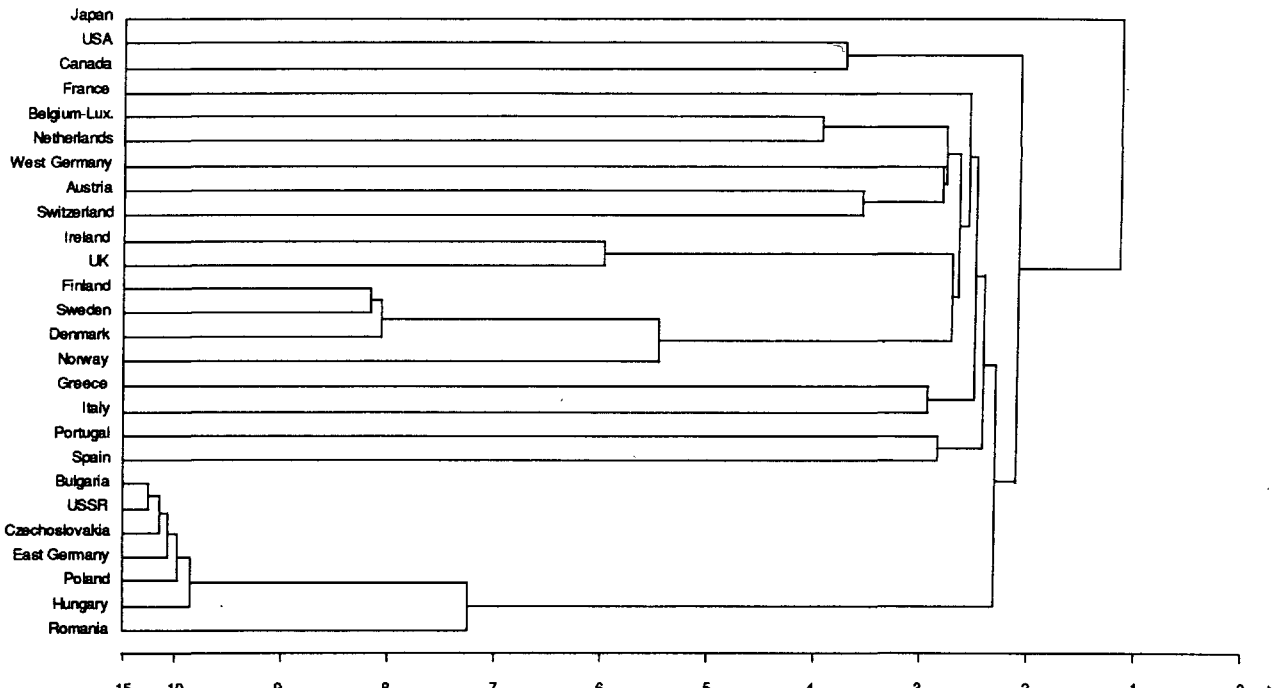
VII.2. An Alternative Hierarchical Clustering Technique

In the single-linkage algorithm, groups of countries are linked according to the closest group members (Seleka and Henneberry, 1991). Alternatively, it is possible to view a group of countries as one entity and to recalculate the trading shares. This approach corresponds to the centroid method used in cluster analysis (Norusis, 1990, pp 361-362). The similarity between two clusters is defined on the basis of the similarity between the means of the relevant variables in the two clusters. The disadvantage of the centroid method lies in the possibility that the value representing the similarity at which clusters are combined can actually increase from one step to the next. Since clusters merged at later stages are more dissimilar than those merged at early stages, this is an undesirable property.

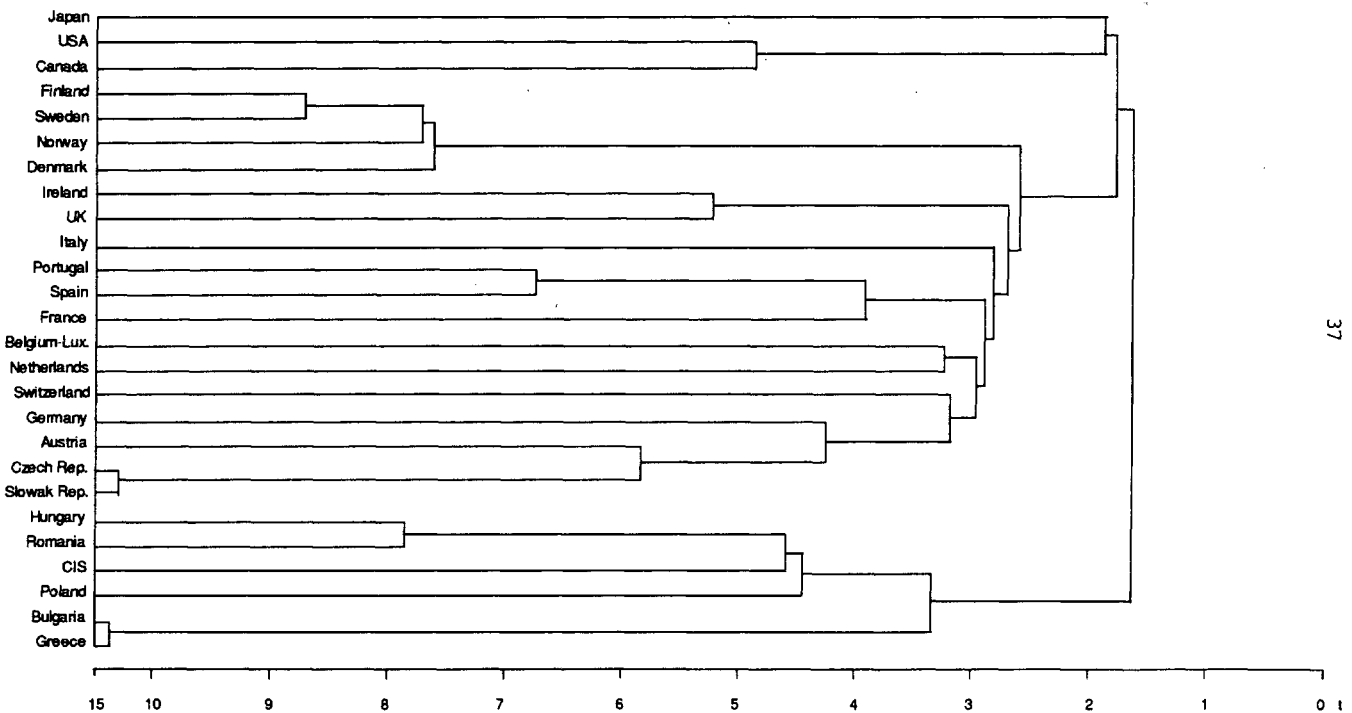
For the derivation of each country's share of the exports of a newly created cluster, the intra-bloc trade is subtracted from the sum of the exports of the countries. This centroid method has been employed for the trade data for 1984 and 1994 in combination with the values (X_{ij} / X_i) and (X_{ji} / X_j) and with Kojima's actual trade intensity index. If no correction is made for the size of clusters, the centroid method leads quickly to very large entities that draw in country by country. Therefore, the centroid approach requires an adjustment like that suggested by Kojima. The resulting dendrograms are reported in the following Appendix figures. Corresponding to the specified disadvantage of the centroid method, the threshold values for connecting clusters did not continuously decrease, but increase for some steps. For the purpose of graphical representation, a lower threshold value than in the previous step was substituted in these cases. For 1984 as well as 1994, the dendrograms demonstrate the existence of an „Eastern Bloc". However, the bloc had changed some of its members and the intensity of intra-bloc trade had declined by 1994. The Czech and Slovak Republics are integrated into the functional regions of Western Europe in 1994. This exercise shows that the selection of the cluster algorithm have an impact upon the analysis,

but that the conclusions from the hierarchical cluster analysis in the main part of this paper are largely unaffected.

Appendix Figure 3:
Dendrogram of Functional Regions 1984 - Centroid Method - Actual Trade Intensity Index



Appendix Figure 4:
Dendrogram of Functional Regions 1994 - Centroid Method - Actual Trade Intensity Index



Appendix Table 1 — CEECs: Geographical Composition of Imports, 1928, 1989, 1994 (percentage of total)

CEECs	Bulgaria			Czech Rep./ Slovak Rep.				Hungary			Poland			Romania			all 6 CEECs[2]		
	1928	1989	1994	1928	1989	1994		1928	1989	1994	1928	1989	1994	1928	1989	1994	1928	1989	1994
Partner countries						Cz[3]	SL[3]												
Eastern Europe	**20.9**	**68.9**	**29.8**	**17.7**	**62.2**	**17.4**	**22.9**	**40.5**	**38.5**	**29.9**	**10.2**	**39.6**	**13.9**	**25.7**	**51.2**	**23.0**	**23.0**	**52.1**	**22.8**
Ex Soviet Union	0.0	57.4	24.7	1.0	45.6	12.0	21.0	0.3	24.3	23.1	1.1	26.1	9.8	0.6	36.0	17.7	0.6	37.9	18.0
EU (15)[1]	**70.9**	**15.8**	**45.3**	**63.5**	**18.5**	**73.4**	**72.1**	**48.9**	**39.8**	**56.2**	**63.2**	**34.7**	**64.9**	**62.5**	**8.4**	**47.3**	**61.8**	**23.4**	**59.9**
Germany	20.9	6.7	14.2	38.7	8.6	40.4	35.8	19.6	18.3	23.6	27.0	12.9	27.5	23.6	3.2	17.7	25.9	9.9	26.5
France	8.1	1.3	3.0	4.3	1.4	4.9	3.6	2.5	2.5	3.1	7.5	2.4	4.5	4.5	1.4	5.0	5.4	1.8	4.0
UK	10.5	1.2	2.8	4.4	1.3	4.2	2.0	2.8	1.9	2.4	9.4	3.9	5.3	9.4	0.6	3.1	7.3	1.8	3.3
Italy	15.1	2.3	6.7	3.3	1.6	6.2	10.8	3.9	3.7	7.0	2.5	3.1	8.4	7.6	0.9	11.7	6.5	2.3	8.5
Greece	1.2	0.4	8.6	0.3	0.2	0.2	0.6	0.6	0.2	0.2	0.2	0.2	0.3	0.6	0.5	1.2	0.6	0.3	1.9
Austria	8.1	1.3	2.5	7.4	2.0	8.5	11.2	16.2	6.9	10.5	6.6	4.5	2.6	11.5	0.4	2.7	10.0	3.0	6.3
US	**2.3**	**1.5**	**2.4**	**5.9**	**0.3**	**2.1**	**1.2**	**3.6**	**1.6**	**1.8**	**14.0**	**1.8**	**3.9**	**5.4**	**1.6**	**6.4**	**6.3**	**1.4**	**3.0**
Asia	**0.0**	**2.2**	**1.7**	**2.9**	**3.6**	**2.1**	**0.7**	**1.4**	**3.1**	**5.1**	**3.5**	**5.0**	**5.3**	**0.6**	**5.0**	**2.6**	**1.7**	**3.8**	**2.9**
Other	**5.8**	**11.5**	**20.9**	**9.9**	**15.4**	**5.0**	**3.1**	**5.6**	**17.0**	**7.0**	**9.2**	**19.0**	**12.0**	**5.7**	**33.9**	**20.7**	**7.3**	**19.4**	**11.4**

Eastern Europe: Bulgaria, Czech Republic, Slovak Republic, Hungary, Poland, Romania, Ex-Soviet Union and Ex-Yugoslavia.
Asia: Japan, Korea, Taiwan, China, India, Burma, Sri Lanka.

[1]EU (15): without Ireland. - [2]Unweighted average. - [3]Total trade for 1994 excludes Czech-Slovak trade.

Sources: Collins and Rodrik (1991) and International Monetary Fund (1995).

Appendix Table 2 — "Normal" Geographical Composition of Trade - Imports

CEECs	Bulgaria		Czech Rep./ Slovak Rep.				Hungary		Poland		Romania		all 6 CEECs[1]	
	1994	expected	1994[2]	expected	1994[2]	expected	1994	expected	1994	expected	1994	expected	1994	expected
Partner countries			Cz		SL									
Eastern Europe	**29.8**	**5.2**	**17.4**	**3.2**	**22.9**	**4.8**	**29.9**	**4.9**	**13.9**	**5.0**	**23.0**	**5.5**	**22.8**	**4.8**
Ex Soviet Union	24.7	2.8	12.0	1.6	21.0	1.8	23.1	2.4	9.8	3.5	17.7	3.4	18.0	2.6
EU (15)	**45.3**	**67.7**	**73.7**	**79.1**	**72.1**	**76.7**	**56.4**	**73.1**	**65.3**	**70.1**	**47.4**	**65.4**	**60.0**	**72.0**
Germany	14.2	19.7	40.4	36.3	35.8	24.1	23.6	24.6	27.5	24.4	17.7	19.5	26.5	24.8
France	3.0	9.8	4.9	10.5	3.6	9.2	3.1	10.1	4.5	10.3	5.0	9.7	4.0	10.0
UK	2.8	6.7	4.2	7.0	2.0	6.2	2.4	6.9	5.3	7.5	3.1	6.8	3.3	6.8
Italy	6.7	13.9	6.2	8.0	10.8	10.0	7.0	11.1	8.4	8.5	11.7	12.0	8.5	10.6
Greece	8.6	1.3	0.2	0.3	0.6	0.4	0.2	0.5	0.3	0.4	1.2	1.2	1.9	0.7
Austria	2.5	3.0	8.5	4.5	11.2	15.5	10.5	7.0	2.6	3.4	2.7	2.9	6.3	6.0
US	**2.4**	**11.4**	**2.1**	**7.3**	**1.2**	**7.7**	**1.8**	**9.3**	**3.9**	**10.6**	**6.4**	**12.2**	**3.0**	**9.7**
Asia	**2.4**	**8.5**	**1.8**	**4.8**	**0.5**	**5.3**	**3.6**	**6.5**	**5.7**	**7.6**	**2.6**	**9.3**	**2.7**	**7.0**
Other	**20.9**	**7.2**	**5.0**	**5.6**	**3.1**	**5.5**	**7.0**	**6.2**	**12.0**	**6.7**	**20.7**	**7.6**	**11.4**	**6.5**

Eastern Europe: Bulgaria, Czech Republic, Slovak Republic, Hungary, Poland, Romania, Ex-Soviet Union and Ex-Yugoslavia.
Asia: Japan, Pakistan, Bangladesh, India, Sri Lanka, Thailand, Malaysia, Singapore, Indonesia, Philippines, Korea, Hong Kong.
[1]Unweighted average. - [2]Total actual trade for 1994 excludes Czech-Slovak trade.

Sources: International Monetary Fund (1995); own calculations.

Appendix Table 3 — Simulation of Different GNP Scenarios - Exports

All CEECs Partner countries	1994	Expected Conventional	Expected Scenario I	Expected Scenario II	Expected Scenario III
Eastern Europe	**15.3**	**7.9**	**14.2**	**19.6**	**18.7**
Ex Soviet Union	9.3	3.7	6.7	9.2	8.7
EU (15)	**63.7**	**68.6**	**63.8**	**59.8**	**56.9**
Germany	30.0	20.1	18.8	17.6	16.8
France	4.0	8.9	8.3	7.7	7.4
United Kingdom	3.4	6.4	6.0	5.6	5.3
Italy	8.9	9.8	9.1	8.5	8.1
Greece	2.0	1.1	1.0	1.0	0.9
Austria	6.0	7.8	7.3	6.8	6.5
US	**4.2**	**6.3**	**5.9**	**5.5**	**5.2**
Asia	**3.2**	**5.4**	**5.0**	**4.7**	**5.1**
Other	**13.6**	**11.9**	**11.1**	**10.4**	**14.1**

Eastern Europe: Bulgaria, Czech Republic, Slovak Republic, Hungary, Poland, Romania, Ex-Soviet Union and Ex-Yugoslavia.
Asia: Japan, Pakistan, Bangladesh, India, Sri Lanka, Thailand, Malaysia, Singapore, Indonesia, Philippines, Korea, Hong Kong.
Conventional: See Table 2.
Scenario I: GNP of the Eastern European Countries is doubled.
Scenario II: GNP of the Eastern European countries is tripled.
Scenario III: GNP of the Eastern European countries is tripled and GNP of the developing countries is doubled.

Sources: International Monetary Fund (1995); own calculations.

Appendix Table 4 — Simulation of Different GNP Scenarios - Imports

All CEECs Partner countries	1994	Expected Conventional	Expected Scenario I	Expected Scenario II	Expected Scenario III
Eastern Europe	**22.8**	**4.8**	**10.2**	**15.5**	**14.8**
Ex Soviet Union	18.0	2.6	5.5	8.4	8.0
EU (15)	**60.0**	**70.0**	**66.1**	**62.2**	**59.5**
Germany	26.5	24.8	23.4	22.1	21.1
France	4.0	10.0	9.4	8.8	8.4
United Kingdom	3.3	6.8	6.5	6.1	5.8
Italy	8.5	10.6	10.0	9.4	8.9
Greece	1.9	0.7	0.7	0.6	0.6
Austria	6.3	6.0	5.7	5.4	5.2
US	**3.0**	**9.7**	**9.2**	**8.6**	**8.2**
Asia	**2.7**	**7.0**	**6.6**	**6.2**	**6.7**
Other	**13.4**	**8.5**	**8.0**	**7.5**	**10.8**

Eastern Europe: Bulgaria, Czech Republic, Slovak Republic, Hungary, Poland, Romania, Ex-Soviet Union and Ex-Yugoslavia.
Asia: Japan, Pakistan, Bangladesh, India, Sri Lanka, Thailand, Malaysia, Singapore, Indonesia, Philippines, Korea, Hong Kong.

Conventional: See Appendix Table 2.

Scenario I: GNP of the Eastern European Countries is doubled.
Scenario II: GNP of the Eastern European countries is tripled.
Scenario III: GNP of the Eastern European countries is tripled and GNP of the developing countries is doubled.

Sources: International Monetary Fund (1995); own calculations.

Appendix Table 5 — Trade Matrix (million of US $) 1984

Exporter/ Importer	USA	CDN	Japan	A	B/ LUX	DK	FIN	F	D	GR	IRL	I	NL	N	P	E	S	CH	UK	BG	CZ	GDR	H	PL	RO	USSR	Total Exports
USA	0	46524	23575	375	5301	605	350	6037	9084	456	1355	4375	7554	859	961	2561	1542	2563	12210	44	58	137	88	318	249	3284	223976
Canada	66300	0	4394	37	543	76	91	576	977	38	77	450	827	253	49	75	133	191	1941	6	15	144	11	29	18	1663	90272
Japan	60429	4286	0	422	1347	933	504	1933	6608	791	248	1031	1812	496	154	643	1008	1088	4665	83	63	153	51	63	70	2515	169700
Austria	647	127	164	0	286	166	130	609	4676	92	32	1481	389	140	38	237	298	1088	689	114	173	344	345	167	56	707	15739
Belgium-Luxembourg	3139	294	430	436	0	473	217	9551	10236	257	194	2663	7219	354	177	451	712	1397	5134	47	58	73	77	86	49	548	51893
Denmark	1559	148	454	130	271	0	312	709	2565	106	88	623	531	1019	38	142	1811	297	2053	12	34	33	32	62	6	117	15980
Finland	1092	113	173	99	199	550	0	533	1296	75	76	286	478	613	29	99	1653	168	1613	22	51	62	47	39	5	2576	13471
France	7536	990	1029	695	8015	718	376	0	13727	807	435	10171	4443	721	654	3054	1228	3632	7389	104	114	212	146	275	155	1950	97566
Germany	16421	1519	2432	8566	12000	3529	1670	21579	0	1743	744	13263	14815	1922	774	3100	4561	9112	14261	470	734	2256	961	828	314	3800	173990
Greece	404	28	56	48	85	33	17	406	946	0	11	661	163	4	15	29	31	40	298	42	22	14	25	13	38	125	4816
Ireland	938	163	165	53	415	73	50	807	978	41	0	301	676	87	24	117	147	108	3323	2	3	3	7	10	2	22	9642
Italy	7947	804	841	1656	2125	555	346	10291	11824	1260	195	0	2108	356	361	1154	768	2981	4944	137	119	131	203	200	93	1581	74564
Netherlands	3315	339	382	574	9095	967	372	6857	19567	595	315	3661	0	538	300	638	1165	1038	6238	42	81	89	111	170	43	303	65677
Norway	969	108	267	82	170	669	274	638	3126	39	29	293	1377	0	77	65	1868	131	6893	6	20	13	14	27	8	76	18886
Portugal	456	45	47	53	172	84	73	646	713	16	26	223	308	87	0	232	185	128	799	5	4	5	4	2	11	55	5200
Spain	2252	229	369	106	598	153	84	3538	2260	140	93	1406	1240	100	560	0	211	413	2137	44	32	60	33	35	21	358	23508
Sweden	3342	384	423	339	1087	2438	1687	1475	3404	111	185	1051	1314	2704	91	335	0	482	3004	52	65	98	75	155	20	282	29378
Switzerland	2542	236	850	1007	627	311	203	2140	5055	161	73	1901	687	210	159	507	515	0	2071	121	110	63	130	109	26	200	25851
United Kingdom	13702	1573	1239	427	4072	1591	905	9395	9874	469	4526	3815	8183	1295	515	1756	3857	2085	0	74	104	125	133	227	95	976	93880
Bulgaria	28	5	60	30	17	4	4	50	137	46	1	73	20	1	2	36	11	19	21	0	484	680	104	227	174	6921	9776
Czechoslovakia	73	48	45	438	63	56	45	141	837	40	11	163	136	23	14	26	69	166	189	478	0	1518	854	1221	297	7449	17153
E. Germany	152	24	39	115	120	164	61	236	2726	83	9	104	143	168	20	75	314	43	240	691	1769	0	469	668	411	9092	19108
Hungary	228	25	35	451	39	33	40	143	639	38	0	281	94	10	0	14	61	192	128	125	444	508	0	366	125	2581	8563
Poland	257	40	49	249	99	157	185	292	1042	42	51	281	191	45	0	115	212	147	478	283	657	539	376	0	324	3447	11750
Romania	703	40	82	190	60	21	12	301	755	188	3	935	251	21	3	36	38	79	240	175	231	437	204	379	0	1659	12646
U.S.S.R.	377	22	1035	938	1485	412	2983	3015	5589	717	47	3889	1986	159	57	410	694	668	1716	7545	8121	9217	5324	7478	2226	0	91650
Total Imports	346181	75932	135939	19756	55278	16722	12783	105057	156838	9729	9675	85364	62314	13856	7961	28750	26413	29811	105449	11712	15255	18515	11749	14855	11163	66624	1374635

Source: IMF, Direction of Trade Statistics Yearbook 1990. - UN, International Trade Statistics Yearbook 1988.

Appendix Table 6 — Trade Matrix (million of US $) 1994

Exporter/ Importer	USA	CDN	Japan	A	B/ LUX	DK	FIN	F	D	GR	IRL	I	NL	N	P	E	S	CH	UK	BG	CZ	SK	H	PL	RO	former USSR	Total Exports
USA	0	114255	53481	1373	11172	1215	1069	13631	19237	830	3416	7196	13591	1269	1054	4645	2520	5608	26833	110	297	43	309	625	337	3565	512521
Canada	133112	0	6857	144	924	61	83	881	1518	47	96	871	828	448	64	250	132	802	2208	5	25	4	16	31	32	146	165380
Japan	118693	5906	0	1248	3796	856	992	5261	17784	604	1684	3357	8507	1356	759	2103	1488	2262	12734	20	125	10	264	118	29	1370	397008
Austria	1593	278	702	0	848	385	234	2048	17155	206	97	3656	1341	251	210	963	628	2864	1425	116	1179	395	1764	528	132	830.	45216
Belgium-Luxembourg	6238	468	1550	1453	0	1086	576	18126	20235	774	381	7232	12111	636	827	2800	1635	2339	9324	60	311	46	351	492	79	889	108235
Denmark	2184	212	1640	422	718	0	950	2173	8880	302	191	1576	1577	2564	215	721	4131	759	3237	28	148	38	114	570	34	661	41417
Finland	2132	199	619	308	667	1015	0	1499	3981	170	136	887	1517	936	155	685	3252	449	3066	41	164	47	224	492	21	2539	29659
France	16365	1635	4568	2539	20421	2047	814	0	39910	1676	1435	21874	10802	970	3471	16699	2673	8779	23069	142	677	128	512	957	345	1688	235505
Germany	33516	2717	9965	24588	28041	7705	3337	50510	0	3462	1898	31674	31432	3696	3559	13455	9500	22957	33455	663	5590	1265	3952	6420	1247	10238	419312
Greece	421	60	119	164	268	17	51	451	1770	0	20	1222	193	34	17	150	81	86	465	398	40	21	42	5	80	220	8347
Ireland	2813	329	1149	249	1248	184	211	2784	4293	175	0	1376	1565	315	92	741	542	659	8685	3	46	1	35	37	4	207	31340
Italy	14730	1742	4052	4667	5658	1592	758	24824	36082	3400	663	0	5432	778	2559	8914	1730	7164	12335	312	859	380	1181	1771	876	2832	189805
Netherlands	5715	574	1540	1728	17512	2104	875	14109	37884	1342	820	6947	0	1092	1046	3465	2267	2510	12597	150	437	95	440	1100	157	1718	156580
Norway	2223	1151	658	140	1032	1628	1032	2794	4280	78	419	990	2971	0	305	472	3215	214	7250	6	49	3	14	334	10	194	34695
Portugal	916	121	135	196	644	407	185	2572	3270	80	87	587	890	179	0	2558	436	329	2041	8	8	4	20	6	4	73	17542
Spain	3614	424	991	610	2192	467	252	14762	10891	681	320	6744	3016	250	5719	0	561	884	6018	26	108	25	240	346	50	367	73296
Sweden	4904	679	1634	851	3004	4228	2921	3125	8135	353	410	2312	3232	4996	280	1174	0	1182	6209	30	206	32	290	597	141	899	61292
Switzerland	6450	481	2732	2522	1747	755	397	6464	16498	410	274	5233	1897	353	470	1404	992	0	4676	69	309	76	306	349	93	500	66278
United Kingdom	26553	2929	4591	1589	10544	2501	2005	19100	24593	1304	9581	9649	13487	3084	1769	7347	5134	3770	0	132	575	72	398	1079	195	1478	204491
Bulgaria	218	27	21	57	39	21	13	142	420	213	1	296	77	6	6	51	14	11	98	0	12	n.a.	22	19	59	338	2994
Czech Rep.	305	38	87	906	158	96	75	311	4477	87	18	609	271	45	18	122	118	132	388	46	0	2370	220	456	46	693	14304
Slovak Rep.	128	16	8	331	34	20	22	115	1237	23	2	334	81	3	6	45	39	37	78	n.a.	2091	0	n.a.	n.a.	29	208	6596
Hungary	436	31	90	1081	195	44	76	365	3061	55	2	885	243	24	11	147	126	147	333	28	98	58	0	208	160	1678	10956
Poland	594	64	38	380	428	550	301	689	6150	66	65	856	1016	114	27	177	443	170	783	45	456	n.a.	184	0	32	1597	17042
Romania	193	39	53	97	104	9	4	316	988	141	2	798	218	11	3	56	34	46	200	103	76	8	161	14	0	410	6152
former USSR	4283	251	2338	919	1536	422	2496	1650	6821	363	1256	3752	2719	291	86	348	1198	3808	4100	1172	1576	742	1198	1766	730	0	70012
Total Imports	689215	151304	275236	55343	139873	34878	23214	229344	373172	22041	25764	167699	143599	27309	26630	92511	51725	64074	226793	5168	14729	6826	14318	21383	6562	86239	

Source: IMF, Direction of Trade Statistics Yearbook 1995.

Appendix Table 7 – Similarity Matrix for 1929

Exporter/ Importer	USA	CDN	Japan	A	B/ LUX	DK	FIN	F	D	GR	I	NL	N	E	S	CH	UK	BG	CZ	H	PL	RO	U.S.S.R.
USA	0.0	18.1	4.9	0.1	2.2	1.0	0.3	5.1	7.8	0.3	3.0	2.4	0.4	1.6	1.1	0.2	16.2	0.1	0.1	0.0	0.3	0.2	1.6
Canada	44.3	0.0	3.2	0.0	2.0	0.5	0.1	1.4	2.7	0.5	1.1	1.8	0.4	0.4	0.4	0.1	24.5	0.1	0.1	0.0	0.0	0.0	0.3
Japan	42.5	1.3	0.0	0.1	0.1	0.0	0.0	2.1	0.6	0.0	0.3	0.3	0.0	0.1	0.0	0.0	2.9	0.0	0.0	0.0	0.0	0.0	0.8
Austria	3.5	0.3	0.3	0.0	0.6	0.6	0.2	3.5	16.5	0.7	9.6	1.4	0.5	0.4	1.1	5.7	4.5	1.0	13.5	7.5	4.8	5.1	2.8
Belgium-Luxembourg	6.8	1.2	1.1	0.4	0.0	1.1	0.3	12.6	12.0	0.8	2.5	12.7	0.7	0.9	1.0	2.5	18.2	0.6	0.5	0.1	0.8	0.3	0.3
Denmark	1.1	0.0	0.6	0.1	0.4	0.0	1.7	0.7	19.9	0.0	0.5	0.7	3.9	0.5	6.4	0.9	56.4	n.a.	0.3	0.0	0.9	0.0	0.5
Finland	7.0	0.1	0.2	0.0	7.9	2.3	0.0	6.5	14.4	0.1	0.9	6.9	0.4	1.9	2.0	0.0	38.0	n.a.	0.0	0.0	0.1	0.0	3.3
France	6.7	1.2	0.6	0.4	14.4	0.6	0.1	0.0	9.4	0.8	4.4	2.5	0.2	3.2	0.5	6.7	15.1	0.1	0.5	0.1	0.9	0.3	0.5
Germany	7.4	0.6	1.8	3.3	4.5	3.6	1.4	8.0	0.0	0.6	4.5	10.0	1.7	1.7	3.5	4.7	9.7	0.3	4.9	1.1	3.1	1.2	2.6
Greece	16.1	0.0	0.0	2.5	3.1	0.0	0.0	6.1	23.2	0.0	18.2	4.3	0.3	0.0	3.4	0.2	11.7	0.1	1.1	0.3	0.8	1.4	0.1
Italy	11.5	0.4	0.4	2.9	1.9	0.4	0.1	8.8	11.9	1.6	0.0	1.2	0.3	1.7	0.6	7.1	9.8	0.8	1.1	0.8	0.9	1.1	0.5
Netherlands	3.6	1.0	0.3	0.7	10.6	1.7	0.8	5.9	22.9	0.3	1.4	0.0	1.2	0.8	1.6	1.4	20.7	0.1	1.0	0.4	0.9	0.3	0.1
Norway	9.8	0.6	1.3	0.3	4.2	4.2	0.6	5.1	13.0	0.3	2.4	2.5	0.0	1.8	5.6	0.1	27.0	n.a.	0.2	0.2	1.4	0.2	2.4
Spain	12.2	0.3	0.0	0.1	3.4	0.4	0.1	21.9	7.4	0.0	4.5	4.9	0.7	0.0	0.5	0.2	18.9	n.a.	0.0	0.0	0.0	0.0	0.7
Sweden	10.9	0.5	0.9	0.3	3.1	6.3	2.8	5.6	15.2	0.4	1.5	3.8	5.3	2.4	0.0	0.4	24.8	n.a.	1.1	0.1	1.0	0.3	1.5
Switzerland	9.9	1.8	2.1	3.3	2.7	0.9	0.3	8.6	16.9	0.5	7.5	3.2	0.6	2.6	1.5	0.0	13.7	0.1	2.6	0.8	2.0	0.8	0.5
United Kingdom	6.2	4.8	1.8	0.3	2.7	1.5	0.4	4.3	5.1	0.7	2.2	3.0	1.4	1.7	1.4	0.9	0.0	0.1	0.3	0.2	0.6	0.3	0.5
Bulgaria	1.7	n.a.	n.a.	12.5	4.6	0.1	0.1	5.1	29.9	7.6	10.5	1.4	0.0	0.0	0.1	2.1	1.6	0.0	4.8	2.7	8.5	0.4	0.0
Czechoslovakia	7.2	0.4	0.4	15.0	0.9	1.5	0.4	1.6	19.3	0.6	2.7	2.2	0.6	0.6	1.5	2.7	6.9	0.4	0.0	6.4	4.4	3.8	1.3
Hungary	1.1	0.0	0.1	30.4	1.0	0.3	0.4	1.2	11.7	1.1	6.9	1.3	0.1	0.2	0.3	4.0	3.6	0.1	16.4	0.0	1.7	4.5	0.1
Poland	1.1	0.0	0.6	10.5	2.4	3.9	1.4	2.2	31.2	0.1	1.4	2.8	0.9	0.2	3.8	1.4	10.3	0.1	10.5	2.0	0.0	2.3	2.9
Romania	0.2	0.0	0.0	9.4	1.6	0.0	n.a.	4.5	27.6	3.5	7.7	1.1	0.0	0.6	0.0	0.2	6.3	0.2	6.2	11.1	2.0	0.0	0.0
U.S.S.R.	4.6	0.0	2.1	0.9	2.1	1.9	0.8	4.6	23.4	0.6	3.6	3.4	0.4	1.3	0.2	0.1	21.9	n.a.	0.9	0.0	1.4	0.0	0.0

Source: League of Nations, Economic Intelligence Service - International Trade Statistics 1938. - League of Nations, Economic Intelligence Service - The Network of World Trade (1942).

Appendix Table 8 — Similarity Matrix for 1984

Exporter/ Importer	USA	CDN	Japan	A	B/ LUX	DK	FIN	F	D	GR	IRL	I	NL	N	P	E	S	CH	UK	BG	CZ	GDR	H	PL	RO	USSR
USA	0	20.77	10.53	0.17	2.37	0.27	0.16	2.70	4.06	0.20	0.60	1.95	3.37	0.38	0.43	1.14	0.69	1.14	5.45	0.02	0.03	0.06	0.04	0.14	0.11	1.47
Canada	73.44	0	4.87	0.04	0.60	0.08	0.10	0.64	1.08	0.04	0.09	0.50	0.92	0.28	0.05	0.08	0.15	0.21	2.15	0.01	0.02	0.16	0.01	0.03	0.02	1.84
Japan	35.61	2.53	0	0.25	0.79	0.55	0.30	1.14	3.89	0.47	0.15	0.61	1.07	0.29	0.09	0.38	0.59	0.64	2.75	0.05	0.04	0.09	0.03	0.04	0.04	1.48
Austria	4.11	0.81	1.04	0	1.82	1.05	0.83	3.87	29.71	0.58	0.20	9.41	2.47	0.89	0.24	1.51	1.89	6.91	4.38	0.72	1.10	2.19	2.19	1.06	0.36	4.49
Belgium-Luxembourg	6.05	0.57	0.83	0.84	0	0.91	0.42	18.41	19.73	0.50	0.37	5.13	13.91	0.68	0.34	0.87	1.37	2.69	9.89	0.09	0.11	0.14	0.15	0.17	0.09	1.06
Denmark	9.76	0.93	2.84	0.81	1.70	0	1.95	4.44	16.05	0.66	0.55	3.90	3.32	6.38	0.24	0.89	11.33	1.86	12.85	0.08	0.21	0.21	0.20	0.39	0.04	0.73
Finland	8.11	0.84	1.28	0.73	1.48	4.08	0	3.96	9.62	0.56	0.56	2.12	3.55	4.55	0.22	0.73	12.27	1.25	11.97	0.16	0.38	0.46	0.35	0.29	0.04	19.12
France	7.72	1.01	1.05	0.71	8.21	0.74	0.39	0	14.07	0.83	0.45	10.42	4.55	0.74	0.67	3.13	1.26	3.72	7.57	0.11	0.12	0.22	0.15	0.28	0.16	2.00
Germany	9.44	0.87	1.40	4.92	6.90	2.03	0.96	12.40	0	1.00	0.43	7.62	8.51	1.10	0.44	1.78	2.62	5.24	8.20	0.27	0.42	1.30	0.55	0.48	0.18	2.18
Greece	8.39	0.58	1.16	1.00	1.76	0.69	0.35	8.43	19.64	0	0.23	13.73	3.38	0.08	0.31	0.60	0.64	0.83	6.19	0.87	0.46	0.29	0.52	0.27	0.79	2.60
Ireland	9.73	1.69	1.71	0.55	4.30	0.76	0.52	8.37	10.14	0.43	0	3.12	7.01	0.90	0.25	1.21	1.52	1.12	34.46	0.02	0.03	0.03	0.07	0.10	0.02	0.23
Italy	10.66	1.08	1.13	2.22	2.85	0.74	0.46	13.80	15.86	1.69	0.26	0	2.83	0.48	0.48	1.55	1.03	4.00	6.63	0.18	0.16	0.18	0.27	0.27	0.12	2.12
Netherlands	5.05	0.52	0.58	0.87	13.85	1.47	0.57	10.44	29.79	0.91	0.48	5.57	0	0.82	0.46	0.97	1.77	1.58	9.50	0.06	0.12	0.14	0.17	0.26	0.07	0.46
Norway	5.13	0.57	1.41	0.43	0.90	3.54	1.45	3.38	16.55	0.21	0.15	1.55	7.29	0	0.41	0.34	9.89	0.69	36.50	0.03	0.11	0.07	0.07	0.14	0.04	0.40
Portugal	8.76	0.86	0.91	1.02	3.31	1.61	1.40	12.42	13.70	0.31	0.50	4.29	5.92	1.67	0	4.45	3.56	2.47	15.35	0.09	0.08	0.10	0.08	0.03	0.22	1.06
Spain	9.58	0.97	1.57	0.45	2.54	0.65	0.36	15.05	9.61	0.60	0.40	5.98	5.27	0.43	2.38	0	0.90	1.76	9.09	0.19	0.14	0.26	0.14	0.15	0.09	1.52
Sweden	11.38	1.31	1.44	1.15	3.70	8.30	5.74	5.02	11.59	0.38	0.63	3.58	4.47	9.20	0.31	1.14	0	1.64	10.23	0.18	0.22	0.33	0.26	0.53	0.07	0.96
Switzerland	9.83	0.91	3.29	3.90	2.43	1.20	0.79	8.28	19.55	0.62	0.28	7.35	2.66	0.81	0.62	1.96	1.99	0	8.01	0.47	0.43	0.24	0.50	0.42	0.10	0.77
United Kingdom	14.60	1.68	1.32	0.45	4.34	1.69	0.96	10.01	10.52	0.50	4.82	4.06	8.72	1.38	0.55	1.87	4.11	2.22	0	0.08	0.11	0.13	0.14	0.24	0.10	1.04
Bulgaria	0.29	0.05	0.62	0.30	0.17	0.04	0.04	0.52	1.40	0.47	0.01	0.74	0.20	0.01	0.02	0.37	0.12	0.19	0.21	0	4.95	6.96	1.07	2.32	1.78	70.79
Czechoslovakia	0.43	0.28	0.26	2.55	0.37	0.33	0.26	0.82	4.88	0.23	0.06	0.95	0.79	0.13	0.08	0.15	0.40	0.97	1.10	2.79	0	8.85	4.98	7.12	1.73	43.43
E. Germany	0.80	0.12	0.20	0.60	0.63	0.86	0.32	1.24	14.27	0.44	0.05	0.54	0.75	0.88	0.10	0.39	1.64	0.23	1.26	3.62	9.26	0	2.45	3.50	2.15	47.58
Hungary	2.67	0.30	0.40	5.26	0.45	0.38	0.47	1.67	7.46	0.44	0.00	3.28	1.10	0.11	0.00	0.17	0.72	2.24	1.50	1.46	5.19	5.93	0	4.28	1.46	30.15
Poland	2.19	0.34	0.42	2.12	0.84	1.34	1.57	2.49	8.87	0.36	0.43	2.39	1.63	0.38	0.00	0.98	1.80	1.25	4.07	2.41	5.59	4.59	3.20	0	2.76	29.34
Romania	5.56	0.32	0.65	1.50	0.47	0.17	0.09	2.38	5.97	1.49	0.02	7.39	1.98	0.17	0.02	0.28	0.30	0.62	1.90	1.38	1.83	3.46	1.61	3.00	0	13.12
U.S.S.R.	0.41	0.02	1.13	1.02	1.62	0.45	3.25	3.29	6.10	0.78	0.05	4.24	2.17	0.17	0.06	0.45	0.76	0.73	1.87	8.23	8.86	10.06	5.81	8.16	2.43	0

Source: IMF, Direction of Trade Statistics Yearbook 1990. - UN, International Trade Statistics Yearbook 1988.

Appendix Table 9 — Similarity Matrix for 1994

Exporter/ Importer	USA	CDN	Japan	A	B/ LUX	DK	FIN	F	D	GR	IRL	I	NL	N	P	E	S	CH	UK	BG	CZ	SK	H	PL	RO	former USSR
USA	0	22.29	10.43	0.27	2.18	0.24	0.21	2.66	3.75	0.16	0.67	1.40	2.65	0.25	0.21	0.91	0.49	1.09	5.24	0.02	0.06	0.01	0.06	0.12	0.07	0.70
Canada	80.49	0	4.15	0.09	0.56	0.04	0.05	0.53	0.92	0.03	0.06	0.53	0.50	0.27	0.04	0.15	0.08	0.48	1.34	0.00	0.02	0.00	0.01	0.02	0.02	0.09
Japan	29.90	1.49	0	0.31	0.96	0.22	0.25	1.33	4.48	0.15	0.42	0.85	2.14	0.34	0.19	0.53	0.37	0.57	3.21	0.01	0.03	0.00	0.07	0.03	0.01	0.35
Austria	3.52	0.61	1.55	0	1.88	0.85	0.52	4.53	37.94	0.46	0.21	8.09	2.97	0.56	0.46	2.13	1.39	6.33	3.15	0.26	2.61	0.87	3.90	1.17	0.29	1.84
Belgium-Luxembourg	5.76	0.43	1.43	1.34	0	1.00	0.53	16.75	18.70	0.72	0.35	6.68	11.19	0.59	0.76	2.59	1.51	2.16	8.61	0.06	0.29	0.04	0.32	0.45	0.07	0.82
Denmark	5.27	0.51	3.96	1.02	1.73	0	2.29	5.25	21.44	0.73	0.46	3.81	3.81	6.19	0.52	1.74	9.97	1.83	7.82	0.07	0.36	0.09	0.28	1.38	0.08	1.60
Finland	7.19	0.67	2.09	1.04	2.25	3.42	0	5.05	13.42	0.57	0.46	2.99	5.11	3.16	0.52	2.31	10.96	1.51	10.34	0.14	0.55	0.16	0.76	1.66	0.07	8.56
France	6.95	0.69	1.94	1.08	8.67	0.87	0.35	0	16.95	0.71	0.61	9.29	4.59	0.41	1.47	7.09	1.14	3.73	9.80	0.06	0.29	0.05	0.22	0.41	0.15	0.72
Germany	7.99	0.65	2.38	5.86	6.69	1.84	0.80	12.05	0	0.83	0.45	7.55	7.50	0.88	0.85	3.21	2.27	5.47	7.98	0.16	1.33	0.30	0.94	1.53	0.30	2.44
Greece	5.04	0.72	1.43	1.96	3.21	0.20	0.61	5.40	21.21	0	0.24	14.64	2.31	0.41	0.20	1.80	0.97	1.03	5.57	4.77	0.48	0.25	0.50	0.06	0.96	2.64
Ireland	8.98	1.05	3.67	0.79	3.98	0.59	0.67	8.88	13.70	0.56	0	4.39	4.99	1.01	0.29	2.36	1.73	2.10	27.71	0.01	0.15	0.00	0.11	0.12	0.01	0.66
Italy	7.76	0.92	2.13	2.46	2.98	0.84	0.40	13.08	19.01	1.79	0.35	0	2.86	0.41	1.35	4.70	0.91	3.77	6.50	0.16	0.45	0.20	0.62	0.93	0.46	1.49
Netherlands	3.65	0.37	0.98	1.10	11.18	1.34	0.56	9.01	24.19	0.86	0.52	4.44	0	0.70	0.67	2.21	1.45	1.60	8.05	0.10	0.28	0.06	0.28	0.70	0.10	1.10
Norway	6.41	3.32	1.90	0.40	2.97	4.69	2.97	8.05	12.34	0.22	1.21	2.85	8.56	0	0.88	1.36	9.27	0.62	20.90	0.02	0.14	0.01	0.04	0.96	0.03	0.56
Portugal	5.22	0.69	0.77	1.12	3.67	2.32	1.05	14.66	18.64	0.46	0.50	3.35	5.07	1.02	0	14.58	2.49	1.88	11.63	0.05	0.05	0.02	0.11	0.03	0.02	0.42
Spain	4.93	0.58	1.35	0.83	2.99	0.64	0.34	20.14	14.18	0.93	0.44	9.20	4.11	0.34	7.80	0	0.77	1.21	8.21	0.04	0.15	0.03	0.33	0.47	0.07	0.50
Sweden	8.00	1.11	2.67	1.39	4.90	6.90	4.77	5.10	13.27	0.58	0.67	3.77	5.27	8.15	0.46	1.92	0	1.93	10.13	0.05	0.34	0.05	0.47	0.97	0.23	1.47
Switzerland	9.73	0.73	4.12	3.81	2.64	1.14	0.60	9.75	24.89	0.62	0.41	7.90	2.86	0.53	0.71	2.12	1.50	0	7.06	0.10	0.47	0.11	0.46	0.53	0.14	0.75
United Kingdom	12.98	1.43	2.25	0.78	5.16	1.22	0.98	9.34	12.03	0.64	4.69	4.72	6.60	1.51	0.87	3.59	2.51	1.84	0	0.06	0.28	0.04	0.19	0.53	0.10	0.72
Bulgaria	7.28	0.90	0.70	1.90	1.30	0.70	0.43	4.74	14.03	7.11	0.03	9.89	2.57	0.20	0.20	1.70	0.47	0.37	3.27	0	0.40	n.a.	0.73	0.63	1.97	11.29
Czech Rep.	2.13	0.27	0.61	6.33	1.10	0.67	0.52	2.17	31.30	0.61	0.13	4.26	1.89	0.31	0.13	0.85	0.82	0.92	2.71	0.32	0	16.57	1.54	3.19	0.32	4.84
Slovak Rep.	1.94	0.24	0.12	5.02	0.52	0.30	0.33	1.74	18.75	0.35	0.03	5.06	1.23	0.05	0.09	0.68	0.59	0.56	1.18	n.a.	31.70	0	n.a.	n.a.	0.44	3.15
Hungary	3.98	0.28	0.82	9.87	1.78	0.40	0.69	3.33	27.94	0.50	0.02	8.08	2.22	0.22	0.10	1.34	1.15	1.34	3.04	0.26	0.89	0.53	0	1.90	1.46	15.32
Poland	3.49	0.38	0.22	2.23	2.51	3.23	1.77	4.04	36.09	0.39	0.38	5.02	5.96	0.67	0.16	1.04	2.60	1.00	4.59	0.26	2.68	n.a.	1.08	0	0.19	9.37
Romania	3.14	0.63	0.86	1.58	1.69	0.15	0.07	5.14	16.06	2.29	0.03	12.97	3.54	0.18	0.05	0.91	0.55	0.75	3.25	1.67	1.24	0.13	2.62	0.23	0	6.66
Former USSR	4.97	0.29	2.71	1.07	1.78	0.49	2.89	1.91	7.91	0.42	1.46	4.35	3.15	0.34	0.10	0.40	1.39	4.42	4.75	1.36	1.83	0.86	1.39	2.05	0.85	0

Source: IMF, Direction of Trade Statistics Yearbook 1995.