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**Diskussionspapiere**  
**Discussion Papers**

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of Increased Division of Labour  
with Eastern Europe\***

by  
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# **Deutsches Institut für Wirtschaftsforschung**

Discussion Paper No. 116

## **Impact on German Trade of Increased Division of Labour with Eastern Europe\***

by  
Dieter Schumacher

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## 1. Introduction<sup>1</sup>

Following the recent political developments in Central and Eastern Europe, a transformation of the former centrally-planned economic system into a market-based economic order with decentralised decision-making is underway. This implies radical social and economic changes in these countries affecting the economic interdependence between Central and Eastern European countries (CEECs) themselves, as well as their economic relations with Western industrial countries and developing countries.

After the collapse of the Council for Mutual Economic Assistance (CMEA) trade relations between the former centrally-planned economies declined dramatically, whereas their trade with Western industrial countries quickly expanded. One can assume that economic relations between Eastern and Western Europe will intensify further in the medium and long-term. Regional proximity and the positive effects of an international division of labour on productivity, but also the political urge to decrease the economic and social gap between Eastern and Western Europe point to this trend. Furthermore, for political reasons trade relations between East and West until the collapse of the old system remained considerably low in comparison to a "natural" level of economic interaction. The changes in CEECs will have substantial effects on other countries in general and, in particular, on Western Europe. Within Western Europe this is especially true for Germany and Austria. The pace at which these processes will occur, however, depends to a considerable extent upon how fast the transformation in the various Eastern European countries will result in economic growth.

In the following analysis, we will investigate how the scope and sectoral structure of German trade with CEECs have developed since the beginning of the transformation process, which started at the end of the 80's / beginning of the 90's. The expected

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<sup>1</sup> The research carried out for this paper is part of a larger project on the impact on foreign trade of the transformation process in Central and Eastern Europe, financed by the Volkswagen Foundation. The computations were carefully carried out by Gerlinde Höpp-Hoffmann and Karin Hollmann. The original German draft was translated by Timothy Clements.

pattern of future bilateral trade flows will be estimated on the basis of a gravity model on the assumption that future trade between Germany and the CEECs will follow the same rules as trade among market economies. Conclusions will then be drawn regarding the effects of increased division of labour with Central and Eastern Europe on economic structures in Germany.

## **2. Germany's trade with Central and Eastern Europe**

Germany is by far the biggest Western trading partner of the CEECs. Of the former Soviet Union's trade with OECD countries in 1993, approximately 30% fell to (unified) Germany; of the other CEECs' OECD trade - namely, that of Poland, CSFR,<sup>2</sup> Hungary, Romania and Bulgaria - over 40% (Table 1). This is considerably more than Germany's proportion of total OECD trade (approx. 16%). In trade with CEECs the significance of Germany is greater on the export side than on the import side, which is in line with Germany's general position in foreign trade. The difference has diminished, however, as German imports have risen sharply in the course of the unification process - both directly into East Germany and into West Germany due to increased production. In recent years, Germany's foreign trade with CEECs has been characterised by two divergent developments. Whereas West Germany's trade has grown considerably, East Germany's has plummeted (Table 2).

In this way, West German imports and exports in trade with Central and Eastern Europe, excluding the former Soviet Union, have nearly trebled within five years. Trade in goods with the CSFR has seen the sharpest increase, followed by Poland and Hungary. A fundamental reason for this rapid intensification of trade relations with the three "Visegrad"-countries is due to the fact that the reform process and trade liberalisation have progressed the most in these three countries. In addition, the geographical proximity certainly played a role, and the fact that trade relations with these three countries were already very close at the time of the CMEA. Furthermore, all three

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<sup>2</sup> For statistical reasons the Czech Republic and the Slovak Republic are treated as one country. Besides the Ex-USSR, the five CEECs considered in the analysis, therefore, represent, in fact, six states.

countries tried to support exports by a considerable depreciation of their currencies in real terms. The intensification of trade with Bulgaria and Romania has made slower progress and West German trade relations with the successor States of the Soviet Union combined have scarcely grown.

Initial hopes that East Germany would be able to maintain its high level of trade with the CMEA countries - its biggest trading partner - and, thereby, ease its necessary economic reform, were not realised. Although East German exports to CEECs at first increased following the introduction of the Economic and Monetary Union with West Germany in the middle of 1990 - with the help of a guarantee by the Federal Government that the GDR's already-existing trade commitments would be fulfilled and extensive subsidies continued - they collapsed after the disbandment of the CMEA at the beginning of 1991 just as domestic sales of East German firms had done so before. In this way, East German exports to CEECs, excluding the former Soviet Union, shrank to one tenth of their value in 1990. Supplies to the successor states of the Soviet Union declined only to a level of 30%, but the absolute size of this collapse was of greater consequence to the East German economy than the loss of markets in other CEECs. Above all, production of agricultural and metal working machinery as well as ships and railroad equipment was severely struck.

The fall in East German exports to the CEECs is partly due to the difficulties experienced by the former state-trading economies during their economic transformation and to the effect of disintegration following the collapse of the CMEA, and later, of the Soviet Union. However, supply-side factors played an equally important role, above all, the unsatisfactory competitiveness of East German products under world market conditions; the lack of quality and poor standard of technology could not even be compensated for by extensive subsidies. Moreover, the factors which had earlier been seen as East Germany's "natural advantages", such as familiarity with the language, culture and mentality, as well as the foreign trade system of the former socialist countries, quickly lost their importance (Lösch and Wohlers 1994: 135).



The regional differences in the size of export reductions are mainly a consequence of the preferential treatment of supplies to the former Soviet Union by means of the German export-guarantee system and other subsidies. Differences in the course of transformation processes have probably played a role too. In those economies which had already made much progress, East German products - mainly investment goods - were, with respect to quality and technological standard, less competitive than they had been in the Soviet Union, where the market-economic reforms and, thereby, also the modernisation of the capital stock were advancing only slowly.

Despite existing obligations to purchase goods, East German imports from the CMEA area collapsed immediately after the introduction of the Economic and Monetary Union with West Germany. Within a short period of time, imports from the Soviet Union and equally from other CEECs fell to below 30% of their value in 1990. The main reasons were the decrease of industrial production - caused by the transformation - which reduced the need for intermediate products drastically, the diminishing competitiveness of East European products under world market conditions as well as better access to West German goods (Lösch and Wohlers 1994: 135). With the recovery of production in East Germany, total imports in 1994 increased moderately once again. However, the increasing volume of imports continued to come mainly from Western countries; the imports from CEECs remained repressed.

Whereas in trade with the former USSR the loss of East Germany's trade relations could not be compensated for by strengthened West German trade contacts, East Germany's loss of markets in the other CEECs were more than made up for by increased supplies from West German firms. Conversely, suppliers from CEECs (excluding the former Soviet Union) were able to increase their sales in West Germany considerably, more than equalling their losses in East Germany. Post-unification Germany maintains more extensive trade relations, in particular, with the three Visegrad-countries, than did the two parts of Germany taken together in 1990. It is remarkable that this trade increased further in 1993, although Germany's total imports and exports fell as a result of the recession in Germany. With the improved economic situation in 1994, German imports, as well as exports, increased again. Trade with Eastern Europe was particularly dynamic,

with imports performing better than exports. Also imports from Russia increased once again, whereas exports to Russia declined. The main impediments to any extension of exports to Russia are uncertain finance, high taxes and duties, a lack of legal security and high transportation costs.

Summarising, one may note that the dynamics of German trade with CEECs has been (i) concentrated in Poland, the CSFR and Hungary and (ii) restricted to West Germany. By 1994, West Germany's trade with CEECs expressed as a proportion of West Germany's total foreign trade had reached 6.5% in comparison to some 4% in 1990. East Germany in 1994 conducted 40% (1990: 75%) of all its foreign trade with CEECs, total trade still being at a low level. East German firms are still unable to supply internationally a wide and competitive range of goods. So far, they have experienced their major market economic successes at a regional level.

Trade between Germany and CEECs is characterised by a large amount of inter-sectoral division of labour, i.e. sectors which take advantage of exports are different from those which come under additional competitive pressure as a result of imports (Table 3). Above all, Germany supplies investment goods, in particular, products from the mechanical engineering, electrical machinery and transport equipment industries. Conversely, the former USSR supplies Germany with mainly mineral raw materials (with a proportion of some 50%). Among the industrial goods, raw-material-intensive product groups, such as mineral oil products, non-ferrous metals and wood, are the most prominent. The other CEECs mainly supply industrial goods, in particular consumer goods.

With the exception of some basic industries (basic industrial chemicals, iron and steel), all (West)German export industries have been able to expand their supplies to CEECs since 1990. In particular, exports of electrical machinery and motor vehicles have risen sharply. The same is true of textiles, clothing and leather, owing to the extension of outward processing activities. Similarly, with the exception of mineral oil products, also (West)German imports from these countries have risen in all product groups. Raw-material and capital-intensive production goods have shrunk in significance, whereas

labour-intensive products have gained in importance. This is also true for a range of technology-intensive goods from the investment goods industry, above all, in the electrical machinery and motor vehicle industries. More electrical goods were supplied mainly from Hungary and the CSFR and more products of the motor vehicle industry from the CSFR and Hungary, and then later from Poland. These trends may indicate where the competitive advantages of CEECs really lie under market conditions.

By now, Romania offers the least diversified range of imports, concentrating on clothing and furniture, alongside Bulgaria which provides mainly food stuffs and textiles (Table 4). Clothing is also the most important item of supplies from Poland and Hungary, followed by furniture, food stuffs and metal products in Poland and by electrical goods and food stuffs in Hungary. The CSFR supplies the most diversified product range - including, above all, metal products, mechanical engineering goods, clothing, iron and steel, electrical goods and products of the motor vehicle industry.

On the whole, the significance of the former Soviet Union and other CEECs as trade partners is still relatively small. In some sectors, however, they play a significantly more important role. In 1993, more than 10% of total German exports in railroad equipment and the ship and footwear industries went to the former USSR. For supplies to the other CEECs, this is true for the textile and leather industries. On the import side, the market share of the former USSR is more than 10% only in non-ferrous metals, while the other CEECs have, in the meantime, reached some 10 to 20% in a number of product groups (clothing, wood products, furniture, fertilisers, glass and other non-metallic mineral products, metal products and railroad equipment). The expansion of their import market shares in Germany did not affect the developing countries negatively, but was at the expense of the OECD countries and of former Yugoslavia.

There is a tendency towards German export surpluses in merchandise trade with the former USSR, and equally in trade with other CEECs. These surpluses occur mainly in the mechanical engineering, motor vehicles, textiles, chemicals and precision engineering industries. In contrast, the clothing sector suffers the largest deficits, followed a long

way behind by furniture, wooden articles and a range of other consumer and production goods.

### 3. Determinants of trade flows among market economies

In the assessment and projection of trade flows between Germany and CEECs, one has to imagine a "normal" pattern of trade flows. Here we can apply the gravity model, which represents bilateral trade volumes as a function of (i) the national product of the supplier country and of the destination country, showing the strength of supply and demand, and (ii) factors hindering and stimulating trade. Of the factors restricting trade, transport costs and protection by tariffs or non-tariff measures are most important. Factors which encourage trade include cultural similarities, a common language, a historical sense of belonging together and regional preference zones.

The gravity hypothesis advanced by Linnemann (1966) proved to be empirically very successful. A theoretical framework to complement the hypothesis was suggested by Anderson (1979) as well as Bergstrand (1985 and 1989). The approach has also been applied at a sectoral level in connection with factor endowment variables (e.g. Leamer 1974 and 1993, Soete 1987). The hypothesis has come back into favour in recent years (i) in the analysis of trends towards regionalisation in world trade (e.g. Frankel 1992 or Frankel and Wei 1993, Saxonhouse 1993, Dhar and Panagariya 1994), and (ii) for estimating potential trade with Eastern Europe after the political and economic changes which have occurred there (e.g. Havrylyshyn and Pritchett 1991, Wang and Winters 1991, Winters and Wang 1994, Baldwin 1994, Vittas and Mauro 1994).

An important conclusion drawn from earlier studies on the foreign trade flows of North American and West European countries - from the beginning of the century until the middle of the 70's - was the persistence of spatial structures in international trade (Haass and Peschel 1982). This has been the case for three quarters of this century; a century characterised by extensive changes in the political and social structures of Europe, as well as by a considerable amount of change regarding borders. The foreign trade in the

first half of the 70's resembles the pattern before the Great Depression of the 30's more so than that of the time in between.

The fact, that transportation costs and hence cif prices tend to increase with distance is one reason why the spatial pattern of trade depends on distance. This argumentation assumes relatively homogeneous goods and markets with perfect competition. The influence of distance, therefore, ought to be less, the more heterogeneous and imperfect the markets are (Bröcker 1980). Furthermore, transport costs as a proportion of production costs have become very low for most goods. However, distance can also have an effect on trade by means of the cost of communication taken in its broadest sense (Peschel 1980). One cannot assume from the outset, that all aspects of communication vary with distance in the same way as transportation costs. It is, therefore, necessary to distinguish between transportation and communication costs (Herrmann, Schmidtke, Bröcker and Peschel 1982). A clear distinction is not possible, as certain aspects of communication costs may be embodied both in geographical distance and membership of preference zones. However, it was attempted in the study cited above to consider communication costs using cultural and language affinities as indicators. These affinities were portrayed in the empirical analysis by factors, such as differences in life-style and social division of labour (measured by the variations in the level of urbanisation, importance of agriculture and significance of women in employment), language barriers, religious differences, former colonial relations and the trade relations in Western Europe and North America in 1900.

The analysis of individual regression coefficients for total exports and for fourteen selected investment and consumer goods with the help of data from the beginning of the 70's showed, that geographical distance, former colonial ties, membership of EC, EFTA or Commonwealth preference zone, as well as language connections are relatively significant determinants of spatial trade patterns. As for the indicators life-style, mentality and social division of labour - including religious affinity - as well as the foreign trade figures from 1900, the coefficients proved to be insignificant or of the wrong sign (Herrmann, Schmidtke, Bröcker and Peschel 1982: 222). The greatest contribution to the explanation of the spatial structure of total foreign trade, after eliminating the impact of

size, is provided by geographical distance, followed some way behind by the variables of "cultural and language affinities", which again make a more significant contribution than does membership of preference zones. The explanatory value of "cultural and language affinities" was greater for communication-cost-intensive groups of investment goods than for trade as a whole (ibidem: 5).

On these grounds the following equation was formulated to estimate the "normal" pattern of trade flows between market economies:

$$\begin{aligned} \ln X_{ij} = & a + b_1 \ln Y_i + b_2 \ln \frac{Y_i}{B_i} + b_3 \ln Y_j + b_4 \ln \frac{Y_j}{B_j} \\ & + b_5 \ln D_{ij} + b_6 ADJ_{ij} + b_7 EC_{ij} + b_8 EFTA_{ij} \\ & + b_9 CUSTA_{ij} + b_{10} LAN_{ij} + b_{11} COL_{ij} \end{aligned}$$

Where:

- $X_{ij}$  Supplies from country i to country j
- $Y_i$  GNP of supplier country i
- $B_i$  Population of supplier country i
- $Y_j$  GNP of destination country j
- $B_j$  Population of destination country j
- $D_{ij}$  Distance in miles between the economic centre of country i and j
- $ADJ_{ij}$  dummy variable which has the value of 1,  
if both countries i and j have a common land border, otherwise it is zero
- $EC_{ij}$ ,  $EFTA_{ij}$ ,  $CUSTA_{ij}$  dummy variables with a value of 1,  
if both countries i and j belong to the EC, EFTA or the Free Trade Agreement  
between the USA and Canada respectively
- $LAN_{ij}$  dummy variable which has a value of 1 or 0.5,  
if both countries i and j share the same language
- $COL_{ij}$  dummy variable which has a value of 1 or 0.5,

if both countries have colonial relations with one another.

The regressions were estimated for the average values of exports and imports between 1988 and 1990 of 22 OECD countries in trade with 70 countries, namely the same 22 OECD countries and an additional 48 developing countries. These additional countries were selected according to their level of trade with OECD countries and then, as to whether data was available for all remaining variables. Estimates were made for trade in all goods, goods of the manufacturing sector as a whole and of individual branches of the manufacturing sector. The industries are defined in line with the ISIC system at the three and four-digit levels. Trade figures from the OECD - reclassified by the DIW from SITC Rev. 3 into ISIC Rev. 2 - were applied. Zero values were replaced by a very small figure and an OLS estimation procedure was used. The number of zero values increases when the product groups are more narrowly defined and, therefore, a Tobit estimation procedure would be more appropriate. OLS estimates should be sufficient, however, for the limited purposes of this paper, i.e. to estimate flows of total trade with CEECs and to indicate the direction of likely changes in the sectoral pattern.

The data on GNP per capita and population were taken from the World Bank's Development Reports. The distance between the countries was calculated as the shortest line between their commercial centres according to the degrees of latitude and longitude. We generally took the capital cities as commercial centres except for Canada (Montreal), USA (Kansas City),<sup>3</sup> Australia (Sidney), West Germany (Frankfurt a.M.), Brazil (Rio de Janeiro), Pakistan (Karachi) and India (Bombay). The language dummy is 1 if both countries have the same first language, and it is 0.5 if the same language is the second language in one or both of them. The colonial dummy is 0.5 if such political ties existed around 1914, and it is 1 if these relations still existed in an institutional form between 1970 and 1990 (e.g. Commonwealth or Franc Zone).

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<sup>3</sup> Kansas City is a commercial centre in the middle of the United States and, thus, is a geographical compromise between the centres on the east coast and those on the west coast.

Considering the national product  $Y$  and population  $B$  in the equation, there are three possibilities, which are of equal value, but allow for a different interpretation of the coefficients. All three variants are to be found in empirical literature and assume, in line with the hypothesis, that the national product represents the total strength of a country as a supplier and purchaser with a positive effect on the volume and variety of export supply and import demand, whereas the population represents the size of the country and has a negative effect, because larger countries tend to have a higher level of self-sufficiency. In the formulation chosen here, the impact of per capita income on trade will be quantified, as well as the impact on trade from the total purchasing power of a country and its economic strength as a supplier respectively. The per capita income can also be interpreted as an indicator for the level of human capital and is the only variable in our approach which represents the factor endowment. Therefore, the coefficients that can be expected for the  $Y_i/B_i$  variable are likely to vary largely according to sector. Alongside the endowment with natural resources, human capital is the decisive determinant of the sectoral pattern of a country's comparative advantage (Wood 1994a and b). This holds particularly true for the division of labour between industrial and developing countries, it can also be found, however, in the intersectoral division of labour between industrial countries (e.g. Schumacher 1992).

The basic idea behind the approach is to explain the long-term pattern of bilateral trade flows among market economies mainly by GNP, distance and factor endowment measured indirectly by per capita income. Empirical evidence here and elsewhere shows that the approach explains bilateral trade at the aggregate level very well. At the level of individual product groups, it only provides a partial explanation unless a larger number of factor endowment variables are introduced to represent more accurately sectoral comparative advantages. It is, however, sufficient in order to derive the direction of changes in comparative advantage as a function of per capita income of the supplier country.



#### 4. Regression results

The multiple regressions for the trade of *OECD countries* in all goods combined yield typical results with regard to sign and significance of variables (Table 5). The supplies between two countries are all the bigger, the higher their national product and the smaller the geographical distance between them is. As for the preference zones, EC membership has a positive impact when the analysis is based on the export statistics. The same is true of a common language and of colonial relations. The impact of a common border recorded here is not always - as should be expected - positive and is less significant than in other studies. The explanatory power of the approach is very high with regard to exports of OECD countries ( $R^2 = 0.84$ ). It is less impressive for imports of OECD countries ( $R^2 = 0.50$ ). The omission of variables concerning endowment with natural resources is apparent. This plays an important role for imports from developing countries. In contrast to the export side, EC membership and colonial relationships are not significant for imports of all goods combined.

By and large, the same pattern emerges for total trade in manufactured goods. As for individual industries within manufacturing, very different coefficients arise. When grouping the industries in accordance with their intensity of R&D - following the OECD's definition - into high, medium and low-tech,<sup>4</sup> the picture given in Table 5 emerges. Supplies of high and medium-tech products rise considerably faster in relation to national product of the exporting country *i*, than the supplies of low-tech products. The elasticity of supplies with regard to the per capita income of the exporting country *i* is highest for high-tech products and lowest for low-tech products. Also, the demand for high-tech products increases most sharply when the national product of the importing country *j* rises.

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<sup>4</sup> See OECD (1992). High-tech = ISIC industries 3522, 3825, 383, 3845, 385. Medium-tech = ISIC industries 351, 352 without 3522, 355, 356, 372, 382 without 3825, 3842, 3843, 3844/9. Low-tech = all manufacturing industries not classified as high or medium-tech. As distinct from OECD we classified ISIC 390 (other manufacturing) as low-tech instead of medium-tech.

At the level of *individual industries* (classified according to three and four digit ISIC-numbers respectively), the validity of the approach diminishes in most cases, with  $R^2$ -values ranging from 0.3 to 0.8. In general, the explanatory power of the approach is weakest in raw-material-intensive and/or labour-intensive sectors, such as food stuffs, textiles, clothing, leather goods, wooden articles, non-ferrous metals and other manufacturing goods (musical instruments, toys, sporting goods and jewellery). The main reason here is, that, besides the per capita income as an indicator for human capital, no variables for the factor endowment of the various countries are considered.

At the level of individual industries, noticeably higher elasticities of income and distance emerge than at a higher level of aggregation. In the majority of industries, unexpected negative signs emerge for a common border, which are in some cases even significant. The interpretation of coefficients is difficult, however, because the explanatory variables are not completely independent of each other. For instance, a common language and common border coincide in a number of cases. A common language and colonial relations overlap even more often. There is also, to a certain extent, a correlation between income level and distance, as a large number of countries with a high level of income are concentrated in Western Europe. These connections do not call the validity of the approach as a whole into question, but complicate the process of distinguishing exactly the impact of individual variables.

Alternative calculations considering solely national product, per capita income and geographical distance yield results with only slightly less explanatory power (Table 6). This is valid for aggregate trade, as well as for individual sectors. The additional explanatory contribution gained by taking into consideration factors such as a common border, membership of a preference zone, a shared language and colonial relations, is, therefore, very slight for all OECD countries on average. The ranking of industries according to income elasticities and elasticity of distance changes only marginally compared to the result derived using all variables.

In Table 7 results of the reduced approach are compiled ranking the 3-digit industries according to the estimated coefficient values of the respective variable. The figures give

the number of the ISIC industry, the value of the coefficient and the value of  $t$ . Distance and GNP are significant determinants of bilateral shipments in all industries, the same is true for GNP per capita in most cases. The coefficient values vary widely across industries, however, and there are also differences between exports and imports.<sup>5</sup>

In general, exports are more sensitive to distance than imports ( $b_5$ ). On the export side food, general machinery, electrical machinery and precision instruments show the smallest (negative) coefficient for distance and rank highest on the list. On the import side this is true for "other" manufactures, textiles and plastic products. OECD trade which occurs over rather long distances, tends to be concentrated on exports of investment goods and imports of consumer goods, reflecting the intersectoral division of labour between OECD countries and developing countries. On the other hand, basic goods like mineral oil products, iron and steel, "other" non-metallic mineral products and non-ferrous metals are traded mainly with nearby countries. As for imports, this is also true for transport equipment and machinery.

When estimating future patterns of supplies from the CEECs as a function of their GNP one should refer to the coefficients of GNP ( $b_1$ ) and GNP per capita ( $b_2$ ) in the import equations, because they cover the broad range of OECD and developing countries as suppliers. With regard to likely future patterns of exports to CEECs as a function of their GNP, one should rely on the coefficients of GNP ( $b_3$ ) and GNP per capita ( $b_4$ ) in the export equation, because they represent the whole range of countries as importers. The coefficients show that the supplies of mineral oil products, plastic products, precision instruments and transport equipment increase most quickly with per capita income of the supplier country ( $b_2$ ). In total ( $b_1 + b_2$ ) the exports of iron and steel, glass products and paper products increase most with GNP of the supplier country. On the other hand, the imports of consumer goods such as footwear, leather products, clothing

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<sup>5</sup> This is due to the OECD trade with developing countries. Considering trade only among OECD countries the results for exports and imports are very similar; here, the differences are due to divergences between export and import statistics of the same flows.

and furniture increase most quickly with per capita income ( $b_4$ ) as well as GNP as a whole ( $b_3 + b_4$ ) of the importing country.

Referring to the results from the regressions including all variables, we find a significant positive impact of EC membership on imports in a number of industries, although the EC dummy is not significant for the overall level of imports. It is significant for food and those industries which mainly produce consumer goods (ISIC numbers 321 to 342, 355 to 369 and 390). This may reflect the impact of EC protection which is highest for agriculture and food, due to the Common Agricultural Policy, and for consumer goods, in particular, clothing, textiles and leather products, which tend to be more strongly protected by tariffs and by non-tariff barriers than producer goods and investment goods (Möbius and Schumacher 1994). To a certain extent, however, the EC dummy may be significant because it covers part of the impact of distance.

The outcome of the analysis also differs for *individual countries*. When the regression equation given above is applied to the trade of the six biggest industrial countries individually, then national product and distance prove to be the deciding determinants for Germany as well as France, Italy, Great Britain, Japan and the USA. For Great Britain and France, however, language and colonial relations are also important factors. Furthermore, the exports and imports of Japan and the USA are more sensitive to distance than the trade flows of the biggest European industrial countries are. The explanatory power of this approach is also very high for the trade of individual countries - with the exception of the USA - in all goods and all manufactured products on the export side as well as the import side (with a  $R^2$  of 0.8 to 0.9). In contrast, the equation only explains 50% of the variance of trade in the case of the USA. It is possible that the USA's trade is orientated to such an extent towards the Pacific region, that it cannot be explained by the level of income and distance alone. This can be taken into consideration by the use of a dummy variable for the membership of APEC, which according to the results from Frankel (1993), displays the highest significance of the various regional trading blocks.

Selected results for Germany are shown in Tables 8 and 9. They demonstrate that German exports and imports are highly dependant on the national product of the destination and supplier countries respectively and on geographical distance. Restricting the approach to these variables reveals a substantially higher distance elasticity of trade than is derived from the equation when all variables are used. This shows that a part of the impact of distance is included in the variable for membership of the EC. As far as Germany's trading partners are concerned, a high GNP, geographical proximity to Germany and membership of the EC often coincide.

The pattern of coefficients according to R&D content of products is much more pronounced for Germany than for the average of OECD countries. Low-tech products are exported mainly to countries near to Germany, whereas medium and high-tech goods are exported over longer distances. The income elasticity of exports of all three product groups is approximately 1, i.e. in this categorisation of goods the commodity structure of German exports varies only slightly with the destination country's level of GNP. In contrast, the GNP of the supplier country plays an important role on the import side: With increasing GNP of the supplier country - assuming a constant population - German imports of low-tech products rise at the same pace, whereas imports of medium-tech goods increase nearly 50% faster and high-tech goods at even double the rate. Distance has a similarly strong (negative) impact on the level of imports in all three product groups. In this sub-division the commodity structure of exports tends to vary with distance, whereas the commodity structure of imports varies more in connection with the GNP of the partner country.

At the 3-digit ISIC level, GNP and distance are significant determinants of German exports in all industries, and GNP per capita is significant in most cases (Table 10). The industries whose exports increase most strongly with changes in GNP of the importing country ( $b_3 + b_4$ ) are the same consumer goods industries as for OECD countries on average. The ranking of German industries according to the distance elasticity of exports is different from the OECD average in a number of cases. Again, the exports of investment goods, however, tend to be less sensitive to distance than producer and consumer goods. As for German imports, the volume is determined significantly by the

GNP of the supplier country in all industries, while GNP per capita is significant only for precision instruments, general and electrical machinery, plastic products and industrial chemicals. Distance plays an important role for German imports of machinery and mineral oil products, as well as precision instruments, electrical machinery and printing goods, whereas it is not significant at all in the other industries. All in all, the figures tend to show that German exports are more sensitive to distance than German imports.

Referring to the regressions including all variables, the dummy for EC membership is not significant for German imports of any industry at the 3-digit ISIC level. This may show the relatively liberal behaviour of Germany, despite EC protection in general. For German exports the EC dummy is significant in a number of consumer goods industries. It remains unclear, however, to what extent this covers merely part of the impact of distance.

### **5. Estimates for Germany's trade with CEECs**

The estimates for Germany's trade with CEECs are derived from the regression results of the reduced approach, which includes the impact of total GNP, the level of GNP per capita and distance solely. We rely on the regression results for German foreign trade, so that the characteristics of Germany can be considered. Additionally, the results for the trade of OECD countries are applied in order to provide a comparison and wider basis for estimation.

The crucial variable for estimating potential trade between Germany and CEECs is - besides distance - the level of GNP. As a Western style national accounts system is just in the process of being developed, figures are still subject to large discrepancies. The World Bank's most up-to-date estimates for the values of per capita national income in 1992 are shown in Table 11. These are considerably lower than earlier estimates, which, in any case, vary substantially (see Lösch and Wohlers 1994). The lowest values are from the CSFB and correspond more closely to present estimates. The estimates of the CIA, however, are as much as four or five times as high. The present-day GNP must

already be lower than the level attained at the end of the 80's, as a large part of physical and human capital lost its value in the course of transformation to a market economy.

Presumably, the latest figures from the World Bank still over estimate the state of development of the former CMEA countries - with the exception of the Visegrad-group (Lösch and Wohlers 1994: 154). In particular the per capita income in Russia may be over estimated. By and large, however, one can assume that the estimates for GNP per capita in 1992 offer a realistic point of reference. According to these estimates Russia, Poland, the CSFR and Hungary have reached about one tenth of the West German level of GNP per capita and are on a par with Turkey and middle income developing countries (like Thailand, Iran, Panama or Chile). Romania and Bulgaria have attained only a twentieth of the German level and rank among the lower third of middle income developing countries (like Morocco, Ecuador, Colombia, Jamaica or Paraguay). In contrast, CEECs should have already gained, according to CIA estimates, the level of GNP of more developed countries such as Ireland, Spain, Israel, Hongkong or Singapore, by the end of the 80's.

Our estimates for the level of German trade with CEECs were initially based on 1992-GNP levels in CEECs. The results reflect the production level of West Germany in 1989, the base year for all regression calculations (Variant I). For a comparison with the actual value of foreign trade, one has to "inflate" the results to the 1992-level for the whole of Germany. Therefore, the estimated values derived from the regression equations for Germany were increased by 51% on the import side and 26% on the export side (Variant Ia). This corresponds to the change in total imports and exports respectively in current US-dollars for the whole of Germany in comparison to the West German level in 1989. The up-dated estimates derived from the regression equations for OECD countries were determined using the level of income for the whole of Germany in 1992 (Variant Ib); in 1992 the total German GNP in current US-dollars was 66%

higher than the West German level in 1989, and the 1992 per capita income for the whole of Germany was about 18% higher than the West German level in 1989.<sup>6</sup>

As a second stage of analysis, a GNP three times as high as 1992 was assumed for CEECs (Variant II). This level of income is derived from the average relationship between per capita income and the supply of human capital in a country with a market economic system - human capital is measured on the basis of the mean years of schooling of the population.<sup>7</sup> As Figure 1 shows, the CEECs' level of income in 1992 was well below the level one might expect, given the average relationship between levels of income and human capital. One reason could be, that the high level of qualification only exists officially and that this knowledge is devalued under market conditions. A trebling of GNP represents an estimate for potential growth, which one can expect in the case of comprehensive economic transformation.

As a third stage of analysis, it was assumed that the focus of economic activity in Germany would tend, during the course of recovery in East Germany, to shift eastward in the long-term (Variant III). To this end, geographical distance for a further estimate was measured using Berlin as a point of reference and not Frankfurt am Main. Correspondingly, the distance to Poland was reduced by around 36% and to Russia by approximately 17%. For other CEECs the reductions are only marginal (4-8%).

The various estimates for total trade between Germany and CEECs are compiled in Table 12. The results - derived from the regression equations for Germany and up-dated to the level of German foreign trade in 1992 - had already been exceeded by the real value of exports and imports in 1992 in trade with Poland, the CSFR and Hungary (as given in Table 1). Only a trebling of GNP in these countries and, thereby, also a trebling

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<sup>6</sup> This increase arises only in terms of value due to the price increases in the DM and the appreciation of the DM against the US-\$. Measured at constant prices, the GNP for the whole of Germany in 1992 was about 22% higher and the per capita income approximately 6% below the West German level in 1989.

<sup>7</sup> The figures refer to 1990 and were taken from UNDP, Human Development Report 1993, New York, 1993, pp. 135-137.



of imports and exports would lead to a considerable further expansion in trade. This is valid for Poland too, if the focus of economic activity in Germany were to shift eastward. In trade with Romania and Bulgaria, the estimated level of exports for 1992 was reached in 1994, but that of imports not yet. In Russia the volume of trade in imports and exports remained well below its potential.

The estimates derived from the regression equations for the OECD countries foresee a higher level of German trade with CEECs; the GNP of partner countries plays, on average, a less important role for OECD countries than for Germany, while distance plays a greater role for OECD countries than for Germany. These higher estimates for 1992 were, more or less, reached in 1994 in trade with Poland, the CSFR and Hungary, whereas the potential for trade with Russia, in particular, has not yet been attained.

The biggest trading partners of Germany today are, after Russia, the CSFR and Poland, followed by Hungary. This corresponds to the hierarchy, which also emerges in the estimates made according to GNP and distance. Before the political changes in Eastern Europe, trade with West Germany reached a "normal" level only for Hungary, whereas trade for Poland and, even more so, for the CSFR lagged behind. Correspondingly, Hungary ranked above the CSFR as a trading partner of West Germany, despite Hungary being smaller and further away. The marked orientation of Hungary towards the West, which was apparent then, has lost its significance totally over the course of political developments. Trade with Poland, which with nearly 40 million inhabitants is by far the largest of the three Visegrad-countries, will only outstrip trade with the CSFR, relative to the extent that economic activities in East Germany strengthen and that Germany and Poland move closer together.

The estimates for trade with CEECs reflect their low level of production and income. Estimates based on the earlier and much larger GNP data from the CIA lead to much higher values, indicating a large trade potential beyond the low level of East-West trade before 1990. It may be, however, that the low level of trade between the OECD and CMEA countries is not only explained by political opposition, but also by a de facto low level of real income in CMEA countries by market economic standards. As for any

backlog, it was quickly made up for by German trade with the countries most advanced in the transformation process, i.e. Poland, the CSFR and Hungary. Further extension of trade relations now depend crucially on future growth in these countries. In contrast, trade with Russia remains far behind its market economic potential, so that considerable increases can be expected, if serious economic reform in Russia is continued. However, in view of the political difficulties, realisation of market economic reforms will require a lengthy period of time. The range of the potential is also possibly exaggerated, assuming a per capita income that is still over estimated.

## **6. Sectoral pattern of trade and structural changes in Germany**

The sectoral structure of trade between Germany and CEECs is determined by geographical proximity, large disparities in the level of per capita GNP and wages and the relatively good situation of human capital. Which product groups may have comparative advantages on these grounds can be derived from the elasticities of exports and imports respectively with respect to distance and income (see Tables 7 and 10). The CEECs should prove to be more important export markets for those German industries which have a high elasticity of exports with respect to distance and a low elasticity with respect to the income of the importing country. Those industries, which have a high elasticity of exports with respect to the GNP of the importing country, will increase their share with rising GNP in the CEECs. As for German imports, the CEECs should tend to achieve high shares in those product groups which have a high elasticity of imports with regard to distance and a low elasticity with respect to the income of the supplier country. Those product groups, which have a high elasticity of imports with regard to the supplier country's income, should increase their share with rising GNP in CEECs.

The following analysis will be concentrated on the division of labour within the manufacturing sector and will be based on - corresponding to the regression approach - general comparative advantage as a function of the level of income and, in as far as it is connected to this, human capital endowments. Country specific advantages, such as history and natural conditions, will not be taken into consideration; they may, however, be apparent in the present commodity structure of imports from the individual CEECs.

As the supplies of the former USSR are obviously based on the considerable natural resources of the country, the following analysis will be restricted to the other CEECs. It will draw, above all, on the regression results for German trade and will be supplemented by results for OECD countries in general when they are more significant. This applies, in particular, to imports.

In accordance with the distance elasticity of German exports, proximity to the market has the greatest positive effect on German exports of clothing, wooden articles, furniture, mineral oil products, textiles and shoes. Conversely, on the import side short distances between CEECs and Germany advantage, above all, supplies of mineral oil products, iron and steel, "other" non-metallic mineral products, wooden articles and motor vehicle industry products. This is particularly true for trade with the CSFR, followed - in order of distance from West Germany - by Hungary, Poland, Bulgaria and Romania.

The German structure of exports varies less with the level of income of the market. Germany tends to supply in low-income countries relatively large amounts of iron and steel, industrial chemicals and machinery. With increasing income German exports of mainly clothing, shoes, furniture, leather products and wooden articles become more important. As for imports from CEECs, their low level of income tends to give them a comparative advantage in wooden articles, pottery, china and earthenware, iron and steel and foodstuffs, as well as "other" non metallic mineral products. With increasing per capita income, the significance of, above all, plastic products, industrial chemicals, rubber products, shoes and paper may increase.

Summarising, one may say that Germany imports more investment goods and less consumer goods, the higher the income level of the trading partner is, whereas on the export side the situation is reversed. A similar pattern is apparent using the classification of industries according to R&D intensity: With increasing GNP of the trading partner the proportion of medium and high-tech goods on the import side increases and on the export side decreases. Hence, the intersectoral division of labour decreases, whereas the intrasectoral division of labour becomes more significant.

This trend also emerges from the estimates of the commodity structure for German trade with CEECs on the basis of the regression equations at alternative income levels. Within the next few years, however, a high proportion of intersectoral division of labour can be expected, so that the expansion of trade will induce changes in the sectoral pattern of production and employment in Germany. This has regional implications and affects the demand for the factors of production.

On the one hand, employment will profit in Germany from high exports to CEECs. On the other, domestic production finds itself under increasing competition from imports. At their present level of incomes, CEECS represent, first and foremost, competition for other low income countries. However, due to geographical proximity to Germany, additional possibilities for international division of labour exist which are not available for countries further away.

According to the results of earlier studies, CEECs are placed between the developing countries and OECD countries with regard to the proportion of intrasectoral trade, labour content and human capital content of their supplies in Western trade (Schumacher 1989, Sapir and Schumacher 1985). More up-to-date calculations for this study, based on the commodity structure of German trade until 1993, confirm these results. To this end, the direct content of labour and human capital for the various commodity bundles of exports and imports were calculated using the average sectoral production functions in West Germany. Input of labour was measured in hours worked per unit of gross output and input of human capital on the basis of personnel expenditure per hour worked.<sup>8</sup> This assumes that the sectoral differences in the hourly rates of pay reflect only the differing structure in the level of training of work forces. In fact, wages depend on a number of other factors too, such as the productivity of capital, sex, age or the influence of unions. One can assume for the majority of industries, however, that the differences in wages are essentially related to the differing intensity of human capital.

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<sup>8</sup> This data refers to 1988 (Eurostat, Structure and Activity of Industry. Annual inquiry - Main results 1988/89, and Eurostat, Labour Cost Survey 1988) and was reclassified from NACE into ISIC.

Dividing the factor content of exports by that of imports, the following relations emerge for the commodity bundles in German trade with various countries or groups of countries for 1993:

	Labour content	Human capital content
Poland	0.93	1.16
CSFR	0.98	1.08
Hungary	0.95	1.12
Romania	0.81	1.31
Bulgaria	0.85	1.28
5 countries total	0.94	1.14
OECD countries	1.01	1.03
Developing countries	0.85	1.25

This shows that the labour content of exports in trade with CEECs is smaller than that of imports. The opposite is true for human capital intensity. A uniform expansion of trade leads to a somewhat smaller need for workers in Germany, and the economy-wide productivity of labour increases due to the change in the sectoral pattern of production. The demand for human capital in Germany increases following additional division of labour with Eastern Europe, i.e. the loss of jobs is concentrated on non-qualified workers, whereas the demand for qualified workers increases.

The effects of changes in the sectoral structure of the German economy are strengthened by the expansion of the intrasectoral division of labour, which follows the same basic pattern: Standardised, labour-intensive parts of production processes are relocated to CEECs. This is particularly true for economic branches where regional proximity is necessary for production. Hence, outward processing has expanded in the last few years, above all, in the areas of textiles, clothing, and leather, but also in electrical appliances (Möbius 1995). In the motor vehicle industry the big German firms have begun to include Eastern Europe in their internal division of labour. Further investment goods industries may well follow this example, so that the division of labour in intermediate

goods will intensify with Eastern Europe, with corresponding structural changes and productivity gains in Germany.

Consequently, the structural changes arising from trade with CEECs call for an upgrading of the skill content of the German labour force in general. Hence, increased trade with CEECs tends to further the long-term trends of structural changes in Germany (and other Western industrialised countries), i.e. increases both labour productivity and human capital intensity.

CEECs will develop more quickly into middle-income countries, the more human capital they accumulate themselves. Their education and industrial experience may offer better prerequisites than are present in many developing countries, with whom they rank equally, at present, in terms of per capita income.

## **7. Summary and policy conclusions**

German trade with CEECs, in particular with the CSFR, Poland and Hungary, who are nearest to Germany and most advanced in the transformation process, has expanded dynamically in the last few years. An important role has been played by the increased division of labour in textiles, leather and clothing, in the form of outward processing, but also in the motor vehicle industry and in electrical engineering. The regional structure of German foreign trade has shifted in the direction of Eastern Europe, above all, to the disadvantage of the West. Whether CEECs will regain their former share in German trade of nearly 18% (in 1913) depends crucially upon the ability of CEECs to make up the gap in income. In any case, the analysis has shown that there is still considerable potential for further expansion of trade under the condition that the transformation process towards a market economy progresses further and will be successful in terms of growth.

With regard to the commodity patterns of trade, one might expect that CEECs will achieve high shares of German exports in all industries; (i) in basic and consumer goods due to geographic proximity and (ii) in investment goods due to their low income level.

Consequently, the commodity structure of German exports to CEECs will be very similar to that of overall German exports. On the other hand, CEECs will achieve high import market shares in Germany mainly in consumer goods due to their low income level, and with rising GNP their share in investment goods will rise too.

A strong economy like Germany's should, in principal, be able to cope with the structural changes arising from the increased division of labour with Eastern Europe. To a large extent, these changes have already taken place, and the effects of a further doubling or trebling of trade with CEECs would be distributed over many years and the adjustment costs would not be very high as compared to the size of German GNP. The German economy should, in fact, benefit from these new structures. On the whole, the economic performance of West Germany in the past can be assessed as good. This is particularly true when measured against key data such as the increase in real income and productivity, as well as the terms of trade.

It is, however, worrying that, in recent times, Germany has been slackening in its efforts to make provision for the future. Spending on R&D and education is declining in proportion to GNP, and the share of predominantly structure-conserving subsidies in total support continues to be high in comparison to subsidies affecting technology and innovation. These developments could mean that Germany is living increasingly on its capital and that its still comparatively good performance is gradually deteriorating, since such omissions make themselves felt only at a very late date. Also, the changes which Germany will be facing as a result of the development in Eastern Europe will require German policy to be more forward-looking and long-term.

Another prerequisite for a further increase in trade is a more liberal stance from the EC regarding imports from Eastern Europe. The imports of agricultural products are hampered by the Common Agricultural Policy, and this protection is not reduced in the Europe Agreements. In principal, the Europe Agreements provide a framework for a progressive liberalisation of industrial imports from the CEECs. The stipulations in detail, however, show that the EC again follows the traditional attitude, i.e. is less liberal, the more competitive the foreign supply. The final benefit to the CEECs will crucially

depend on the actual behaviour of the EC within the provisions of the Agreements. There is room for less liberal behaviour with regard to the tariffication of "sensitive" products above the ceilings and the escape clause may or may not be applied to introduce import quotas or anti-dumping proceedings when increased imports "cause or threaten to cause serious injury". All in all, one may say that the Europe Agreements potentially offer a significant liberalisation of imports from the CEECs, which provides space for high additional supplies of industrial products. The trend towards liberalisation is not, however, irreversible as there are various escape clauses in the Agreements. To refrain from high anti-dumping duties and to remove, or avoid re-application of, QR on products where CEECs prove to be competitive is more important than any acceleration of tariff reductions.



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Table 1

Trade of Germany<sup>1)</sup> with CEECs, 1989 to 1994

	Poland	CSFR	Hungary	Romania	Bulgaria	5 countries total	USSR	of which: Russia	for comparison: World
Exports									
in US-\$ billion									
1989	2.4	1.5	1.9	0.3	0.8	6.9	6.1	.	341.2
1990	2.9	1.9	2.1	0.7	0.5	8.1	6.4	.	398.4
1991	5.1	3.0	2.6	0.7	0.5	11.9	10.7	.	402.6
1992	5.3	5.3	3.0	0.9	0.6	15.0	8.9	.	430.4
1993	5.9	5.5	3.1	1.1	0.5	16.1	9.6	6.9	380.1
1994	6.4	7.2	4.0	1.2	0.7	19.5	10.1	6.6	424.0
Share in total German exports (in %)									
1989	0.7	0.4	0.6	0.1	0.2	2.0	1.8	.	100
1994	1.5	1.7	0.9	0.3	0.2	4.6	2.4	1.6	100
Share of Germany in OECD exports (in %)									
1992	39.2	49.6	38.7	27.8	29.6	40.7	33.9	.	16.6
Imports									
in US-\$ billion									
1989	1.9	1.3	1.4	0.8	0.2	5.7	4.6	.	269.7
1990	3.2	1.7	2.0	0.7	0.2	7.9	5.7	.	342.6
1991	4.4	3.1	2.6	0.7	0.3	11.1	8.6	.	389.0
1992	5.3	4.7	3.0	0.8	0.4	14.1	8.3	.	408.5
1993	5.2	4.8	2.7	0.8	0.3	13.9	7.9	6.5	342.7
1994	6.3	6.6	3.4	1.1	0.5	17.9	9.9	8.2	378.1
Share in total German imports (in %)									
1989	0.7	0.5	0.5	0.3	0.1	2.1	1.7	.	100
1994	1.7	1.8	0.9	0.3	0.1	4.7	2.6	2.2	100
Share of Germany in OECD imports (in %)									
1992	47.7	50.7	40.6	33.4	24.0	44.8	26.8	.	15.1

<sup>1)</sup> 1989 and 1990 West Germany only, 1994 preliminary figures.

Source: Own calculations based on data from the Federal Statistical Office and OECD.

Table 2

**Trade of West Germany and East Germany with CEECs, 1990 to 1994<sup>1)</sup>**  
**(in DM billion)**

		Poland	CSFR	Hungary	Romania	Bulgaria	5 countries total	USSR	of which: Russia	for comparison: World
<b>West Germany</b>										
Exports	1990	4.7	3.1	3.4	1.1	0.8	13.0	10.4	.	642.8
	1991	7.5	4.3	3.8	1.0	0.7	17.3	8.6	.	648.4
	1992	7.7	7.5	4.5	1.2	0.8	21.7	8.4	.	657.4
	1993	9.3	8.5	5.0	1.7	0.8	25.3	11.0	7.7	616.4
	1994	9.9	11.1	6.2	1.9	1.0	30.1	11.6	8.4	673.1
Imports	1990	5.2	2.7	3.3	1.1	0.4	12.6	9.1	.	550.6
	1991	6.5	4.4	4.0	1.1	0.5	16.5	9.9	.	633.1
	1992	7.4	6.6	4.5	1.2	0.6	20.3	10.1	.	628.0
	1993	7.9	7.2	4.4	1.3	0.5	21.4	10.6	8.4	557.8
	1994	9.2	9.9	5.3	1.8	0.7	26.8	13.0	11.2	601.0
<b>East Germany</b>										
Exports	1990	2.9	3.4	2.7	1.5	1.4	12.0	17.8	.	38.1
	1991	1.0	0.6	0.4	0.2	0.1	2.4	9.0	.	17.5
	1992	0.5	0.8	0.2	0.1	0.1	1.6	5.5	.	13.8
	1993	0.4	0.5	0.2	0.2	0.1	1.3	4.9	3.7	11.9
	1994	0.5	0.6	0.2	0.1	0.1	1.4	3.4	2.4	12.1
Imports	1990	1.8	1.7	1.2	0.4	0.5	5.7	9.1	.	22.9
	1991	0.8	0.7	0.3	0.1	0.0	1.9	4.3	.	10.9
	1992	0.8	0.7	0.2	0.0	0.0	1.7	2.9	.	9.6
	1993	0.7	0.7	0.1	0.0	0.0	1.6	2.4	2.3	8.4
	1994	1.0	0.8	0.1	0.0	0.0	2.0	2.0	1.9	10.2

<sup>1)</sup> 1993 and 1994 preliminary figures.  
Source: Federal Statistical Office.

Table 3

## Commodity structure of German trade with CEECs, 1993 (%)

ISIC		Poland, CSFR, Hungary, Romania, Bulgaria		Ex-USSR	
		Exports	Imports	Exports	Imports
100	Agriculture	2,0	3,1	2,2	3,0
200	Mining and quarrying	0,4	3,0	0,0	40,1 1)
3	Manufacturing industries	97,7	93,9	97,7	56,9
31	Food, beverages and tobacco	5,3	6,2	14,7	3,1
321	Textiles	×11,8	4,7	2,5	1,1
322	Wearing apparel	1,8	×16,7	1,5	3,9
323	Leather and leather products	1,1	0,8	0,2	0,3
324	Footwear	0,6	2,6	1,5	0,6
331	Wood and wood products	0,5	3,6	0,2	2,7
332	Furniture and fixture	0,8	6,2	0,8	0,9
341	Paper and paper products	2,3	1,2	1,0	0,7
342	Printing and publishing	1,0	0,4	0,5	0,0
351	Industrial chemicals	6,3	4,7	3,3	6,2
3511	of which: basic ind. chemicals	2,7	1,8	1,1	3,2
3512	Fertilizers and pesticides	0,5	1,0	0,7	2,2
352	Other chemical products	6,0	0,6	5,2	0,8
3522	of which: drugs and medicines	2,1	0,3	3,0	0,4
353+354	Petroleum refineries and prod.	0,9	1,8	0,1	10,3
355	Rubber products	0,9	0,8	0,3	0,1
356	Plastic products	1,6	0,9	0,4	0,0
361	Pottery, china and earthenware	0,2	0,4	0,1	0,0
362	Glass and glass products	0,5	1,4	0,1	0,1
369	Structural clay products	0,9	3,3	0,4	0,2
371	Iron and steel basic industr.	1,8	4,6	2,2	4,8
372	Basic non-ferrous metals	1,2	3,2	0,3	15,6
381	Fabricated metal products	4,4	×7,7	2,6	0,6
382	Machinery (exc. electrical)	×20,5	6,6	28,3	1,4
3821	Engines and turbines	0,1	0,1	0,2	0,1
3822	Agricultural machinery	0,6	0,6	1,9	0,3
3823	Metal and wood work. machinery	2,6	0,9	4,3	0,3
3824	Special industrial machinery	7,1	1,8	12,5	0,2
3825	Office, computing, account. m.	2,7	0,4	2,0	0,0
3829	Lifting, domestic equipm. etc.	7,2	2,8	7,3	0,5
383	Electrical machinery	×11,2	×7,4	8,1	0,5
3831	Electrical industrial mach.	2,7	1,8	0,8	0,2
3832	Radio, television, communic.	4,7	1,2	5,2	0,2
3833	Electrical appliances, housw.	0,6	0,6	0,4	0,0
3839	Batt., Accumulators, lamps etc.	3,2	3,8	1,6	0,2
384	Transport equipment	×11,4	6,2	20,1	1,9
3841	Shipbuilding and repairing	0,1	1,2	3,3	0,7
3842	Railroad equipment	0,6	0,4	4,9	0,4
3843	Motor vehicles	×10,5	4,3	11,6	0,6
3845	Air craft	0,1	0,1	0,1	0,0
3844/49	Motorcycles, bicycles etc.	0,2	0,2	0,1	0,2
385	Measuring, photogr., optical etc.	3,3	0,8	3,0	0,2
390	Other manufacturing industries	1,5	1,1	0,5	0,8
00	All products	100,0	100,0	100,0	100,0
001	High-tech	19,4	9,1	16,2	1,2
002	Medium-tech	×42,9	20,9	49,5	24,8
003	Low-tech	35,3	×63,9	32,0	30,9

1) Mineral oil and gas imports underestimated due to secrets not shown separately by commodity and partner country.

Source: DIW Foreign Trade Data.

Table 4

## Commodity structure of German imports from five CEECs, 1993 (%)

ISIC		Poland	CSFR	Hungary	Romania	Bulgaria
100	Agriculture	2,4	2,6	5,2	2,0	6,7
200	Mining and quarrying	4,6	3,6	0,1	0,0	0,7
3	Manufacturing industries	93,0	93,8	94,7	98,0	92,5
31	Food, beverages and tobacco	7,5	2,3	11,1	3,1	10,2
321	Textiles	3,0	5,8	5,5	5,5	9,1
322	Wearing apparel	19,6	8,6	14,7	45,8	30,5
323	Leather and leather products	0,3	0,5	0,4	0,4	1,6
324	Footwear	1,5	2,1	5,7	2,4	2,3
331	Wood and wood products	5,7	3,1	1,3	1,5	0,3
332	Furniture and fixture	9,0	3,1	3,1	18,5	1,6
341	Paper and paper products	1,0	2,0	0,6	0,3	0,3
342	Printing and publishing	0,1	0,8	0,4	0,0	0,1
351	Industrial chemicals	4,0	6,4	3,8	2,0	3,1
3511	of which: basic ind. chemicals	1,7	2,5	1,5	0,8	0,9
3512	Fertilizers and pesticides	1,1	1,3	0,2	0,5	1,7
352	Other chemical products	0,5	0,8	0,6	0,4	2,0
3522	of which: drugs and medicines	0,1	0,4	0,4	0,2	1,3
353+354	Petroleum refineries and prod.	1,8	2,0	2,2	0,5	0,0
355	Rubber products	0,6	1,1	0,9	0,3	0,7
356	Plastic products	0,7	1,1	0,9	0,4	0,5
361	Pottery, china and earthenware	0,2	0,5	0,1	1,0	0,5
362	Glass and glass products	0,7	2,1	1,1	2,7	0,2
369	Structural clay products	3,3	5,3	0,9	0,2	1,7
371	Iron and steel basic industr.	3,6	7,9	2,0	1,8	1,6
372	Basic non-ferrous metals	6,1	1,0	2,0	0,4	5,0
381	Fabricated metal products	7,1	10,0	6,8	3,4	2,1
382	Machinery (exc. electrical)	3,8	9,1	8,4	2,8	9,2
3821	Engines and turbines	0,1	0,2	0,2	0,0	0,0
3822	Agricultural machinery	0,3	0,8	1,3	0,0	0,2
3823	Metal and wood work. machinery	0,4	1,3	0,7	0,5	4,0
3824	Special industrial machinery	1,1	2,4	2,3	0,4	1,1
3825	Office, computing, account. m.	0,0	1,0	0,2	0,0	0,7
3829	Lifting, domestic equipm. etc.	1,9	3,4	3,7	1,8	3,2
383	Electrical machinery	4,8	7,6	13,9	2,3	5,6
3831	Electrical industrial mach.	0,8	2,5	3,2	0,3	2,2
3832	Radio, television, communic.	0,6	1,5	2,1	0,2	0,5
3833	Electrical appliances, housw.	0,8	0,5	0,6	0,0	0,3
3839	Batt., Accumulators, lamps etc.	2,7	3,1	8,1	1,7	2,5
384	Transport equipment	6,2	7,6	5,7	1,3	1,9
3841	Shipbuilding and repairing	2,3	0,6	0,6	0,1	0,0
3842	Railroad equipment	0,2	0,7	0,2	0,6	0,0
3843	Motor vehicles	3,4	5,9	4,7	0,6	0,4
3845	Air craft	0,1	0,1	0,0	0,0	1,5
3844/49	Motorcycles, bicycles etc.	0,3	0,3	0,1	0,0	0,0
385	Measuring, photogr., optical etc.	0,4	1,1	1,3	0,3	0,6
390	Other manufacturing industries	0,6	1,8	0,9	0,6	1,7
00	All products	100,0	100,0	100,0	100,0	100,0
001	High-tech	5,5	10,1	15,9	2,8	9,7
002	Medium-tech	19,3	25,0	20,9	7,3	18,8
003	Low-tech	68,1	58,6	57,9	87,9	64,0

Source: DIW Foreign Trade Data.

Table 5

Regression results for trade of 22 OECD countries with 70 countries (all variables)

			ln(Yi)	ln(Yi/Bi)	ln(Yj)	ln(Yj/Bj)	ln(Dji)	ADJL	EC	EFTA	CUSTA	LAN	Col	r squared	Constant	Degrees of Freedom
Exports																
000	All goods	X-Coefficients	0.89	0.40	0.79	0.17	-0.87	0.01	0.31	-0.45	0.07	0.89	1.16	0.84	-13.16	1506
		Std Err of Coef.	0.02	0.04	0.02	0.03	0.04	0.19	0.12	0.25	0.76	0.11	0.23			
		T-Test	39.5	8.9	37.6	6.6	-22.8	0.0	2.5	-1.8	0.1	8.2	5.1			
		Significance	**	**	**	**	**		*			**	**			
3	Manufactures	X-Coefficients	0.87	0.49	0.77	0.17	-0.95	-0.04	0.28	-0.48	0.17	0.78	1.32	0.82	-13.18	1506
		Std Err of Coef.	0.02	0.05	0.02	0.03	0.04	0.20	0.13	0.27	0.81	0.12	0.24			
		T-Test	36.5	10.4	34.3	6.2	-23.4	-0.2	2.2	-1.8	0.2	6.7	5.4			
		Significance	**	**	**	**	**		*			**	**			
001	High-tech	X-Coefficients	1.10	2.11	0.95	0.18	-1.40	-1.15	0.20	-1.14	-0.94	1.48	1.82	0.50	-32.32	1506
		Std Err of Coef.	0.07	0.15	0.07	0.08	0.13	0.62	0.41	0.84	2.52	0.36	0.76			
		T-Test	14.8	14.3	13.5	2.2	-11.1	-1.9	0.5	-1.4	-0.4	4.1	2.4			
		Significance	**	**	**	*	**					**	*			
002	Medium-tech	X-Coefficients	1.19	0.60	0.83	0.08	-1.20	-0.23	0.08	-0.29	0.34	0.56	1.45	0.69	-17.19	1506
		Std Err of Coef.	0.04	0.08	0.04	0.04	0.07	0.33	0.22	0.44	1.34	0.19	0.40			
		T-Test	30.0	7.7	22.2	1.7	-17.9	-0.7	0.4	-0.7	0.3	2.9	3.6			
		Significance	**	**	**	**	**					**	**			
003	Low-tech	X-Coefficients	0.74	0.29	0.79	0.22	-1.09	-0.21	0.18	-0.66	-0.24	1.05	1.30	0.63	-10.19	1506
		Std Err of Coef.	0.04	0.08	0.04	0.04	0.07	0.32	0.21	0.44	1.32	0.19	0.40			
		T-Test	18.9	3.8	21.6	5.1	-16.5	-0.7	0.9	-1.5	-0.2	5.6	3.3			
		Significance	**	**	**	**	**					**	**			
Imports																
000	All goods	X-Coefficients	1.02	0.17	1.18	-0.24	-0.93	-0.41	0.11	0.10	-0.52	0.97	1.05	0.50	-12.87	1506
		Std Err of Coef.	0.06	0.07	0.06	0.12	0.10	0.49	0.33	0.67	2.00	0.29	0.60			
		T-Test	18.2	2.5	19.9	-2.0	-9.2	-0.8	0.3	0.2	-0.3	3.4	1.7			
		Significance	**	*	**	*	**					**	**			
3	Manufactures	X-Coefficients	1.20	0.24	1.24	-0.13	-1.00	-0.74	0.38	0.39	-0.79	1.25	1.20	0.49	-17.35	1506
		Std Err of Coef.	0.06	0.08	0.07	0.14	0.12	0.57	0.38	0.77	2.32	0.33	0.70			
		T-Test	18.6	3.1	18.1	-1.0	-8.6	-1.3	1.0	0.5	-0.3	3.8	1.7			
		Significance	**	**	**	**	**					**	**			
001	High-tech	X-Coefficients	2.08	1.25	1.59	1.04	-1.34	-2.03	0.70	0.12	-3.38	2.07	4.09	0.40	-53.00	1506
		Std Err of Coef.	0.15	0.18	0.16	0.31	0.27	1.31	0.87	1.77	5.33	0.76	1.60			
		T-Test	14.0	7.1	10.1	3.3	-5.0	-1.6	0.8	0.1	-0.6	2.7	2.6			
		Significance	**	**	**	**	**					**	**			
002	Medium-tech	X-Coefficients	1.85	0.77	1.76	-0.53	-1.56	-1.45	-0.15	0.83	-1.37	0.42	3.10	0.39	-29.90	1506
		Std Err of Coef.	0.13	0.15	0.13	0.27	0.23	1.12	0.74	1.52	4.57	0.65	1.38			
		T-Test	14.5	5.0	13.0	-2.0	-6.8	-1.3	-0.2	0.5	-0.3	0.6	2.3			
		Significance	**	**	**	*	**					*	*			
003	Low-tech	X-Coefficients	1.25	0.14	1.29	0.03	-1.03	-0.84	0.41	0.39	-1.57	1.37	1.11	0.44	-19.81	1506
		Std Err of Coef.	0.07	0.09	0.08	0.15	0.13	0.64	0.43	0.87	2.63	0.38	0.79			
		T-Test	17.0	1.6	16.6	0.2	-7.8	-1.3	1.0	0.4	-0.6	3.6	1.4			
		Significance	**		**		**					**	*			

Note: \*\* indicates significance at 99% level, \* indicates significance at 95% level.

Source: Own calculations, for methodology and data see text.



Table 6

Regression results for trade of 22 OECD countries with 70 countries (5 variables)

			ln(Yi)	ln(Yi/Bi)	ln(Yj)	ln(Yj/Bj)	ln(Dji)	r squared	Constant	Degrees of Freedom
Exports										
000	All goods	X-Coefficients	0.92	0.38	0.79	0.17	-0.89	0.82	-13.07	1512
		Std Err of Coef.	0.02	0.05	0.02	0.03	0.03			
		T-Test	39.8	8.2	36.3	6.5	-27.1			
		Significance	**	**	**	**	**			
3	Manufactures	X-Coefficients	0.91	0.47	0.77	0.17	-0.96	0.81	-13.11	1512
		Std Err of Coef.	0.02	0.05	0.02	0.03	0.03			
		T-Test	37.2	9.7	33.4	6.0	-27.8			
		Significance	**	**	**	**	**			
001	High-tech	X-Coefficients	1.14	2.08	0.93	0.18	-1.30	0.49	-32.99	1512
		Std Err of Coef.	0.07	0.15	0.07	0.08	0.10			
		T-Test	15.5	14.1	13.3	2.2	-12.3			
		Significance	**	**	**	*	**			
002	Medium-tech	X-Coefficients	1.22	0.58	0.82	0.08	-1.18	0.68	-17.35	1512
		Std Err of Coef.	0.04	0.08	0.04	0.04	0.06			
		T-Test	31.0	7.4	22.1	1.7	-21.2			
		Significance	**	**	**	**	**			
003	Low-tech	X-Coefficients	0.77	0.27	0.79	0.23	-1.07	0.62	-10.35	1512
		Std Err of Coef.	0.04	0.08	0.04	0.04	0.06			
		T-Test	19.7	3.5	21.3	5.1	-19.3			
		Significance	**	**	**	**	**			
Imports										
000	All goods	X-Coefficients	1.00	0.18	1.20	-0.24	-0.90	0.49	-13.14	1512
		Std Err of Coef.	0.06	0.07	0.06	0.12	0.08			
		T-Test	18.1	2.6	20.6	-2.1	-10.8			
		Significance	**	**	**	*	**			
3	Manufactures	X-Coefficients	1.18	0.26	1.26	-0.13	-0.99	0.49	-17.56	1512
		Std Err of Coef.	0.06	0.08	0.07	0.14	0.10			
		T-Test	18.4	3.3	18.6	-1.0	-10.2			
		Significance	**	**	**	**	**			
001	High-tech	X-Coefficients	2.03	1.27	1.66	1.00	-1.25	0.39	-53.59	1512
		Std Err of Coef.	0.15	0.18	0.16	0.31	0.22			
		T-Test	13.8	7.2	10.7	3.2	-5.7			
		Significance	**	**	**	**	**			
002	Medium-tech	X-Coefficients	1.81	0.77	1.79	-0.54	-1.44	0.39	-30.69	1512
		Std Err of Coef.	0.13	0.15	0.13	0.27	0.19			
		T-Test	14.4	5.1	13.5	-2.0	-7.7			
		Significance	**	**	**	*	**			
003	Low-tech	X-Coefficients	1.23	0.16	1.31	0.03	-1.01	0.43	-20.04	1512
		Std Err of Coef.	0.07	0.09	0.08	0.15	0.11			
		T-Test	16.9	1.8	17.1	0.2	-9.2			
		Significance	**		*		**			
Note: ** indicates significance at 99% level, * indicates significance at 95% level.										
Source: Own calculations, for methodology and data see text.										

Table 7

Ranking of three-digit ISIC industries according to the value of the regression coefficients  
- trade of 22 OECD countries with 70 countries, 5 variables -

## Exports

b1 (for Yi)				b2 (for Yi/Bi)				b1 + b2	
ISIC	Coeff.	T-Test	Sign.	ISIC	Coeff.	T-Test	Sign.	ISIC	Coeff
353/4	4.81	23.4	**	385	4.81	20.4	**	385	6.28
324	4.18	20.3	**	341	4.41	14.5	**	342	6.27
361	4.10	21.3	**	342	3.89	13.1	**	341	6.25
323	3.68	19.1	**	332	2.90	8.2	**	332	5.98
371	3.62	20.1	**	384	2.76	10.8	**	372	5.13
322	3.51	20.4	**	356	2.66	9.7	**	384	5.02
362	3.31	19.5	**	352	2.57	11.7	**	331	4.85
369	3.22	18.5	**	383	2.26	11.9	**	371	4.78
355	3.11	20.1	**	372	2.21	6.1	**	356	4.63
332	3.09	17.5	**	381	2.08	9.7	**	390	4.27
372	2.93	16.2	**	382	2.03	14.4	**	355	4.00
331	2.84	15.0	**	331	2.01	5.3	**	353/4	3.84
342	2.38	16.0	**	390	1.95	6.5	**	352	3.79
390	2.32	15.5	**	371	1.16	3.2	**	383	3.72
384	2.26	17.8	**	355	0.89	2.9	**	381	3.53
321	2.00	15.3	**	351	0.87	3.7	**	382	3.18
356	1.98	14.4	**	31	0.57	3.3	**	323	3.15
341	1.83	12.0	**	369	-0.26	-0.7		361	3.06
351	1.73	14.6	**	362	-0.36	-1.1		369	2.96
385	1.47	12.4	**	323	-0.53	-1.4		362	2.94
381	1.46	13.6	**	321	-0.57	-2.2	*	324	2.90
383	1.46	15.3	**	322	-0.85	-2.5	*	322	2.65
352	1.22	11.0	**	353/4	-0.97	-2.4	*	351	2.60
382	1.15	16.3	**	361	-1.04	-2.7	**	321	1.43
31	0.65	7.5	**	324	-1.29	-3.1	**	31	1.22

## Imports

b1 (for Yi)				b2 (for Yi/Bi)				b1 + b2	
ISIC	Coeff.	T-Test	Sign.	ISIC	Coeff.	T-Test	Sign.	ISIC	Coeff
362	4.64	24.7	**	353/4	2.40	9.7	**	371	6.03
371	4.43	21.0	**	356	2.14	9.1	**	362	6.03
341	4.25	21.0	**	385	1.85	8.4	**	341	5.82
324	4.25	20.2	**	384	1.66	7.6	**	353/4	5.67
369	4.17	21.0	**	371	1.59	6.3	**	355	5.63
355	4.11	20.4	**	382	1.58	8.2	**	356	5.60
361	3.99	20.1	**	341	1.56	6.4	**	369	5.00
331	3.64	17.4	**	372	1.53	5.8	**	372	4.99
323	3.53	17.9	**	355	1.52	6.3	**	351	4.73
372	3.46	15.7	**	342	1.52	7.3	**	384	4.72
356	3.46	17.7	**	383	1.40	7.2	**	352	4.66
381	3.42	19.3	**	362	1.39	6.2	**	385	4.58
351	3.42	18.6	**	352	1.36	6.0	**	342	4.43
352	3.31	17.6	**	351	1.31	5.9	**	324	4.26
353/4	3.27	15.9	**	369	0.83	3.5	**	361	4.24
384	3.05	16.8	**	381	0.73	3.4	**	381	4.15
332	3.03	16.4	**	390	0.44	2.1	*	382	4.11
342	2.92	16.8	**	322	0.34	1.5		383	3.87
385	2.73	14.9	**	321	0.32	1.6		323	3.45
321	2.55	15.1	**	361	0.25	1.0		332	3.05
382	2.53	15.9	**	31	0.13	0.8		390	2.93
390	2.49	14.3	**	332	0.02	0.1		321	2.87
383	2.47	15.2	**	324	0.01	0.0		331	2.75
322	2.39	12.8	**	323	-0.07	-0.3		322	2.73
31	1.72	12.1	**	331	-0.89	-3.6	**	31	1.86

Table 7 cont'd

## Exports

b3 (for Yj)				b4 (for Yj/Bj)				b3 + b4		b5 (for Dji)			
ISIC	Coeff.	T-Test	Sign.	ISIC	Coeff.	T-Test	Sign.	ISIC	Coeff.	ISIC	Coeff.	T-Test	Sign.
323	2.18	11.9	**	324	1.93	8.2	**	323	3.98	31	-1.08	-8.8	**
353/4	2.16	11.1	**	323	1.80	8.2	**	324	3.69	382	-1.25	-12.4	**
371	1.99	11.7	**	322	1.77	9.1	**	322	3.35	383	-1.50	-11.1	**
372	1.90	11.1	**	332	1.41	7.0	**	331	2.93	385	-1.58	-9.4	**
361	1.80	9.8	**	331	1.26	5.9	**	361	2.81	321	-1.80	-9.7	**
324	1.76	9.0	**	390	1.05	6.2	**	332	2.81	381	-1.90	-12.4	**
331	1.67	9.3	**	361	1.02	4.6	**	372	2.46	351	-1.93	-11.5	**
322	1.57	9.7	**	362	0.79	4.1	**	390	2.35	352	-1.94	-12.3	**
369	1.47	8.9	**	342	0.73	4.3	**	353/4	2.16	390	-2.10	-9.9	**
351	1.42	12.6	**	356	0.66	4.2	**	362	2.05	384	-2.30	-12.7	**
332	1.41	8.4	**	321	0.64	4.3	**	342	1.97	356	-2.35	-12.1	**
321	1.31	10.6	**	372	0.57	2.8	**	321	1.95	342	-2.47	-11.7	**
390	1.30	9.2	**	385	0.49	3.7	**	356	1.91	323	-2.69	-9.8	**
355	1.28	8.7	**	355	0.42	2.4	*	371	1.83	322	-2.85	-11.7	**
362	1.26	7.8	**	341	0.37	2.1	*	369	1.82	355	-2.94	-13.4	**
356	1.26	9.7	**	31	0.36	3.6	**	355	1.70	362	-2.95	-12.2	**
384	1.25	10.4	**	381	0.34	2.8	**	385	1.70	372	-3.11	-12.1	**
342	1.23	8.7	**	369	0.34	1.7	*	384	1.49	361	-3.15	-11.5	**
385	1.20	10.7	**	383	0.25	2.3	*	341	1.46	341	-3.17	-14.7	**
341	1.09	7.5	**	384	0.24	1.6	*	351	1.37	369	-3.46	-14.0	**
352	1.07	10.2	**	382	0.13	1.6	*	381	1.32	332	-3.52	-14.0	**
383	1.05	11.6	**	352	0.10	0.8	*	383	1.30	331	-3.71	-13.8	**
381	0.98	9.7	**	353/4	0.00	0.0	*	31	1.24	371	-3.80	-14.8	**
382	0.95	14.2	**	351	-0.04	-0.3	*	352	1.17	324	-4.07	-13.9	**
31	0.88	10.7	**	371	-0.16	-0.8	*	382	1.08	353/4	-4.47	-15.3	**

## Imports

b3 (for Yj)				b4 (for Yj/Bj)				b3 + b4		b5 (for Dij)			
ISIC	Coeff.	T-Test	Sign.	ISIC	Coeff.	T-Test	Sign.	ISIC	Coeff.	ISIC	Coeff.	T-Test	Sign.
353/4	4.18	19.3	**	322	3.28	8.3	**	332	5.06	390	-0.76	-2.9	**
372	3.15	13.5	**	332	2.73	7.0	**	322	4.94	321	-0.89	-3.5	**
371	2.65	11.9	**	361	2.65	6.3	**	342	4.73	356	-1.07	-3.7	**
341	2.48	11.6	**	342	2.42	6.6	**	361	4.69	361	-1.11	-3.7	**
369	2.46	11.8	**	390	2.29	6.2	**	390	4.13	352	-1.11	-3.9	**
362	2.46	12.4	**	324	1.69	3.8	**	324	3.60	31	-1.11	-5.2	**
351	2.41	12.4	**	331	1.56	3.5	**	331	3.55	323	-1.24	-4.2	**
381	2.39	12.7	**	383	1.06	3.1	**	383	3.07	322	-1.35	-4.8	**
352	2.37	12.0	**	321	0.71	2.0	*	369	3.00	385	-1.38	-5.0	**
323	2.35	11.3	**	385	0.67	1.7	*	381	2.99	342	-1.40	-5.4	**
384	2.32	12.1	**	381	0.60	1.6	*	385	2.92	381	-1.46	-5.5	**
332	2.32	11.9	**	369	0.54	1.3	*	356	2.62	362	-1.48	-5.2	**
342	2.31	12.6	**	355	0.51	1.2	*	353/4	2.59	383	-1.53	-6.3	**
356	2.28	11.1	**	356	0.34	0.8	*	384	2.58	332	-1.55	-5.6	**
385	2.25	11.7	**	384	0.25	0.7	*	352	2.48	331	-1.58	-5.0	**
382	2.08	12.3	**	382	0.15	0.5	*	355	2.46	355	-1.58	-5.2	**
361	2.04	9.7	**	352	0.11	0.3	*	362	2.45	324	-1.63	-5.2	**
383	2.01	11.7	**	362	-0.01	-0.0	*	372	2.42	372	-1.74	-5.3	**
331	1.99	9.0	**	31	-0.26	-0.9	*	321	2.36	351	-1.75	-6.4	**
355	1.95	9.2	**	323	-0.29	-0.7	*	382	2.23	382	-1.77	-7.4	**
324	1.90	8.6	**	371	-0.53	-1.2	*	371	2.12	341	-1.79	-5.9	**
390	1.84	10.0	**	372	-0.73	-1.6	*	323	2.06	369	-1.84	-6.2	**
31	1.79	11.9	**	341	-0.78	-1.8	*	341	1.70	384	-2.16	-7.9	**
322	1.67	8.4	**	351	-1.33	-3.4	**	31	1.53	371	-2.55	-8.1	**
321	1.65	9.3	**	353/4	-1.59	-3.7	**	351	1.08	353/4	-4.65	-15.1	**

Table 8

Regression results for trade of West Germany with 69 countries (all variables)

			ln(Yj)	ln(Yj/Bj)	ln(Dji)	ADJL	EC	LAN	r squared	Constant	Degrees of Freedom
Exports											
000	All goods	X-Coefficients	0.80	0.15	-0.48	0.13	0.51	0.80	0.94	0.67	62
		Std Err of Coef.	0.05	0.06	0.10	0.34	0.27	0.52			
		T-Test	16.4	2.4	-4.8	0.4	1.9	1.6			
		Significance	**	*	**						
3	Manufactures	X-Coefficients	0.79	0.17	-0.47	0.11	0.56	0.84	0.94	0.48	62
		Std Err of Coef.	0.05	0.06	0.10	0.34	0.28	0.52			
		T-Test	16.1	2.7	-4.7	0.3	2.0	1.6			
		Significance	**	**	**		*				
001	High-tech	X-Coefficients	0.85	0.22	-0.32	0.05	0.82	1.12	0.91	-3.49	62
		Std Err of Coef.	0.06	0.08	0.13	0.46	0.37	0.69			
		T-Test	13.0	2.7	-2.4	0.1	2.2	1.6			
		Significance	**	**	*		*				
002	Medium-tech	X-Coefficients	0.82	0.14	-0.40	0.15	0.50	0.76	0.94	-0.77	62
		Std Err of Coef.	0.05	0.06	0.10	0.34	0.27	0.51			
		T-Test	16.9	2.4	-4.0	0.4	1.8	1.5			
		Significance	**	*	**						
003	Low-tech	X-Coefficients	0.68	0.20	-0.74	0.05	0.46	0.79	0.93	2.00	62
		Std Err of Coef.	0.06	0.07	0.11	0.39	0.31	0.58			
		T-Test	12.34	3.00	-6.54	0.13	1.47	1.34			
		Significance	**	**	**						
Imports											
			ln(Yi)	ln(Yi/Bi)	ln(Dij)	ADJL	EC	LAN	r squared	Constant	Degrees of Freedom
000	All goods	X-Coefficients	0.76	0.11	-0.30	0.45	0.65	0.59	0.85	-0.07	62
		Std Err of Coef.	0.07	0.09	0.15	0.50	0.40	0.76			
		T-Test	10.5	1.3	-2.1	0.9	1.6	0.8			
		Significance	**		*						
3	Manufactures	X-Coefficients	0.89	0.17	-0.20	0.44	1.29	1.31	0.77	-3.67	62
		Std Err of Coef.	0.12	0.14	0.24	0.81	0.65	1.22			
		T-Test	7.7	1.2	-0.8	0.5	2.0	1.1			
		Significance	**				*				
001	High-tech	X-Coefficients	1.24	0.66	-0.08	-0.09	2.05	2.52	0.74	-15.64	62
		Std Err of Coef.	0.20	0.24	0.41	1.39	1.11	2.09			
		T-Test	6.2	2.7	-0.2	-0.1	1.8	1.2			
		Significance	**	**							
002	Medium-tech	X-Coefficients	0.97	0.39	-0.23	0.81	1.45	1.62	0.68	-8.18	62
		Std Err of Coef.	0.18	0.22	0.37	1.26	1.01	1.90			
		T-Test	5.4	1.8	-0.6	0.6	1.4	0.9			
		Significance	**								
003	Low-tech	X-Coefficients	0.86	0.08	-0.36	0.35	1.10	0.86	0.69	-2.13	62
		Std Err of Coef.	0.13	0.16	0.27	0.93	0.75	1.40			
		T-Test	6.5	0.5	-1.3	0.4	1.5	0.6			
		Significance	**								

Note: \*\* indicates significance at 99% level, \* indicates significance at 95% level.

Source: Own calculations, for methodology and data see text.

Table 9

Regression results for trade of West Germany with 69 countries (3 variables)

			ln(Yj)	ln(Yj/Bj)	ln(Dji)	r squared	Constant	Degrees of Freedom
Exports								
000	All goods	X-Coefficients	0.81	0.17	-0.65	0.93	1.83	65
		Std Err of Coef.	0.05	0.06	0.07			
		T-Test	16.5	2.7	-9.2			
		Significance	**	**	**			
3	Manufactures	X-Coefficients	0.80	0.18	-0.65	0.93	1.69	65
		Std Err of Coef.	0.05	0.06	0.07			
		T-Test	16.2	3.0	-9.1			
		Significance	**	**	**			
001	High-tech	X-Coefficients	0.86	0.24	-0.55	0.90	-1.89	65
		Std Err of Coef.	0.07	0.08	0.09			
		T-Test	13.1	3.0	-5.9			
		Significance	**	**	**			
002	Medium-tech	X-Coefficients	0.83	0.16	-0.57	0.93	0.37	65
		Std Err of Coef.	0.05	0.06	0.07			
		T-Test	17.0	2.7	-8.1			
		Significance	**	**	**			
003	Low-tech	X-Coefficients	0.69	0.22	-0.88	0.92	2.98	65
		Std Err of Coef.	0.05	0.07	0.08			
		T-Test	12.6	3.3	-11.3			
		Significance	**	**	**			
Imports								
			ln(Yi)	ln(Yi/Bi)	ln(Dij)	r squared	Constant	Degrees of Freedom
000	All goods	X-Coefficients	0.77	-0.13	-0.54	0.84	1.59	65
		Std Err of Coef.	0.07	0.09	0.10			
		T-Test	10.7	1.5	-5.3			
		Significance	**		**			
3	Manufactures	X-Coefficients	0.93	0.21	-0.61	0.75	-0.89	65
		Std Err of Coef.	0.12	0.14	0.17			
		T-Test	7.9	1.4	-3.6			
		Significance	**		**			
001	High-tech	X-Coefficients	1.29	0.71	-0.61	0.72	-11.99	65
		Std Err of Coef.	0.20	0.24	0.28			
		T-Test	6.5	2.9	-2.2			
		Significance	**	**	*			
002	Medium-tech	X-Coefficients	1.01	0.44	-0.74	0.66	-4.63	65
		Std Err of Coef.	0.18	0.22	0.26			
		T-Test	5.6	2.0	-2.9			
		Significance	**	*	**			
003	Low-tech	X-Coefficients	0.89	0.11	-0.69	0.68	0.12	65
		Std Err of Coef.	0.13	0.16	0.19			
		T-Test	6.80	0.69	-3.66			
		Significance	**		**			
Note: ** indicates significance at 99% level, * indicates significance at 95% level.								
Source: Own calculations, for methodology and data see text.								

Table 10

Ranking of three-digit ISIC industries according to the value of the regression coefficients  
- trade of West Germany with 69 countries, 3 variables -

## Exports

b3 (for Yj)				b4 (for Yj/Bj)				b3 + b4		b5 (for Dij)			
ISIC	Coeff.	T-Test	Sign.	ISIC	Coeff.	T-Test	Sign.	ISIC	Coeff.	ISIC	Coeff.	T-Test	Sign.
371	0.92	11.9	**	322	0.96	6.0	**	332	1.57	385	-0.45	-5.0	**
372	0.91	11.8	**	324	0.82	5.0	**	323	1.57	390	-0.46	-3.8	**
383	0.87	11.5	**	332	0.73	4.7	**	324	1.54	352	-0.49	-6.4	**
382	0.87	15.0	**	323	0.72	3.8	**	322	1.49	351	-0.53	-6.5	**
385	0.85	13.5	**	390	0.61	5.8	**	361	1.40	361	-0.54	-4.6	**
342	0.85	10.0	**	331	0.58	4.4	**	331	1.35	382	-0.55	-6.6	**
332	0.85	6.8	**	361	0.56	5.4	**	342	1.24	383	-0.59	-5.5	**
323	0.84	5.4	**	356	0.47	5.7	**	362	1.21	384	-0.67	-6.7	**
361	0.84	10.1	**	321	0.40	2.9	**	390	1.21	369	-0.67	-6.6	**
351	0.84	14.5	**	362	0.39	5.3	**	372	1.20	362	-0.68	-7.9	**
362	0.82	13.5	**	342	0.39	3.7	**	356	1.17	323	-0.72	-3.2	**
384	0.81	11.7	**	341	0.32	3.6	**	385	1.17	381	-0.78	-8.7	**
369	0.79	11.0	**	385	0.32	4.1	**	384	1.12	372	-0.80	-7.3	**
355	0.77	11.3	**	381	0.31	3.9	**	383	1.09	355	-0.86	-8.8	**
331	0.77	7.3	**	384	0.30	3.5	**	355	1.06	341	-0.86	-8.3	**
352	0.75	14.2	**	372	0.30	3.1	**	341	1.06	356	-0.88	-9.3	**
341	0.74	10.1	**	355	0.28	3.3	**	321	1.03	342	-0.93	-7.7	**
381	0.72	11.3	**	352	0.22	3.4	**	381	1.02	371	-0.95	-8.6	**
324	0.71	5.4	**	383	0.22	2.4	*	382	0.98	31	-0.98	-9.2	**
356	0.71	10.7	**	31	0.19	2.1	*	352	0.98	324	-1.02	-5.4	**
31	0.66	8.8	**	353/4	0.12	1.0		369	0.90	321	-1.02	-6.4	**
321	0.63	5.6	**	369	0.12	1.3		351	0.87	353/4	-1.02	-6.9	**
353/4	0.61	5.9	**	382	0.11	1.6		31	0.85	332	-1.04	-5.9	**
390	0.60	7.1	**	351	0.03	0.4		371	0.79	331	-1.25	-8.3	**
322	0.52	4.0	**	371	-0.13	-1.3		353/4	0.73	322	-1.35	-7.2	**

## Imports

b1 (for Yi)				b2 (for Yi/Bi)				b1 + b2		b5 (for Dij)			
ISIC	Coeff.	T-Test	Sign.	ISIC	Coeff.	T-Test	Sign.	ISIC	Coeff.	ISIC	Coeff.	T-Test	Sign.
361	4.38	5.2	**	356	2.04	2.0	*	362	5.18	323	0.71	0.7	
371	4.33	5.0	**	351	1.89	2.5	*	356	5.02	355	0.25	0.2	
362	4.20	5.0	**	355	1.72	1.6		355	5.01	390	-0.02	-0.0	
353/4	4.12	4.2	**	324	1.22	1.2		341	4.95	324	-0.03	-0.0	
341	3.84	5.2	**	341	1.11	1.2		353/4	4.76	361	-0.11	-0.1	
369	3.62	4.8	**	362	0.99	1.0		324	4.53	356	-0.17	-0.1	
324	3.30	3.9	**	385	0.84	3.8	**	371	3.79	332	-0.38	-0.4	
355	3.29	3.7	**	323	0.77	0.9		361	3.76	352	-0.39	-0.6	
331	3.18	3.8	**	382	0.77	4.1	**	351	3.72	321	-0.44	-0.7	
356	2.97	3.7	**	383	0.74	2.7	**	369	3.51	351	-0.46	-0.5	
372	2.89	3.4	**	381	0.73	1.7		372	2.95	31	-0.52	-0.9	
384	2.54	6.1	**	353/4	0.64	0.5		323	2.90	385	-0.54	-2.1	*
323	2.13	2.9	**	342	0.62	1.5		384	2.72	322	-0.60	-1.2	
351	1.83	3.0	**	352	0.34	0.6		381	2.35	362	-0.67	-0.6	
352	1.76	3.5	**	332	0.22	0.3		342	2.12	383	-0.73	-2.3	*
332	1.72	2.8	**	321	0.21	0.4		352	2.10	382	-0.75	-3.4	**
390	1.69	3.3	**	390	0.18	0.3		383	2.08	341	-0.86	-0.8	
381	1.62	4.5	**	384	0.18	0.3		382	2.05	372	-0.92	-0.8	
342	1.50	4.6	**	322	0.07	0.2		385	1.99	381	-0.92	-1.8	
321	1.42	3.3	**	372	0.07	0.1		332	1.94	342	-0.98	-2.1	*
383	1.33	6.0	**	369	-0.11	-0.1		390	1.88	384	-1.15	-1.9	
31	1.31	3.1	**	31	-0.12	-0.2		331	1.77	331	-1.28	-1.1	
382	1.28	8.4	**	371	-0.53	-0.5		321	1.63	369	-1.31	-1.2	
385	1.15	6.4	**	361	-0.62	-0.6		31	1.19	371	-1.91	-1.6	
322	1.09	3.2	**	331	-1.41	-1.3		322	1.16	353/4	-4.56	-3.3	**

**Table 11**

**Basic data of CEECs**

	Poland	CSFR	Hungary	Romania	Bulgaria	Russia
GNP per capita (US-\$)						
1988 CIA	7270	10140	8660	5490	7510	10984
1988 CSFB <sup>1)</sup>	2000	3500	3000	1000	1500	2065
1989 World Bank	1890	3450	2630	1730	2780	
1992 World Bank	1910	2280	2970	1130	1330	2510
GNP (US-\$ billion)	73.3	35.6	30.6	11.3	25.7	374.0
Population 1992 (millions)	38.7	15.6	10.3	22.7	8.5	149
Distance (miles) <sup>2)</sup> between capital and						
- Frankfurt a.M.	539	222	474	868	899	1226
- Berlin	343	212	434	830	858	1019

<sup>1)</sup> Credit Swiss First Boston.- <sup>2)</sup> Calculated as the shortest geographical distance between the relevant towns according to their degrees of latitude and longitude.  
*Sources:* World Bank, World Tables 1994, Washington (D.C.) 1994; World Bank, World Development Report, various issues; Lösch and Wohlers (1994): 151; Wang and Winters (1991): 45; own calculations.

Table 12

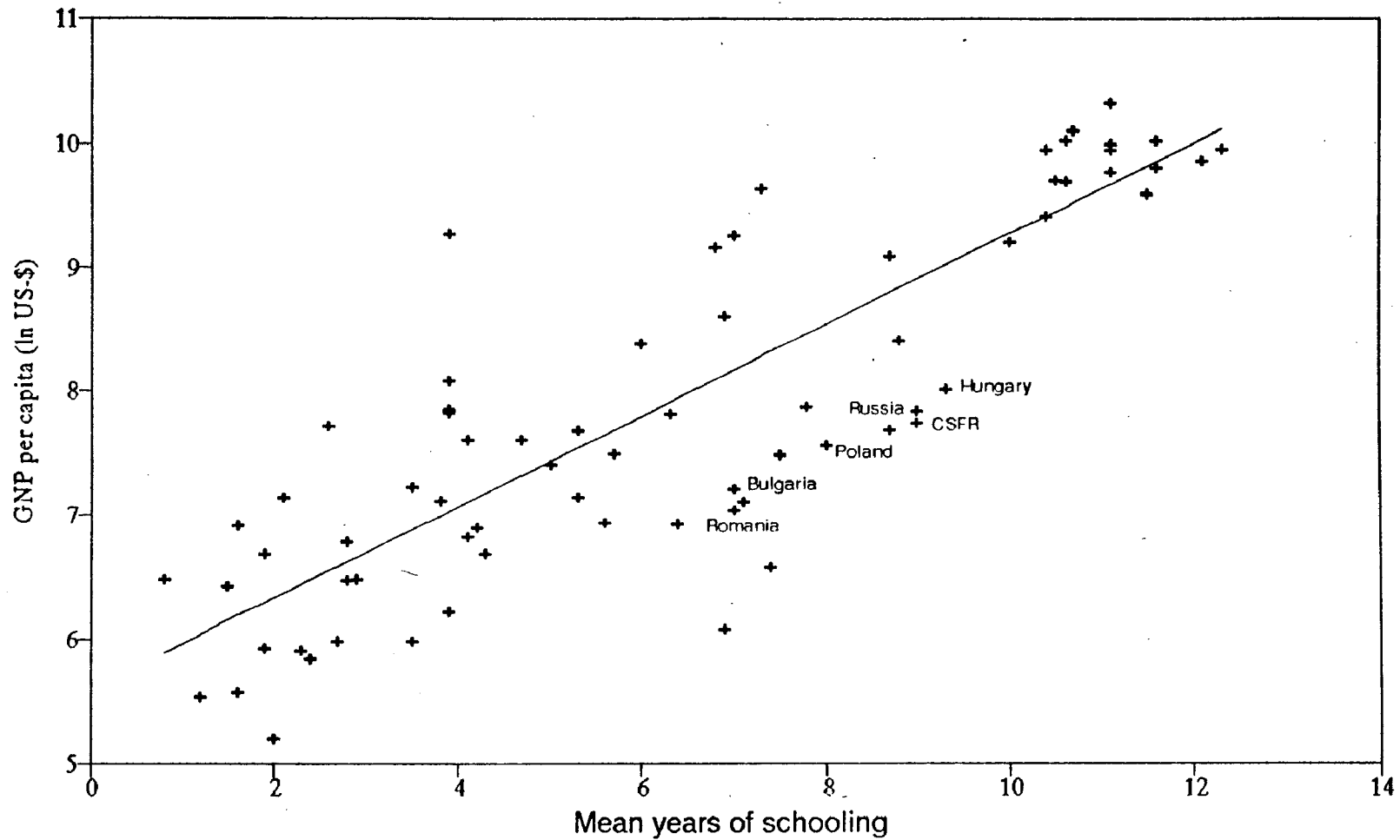
## Estimated values of German exports and imports in trade with CEECs (in US-\$ billion)

	Poland	CSFR	Hungary	Romania	Bulgaria	5 countries total	Russia
Exports							
Based on regression results for Germany							
I GNP in CEECs 1992, West Germany 1989	3.3	3.4	1.9	0.9	0.5	10.0	7.6
Ia GNP in CEECs 1992, German trade level 1992	4.1	4.2	2.4	1.2	0.6	12.5	9.6
II GNP in CEECs 3 times 1992, German trade level 1992	12.2	12.4	7.0	3.4	1.8	36.8	28.1
III additionally Berlin instead of Frankfurt a.M.	16.3	12.8	7.4	3.5	1.9	41.9	31.7
Based on regression results for OECD countries							
I GNP in CEECs 1992, West Germany 1989	3.4	4.4	2.1	0.9	0.5	11.3	6.3
Ib GNP in CEECs 1992, Germany 1992	6.0	7.6	3.6	1.5	0.8	19.5	11.0
II GNP in CEECs 3 times 1992, Germany 1992	17.1	21.8	10.4	4.4	2.4	56.1	31.5
III additionally Berlin instead of Frankfurt a.M.	25.5	22.8	11.2	4.5	2.5	66.5	37.1
Imports							
Based on regression results for Germany							
I GNP in CEECs 1992, West Germany 1989	2.6	2.4	1.5	0.8	0.4	7.7	6.0
Ia GNP in CEECs 1992, German trade level 1992	3.9	3.7	2.2	1.2	0.7	11.7	9.1
II GNP in CEECs 3 times 1992, German trade level 1992	10.5	10.0	6.1	3.3	1.8	31.7	24.6
III additionally Berlin instead of Frankfurt a.M.	13.4	10.2	6.4	3.4	1.9	35.3	27.3
Based on regression results for OECD countries							
I GNP in CEECs 1992, West Germany 1989	3.8	4.2	1.9	0.8	0.4	11.1	9.7
Ib GNP in CEECs 1992, Germany 1992	6.5	7.2	3.3	1.3	0.6	18.9	16.8
II GNP in CEECs 3 times 1992, Germany 1992	23.8	26.4	12.1	4.8	2.2	69.3	61.4
III additionally Berlin instead of Frankfurt a.M.	35.7	27.6	13.0	5.0	2.3	83.6	72.5
<i>Source: Own calculations based on the regressions with the reduced number of variables.</i>							



Figure 1

Correlation of per capita income and human capital 1)



1) Based on ln GNP per capita 1989 and mean years of schooling 1990 in 66 Western industrialised countries and developing countries (R squared = 0.75). The GNP figures for CEECs refer to 1992.

Source: Own calculations based on data from the World Bank and UNDP.