THE IMPACT OF REGIONALISM ON TRADE IN EUROPE *

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Abstract. Using the classical gravity model we try to reach a more systematic view than previously in the literature of the impact of regionalism on the intensity of mutual integration through trade in Europe. We find that European trade is significantly influenced by various regional agreements and intensities of trade are strongly asymmetric between the regions. EMU has a positive impact on bilateral trade intensity, and its effect on total European trade of its member countries is also significantly positive. Both between the EU and CEE countries there are, respectively, significant differences with respect to the intensity in this trade.

Key words. Trade, EU, EMU, CEE, gravity model

JEL code. F10, F15

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1. Introduction

Europe is covered by a range of regional economic agreements, which have an impact on trade barriers and mutual integration through trade. There is the EU internal market, EMU with a single currency, the EEA (European Economic Area) establishing free trade relations between the EU and EFTA countries, and the Europe Agreements covering EU-CEE economic relations. There are also countries outside these agreements, of which Russia is the biggest.[1] The basic characteristic of these agreements is that the EU is in the centre of this regionalism while other countries form the periphery. In other words, there is a hub-and-spoke system of trade agreements, an apt term introduced by Baldwin (1994). The situation is as depicted by Figure 1.

The aim of this paper is to analyse in a systematic way the impact of these various regional economic agreements in Europe on the intensity of trade between the European countries. To that end, we use data on mutual trade flows in 1999, the first year of EMU. The fact that EMU is a subset of the EU has to be taken into account in the interpretation of the results of the estimations, but it does not change the basic formulation of the model, where we separate both the EU and EMU into two individual regions.

There has recently been an intense debate on the effects of a currency union on trade, following the spectacular result by Rose (2000) that a currency union expands, ceteris paribus, bilateral trade by as much as 235 per cent. This was challenged by Persson (2001), who, through a careful and extensive analysis of this 'treatment' effect, con-

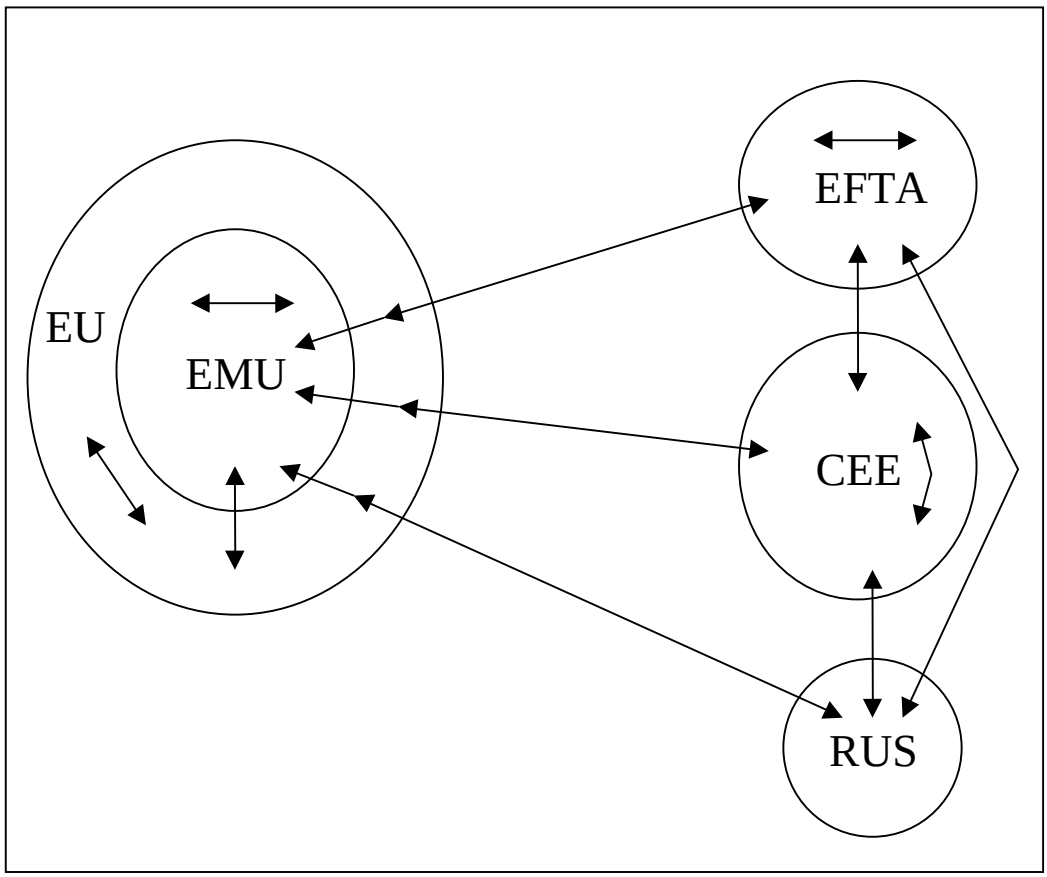
[1] There are also a number of smaller regional trade agreements by non-EU countries in Europe. See Sapir (2001a) for a complete listing of them.

cluded that the impact of a currency union on mutual trade is much lower, varying between 15 and 65 per cent. This estimate, however, is not statistically significantly different from zero. Rose (2001) responded again, sticking to his original estimate. Flandreau and Maurel (2001) extended the analysis by providing an explanation behind the large impact of a monetary union on trade. Rose and van Wincoop (2001) applied the estimate of the impact of a currency union on bilateral trade in their examination of the impact of potential currency unions, using the concept of aggregate trade resistance (generalised barrier) suggested by Anderson and van Wincoop (2001). For EMU 11, Rose and van Wincoop (2001) found that the currency union increases trade within the region by 58 per cent.

Here we employ a standard gravity model to consider the same question. Our results with respect to EMU are similar to those of Rose and van Wincoop (2001): the trade intensity prevailing within the Euro Area is some 50 per cent higher than that prevailing within the EU single market, and this difference is statistically significant. A more relevant issue, however, from a policy point of view, may be the effect of a currency union on total, not just bilateral, trade of its member countries, as there may be both trade creation and trade diversion connected to a currency union. Examining this wider context, then, we find that EMU has a positive impact on total trade in the region. To obtain more empirical evidence on this, we also estimate the model using data from 1995. In this pre-EMU situation the intensity of mutual trade between the EMU countries was also higher than that in the internal market, which suggests a smaller impact of EMU on mutual trade than that revealed by the 1999 data as such.

The gravity model has become the standard workhorse in empirical trade analysis. Here our aim is to utilise it in a more systematic way than has been the case in the past to determine the impact of European regionalism on trade. Earlier similar analyses on trade in connection with European integration have been carried out by, e.g., Baldwin (1994) and Sapir (2001b). In contrast to the models used in the earlier literature, our model allows for asymmetry in trade intensities and respective trade barriers between the regions, i.e., they may be different in exports and imports between the regions. Empirically, we also find that this asymmetry is a very essential factor characterising European trade.

Figure 1. The main regional blocs and bilateral trade flows in Europe since EMU



The paper is organised as follows. In Section 2 we outline the basic gravity model and present estimation results for a model without the regional dummy matrices representing the regional agreements. In that section, we also report the estimation results of the full model, and discuss the regional impacts and the results of statistical tests on them. In Section 3 we extend the basic model to take into account the eastern enlargement of the EU to include the CEE countries, and disaggregate trade between the EU and the CEECs into country-wise impacts, from the point of view of either the EU or the CEE countries. We again test for asymmetry and find significant differences in the intensities of this trade by country. Section 4 concludes.

2. The basic model and its extension to include regional impacts

As already mentioned, we distinguish the following regional economic agreements in Europe: the EU with its internal market, EMU with a single currency, Europe Agreements between the EU and the CEE countries, the free trade agreement between the EFTA countries and the EU, and the Partnership and Cooperation Agreement between Russia and the EU. So, we have altogether five trading areas covering 27 European countries and 20 bi-regional trading relations, for exports and imports, between these countries belonging to the above five regional economic agreements. In addition, we have internal, within-bloc impacts for four trading blocs (excluding, of course, Russia). We define the concept of trade intensity as the ratio of exports from region i to region j to the average trade intensity within the internal market of the EU, controlling for the impact of differences in other factors explaining trade between i and j, on the one hand, and the average situation within the EU single market, on the other. So, we

estimate a total of 23 pairwise regional intensities relative to that prevailing within the EU internal market. This means that an essential element in the paper is that we allow for asymmetry in trade barriers in exports from region i to j and in exports from j to i, and test for their existence.

The basic model is the following gravity equation, which allows a role for both standard explanatory variables and regional dummies for all the regional agreements in Europe:

$$\log(X_{ij}) = C + \beta_1 \log Y_j + \beta_2 \log Y_i + \beta_3 \log DIST_{ij} + \beta_4 \log A_j + \beta_5 \log A_i + \beta_6 \log POP_j + \beta_7 \log POP_i + \beta_7 BOR_{ij} + \beta_8 ISL_j + \beta_9 ISL_i + \sum_{k,m=1}^{5} \beta_{km} D_{km}(i,j), \quad (1)$$

where X_{ij} is the value of exports from country i to j, and the subscript i denotes the exporting country and j the importing country. The explanatory variables used are GDP at current prices of the exporting and importing countries, denoted by Y_i and Y_j, the distance between the regions, DIST, measured by the road distance between the capitals of the respective countries, the area of the region, denoted by A_i and A_j, the size of population, POP_i and POP_j, the dummy variable BOR denoting whether the countries i and j have a common border (unity) or not (zero), and the dummy ISL denoting whether the country is an island or not. The rest of the model consists of the above mentioned regional integration indicators, i.e., $D_{km}(i,j)$ denotes the regional dummy variables for exports from country group k to country group m, and is unity if the exporting country i belongs to region k and the importing country j belongs to region m, and zero otherwise. All variables except the dummies are expressed in logarithms.

We estimate the model for a single year, 1999, the first year after the advent of EMU. All the estimations were carried out using SUR. First, let us look at the estimation results of the basic gravity model (1) without regional impacts, which are presented in Table 1.

Table 1. Regression results of the basic gravity model without regional integration indicators

Variable	Coefficient	t-value
Constant	-6.511	-19.459
Y_j	0.762	44.6235
Y_i	0.914	47.702
$DIST_{ij}$	-1.204	-67.604
A_j	-0.010	-0.762
A_i	0.144	6.628
POP_j	0.086	3.147
POP_i	-0.116	-3.458
BOR_{ij}	0.431	17.222
ISL_j	-0.038	-0.840
ISL_i	0.164	2.687
R_C^2	0.868	

* All explanatory variables are in logs, except the border and island variables, which are 0-1 dummy variables.

The estimation results are quite straightforward, with almost all of the coefficients being statistically highly significant and of the plausible sign, as is the normal case in empirical work using gravity models. The gravity model explains a much higher share of the total variation in European trade than it does that of global trade. Here the R-square is over 85 per cent while in the annual estimations for global trade by Rose (2000) it was around two thirds.

Let us now turn to the estimation of the full model with regional dummies. The F-statistic expressing their importance as a group in the model receives the value 46.87, and is highly significant, the probability being much less than 0.1 per cent. So we get our first plausible result:

Outcome 1. The various regional economic agreements in Europe, as a whole, have a significant impact on European trade.

Let us then turn to study the coefficients of the individual regional integration dummies. Their interpretation is straightforward; the partial impact of variable D_{km} with an estimated coefficient of b_{km}, as a per cent deviation from the intensity prevailing in the EU single market, is equal to $100(e^{b_{km}} - 1)$. Determining the impact of EMU requires elaboration. The total effect of EMU on trade consists of its direct effect and the indirect effect related to the simultaneous EU membership. So, we have,

$$b_{EMU,m}(\text{total}) = b_{EMU,m} + b_{EU,m} \text{ and} \qquad (2)$$

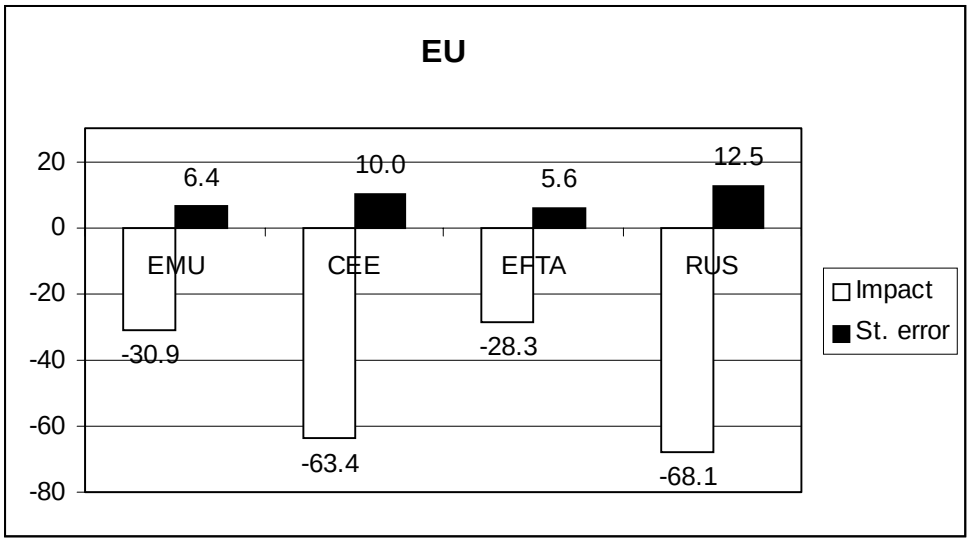
$$b_{m,EMU}(\text{total}) = b_{m,EMU} + b_{m,EU},$$

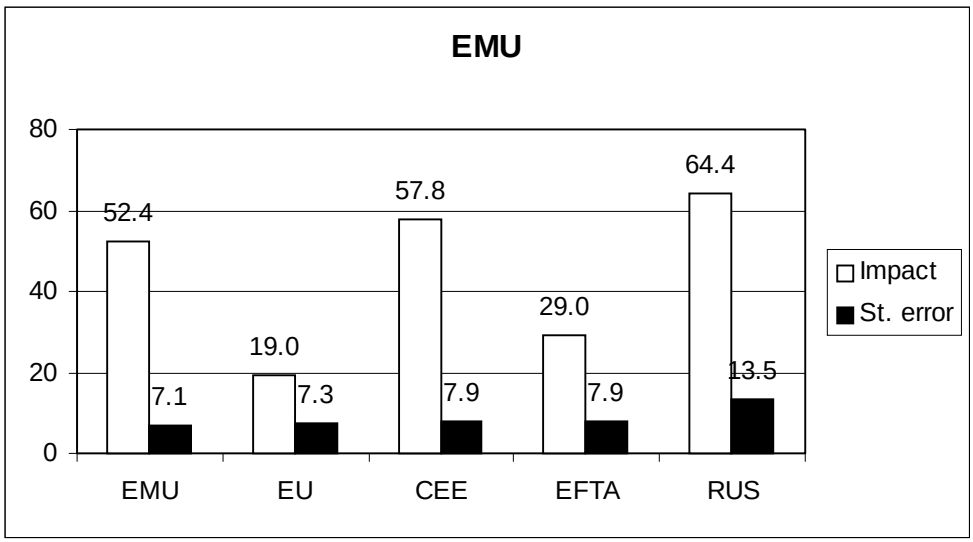
for m = CEE, EFTA and Russia. The standard error of the total coefficient has to be calculated separately using this definition of the combined effect.[2]

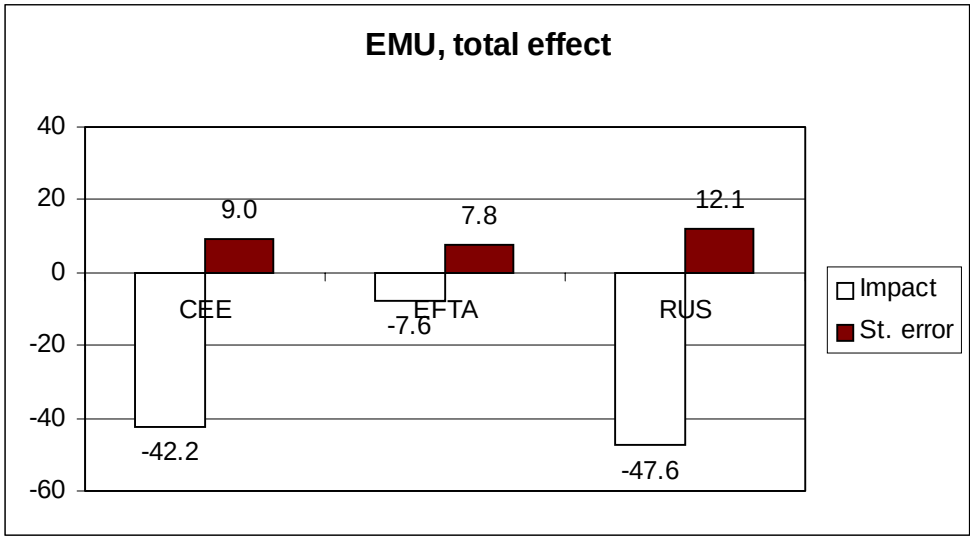
For purposes of illustration, we present the impacts of regional agreements in Europe in graphical form; see Figure 2. In each of the figures below, the title refers to the exporting region, while the respective importing regions are denoted on the horizontal axis.

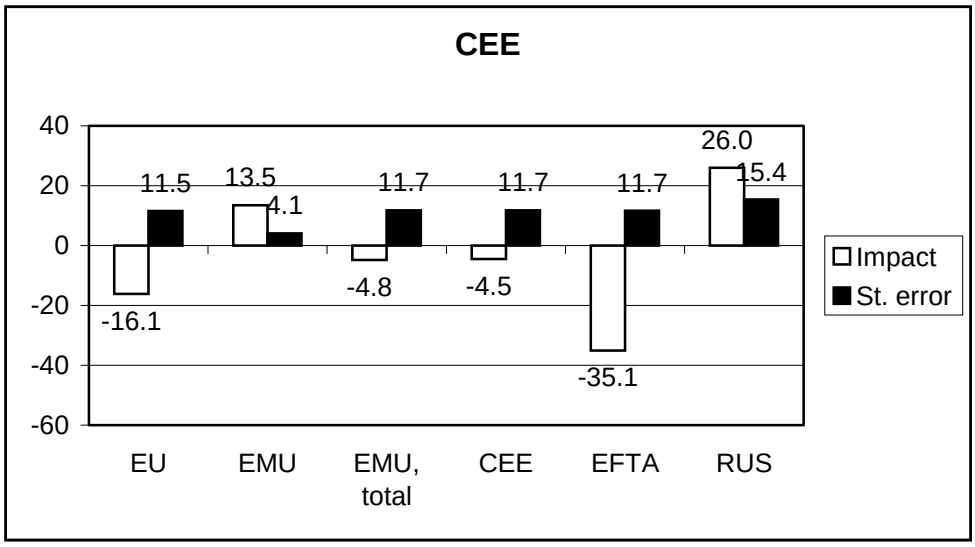
[2] This was estimated with the aid of the Wald test on a constraint imposed on the sum of the two coefficients. If W is the value of the χ^2 -statistic that the total effect b(tot) of EMU is zero, we can solve for the standard error s of the total estimate b(tot) from the definition of W, which gives $s^2 = (b_{tot})^2/W$.

Figure 2. **The effects of regional economic agreements on exports from the title region to the respective destination regions, percentage deviations from the intensity prevailing on average in the EU internal market ***






EMU, total effect
40
20
0
-20
-40
-60
9.0
7.8
12.1
CEE
EFTA
RUS
-7.6
-42.2
-47.6
Impact
St. error


CEE
40
20
0
-20
-40
-60
11.5
13.5
4.1
11.7
11.7
11.7
26.0
15.4
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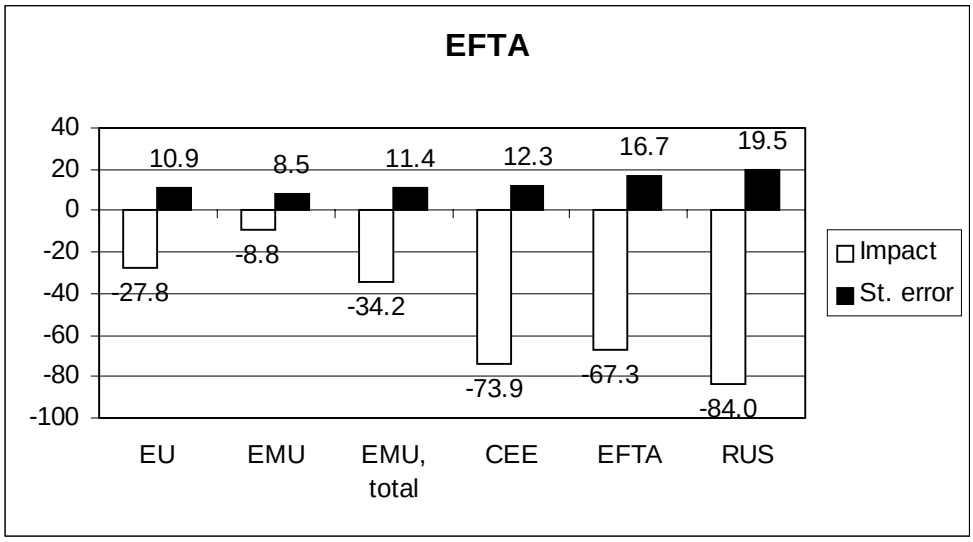
-4.8
-4.5
-35.1
EU
EMU
EMU, total
CEE
EFTA
RUS
Impact
St. error


EFTA
40
20
0
-20
-40
-60
-80
-100
10.9
8.5
11.4
12.3
16.7
19.5
-27.8
-8.8
-34.2
-73.9
-67.3
-84.0
EU
EMU
EMU, total
CEE
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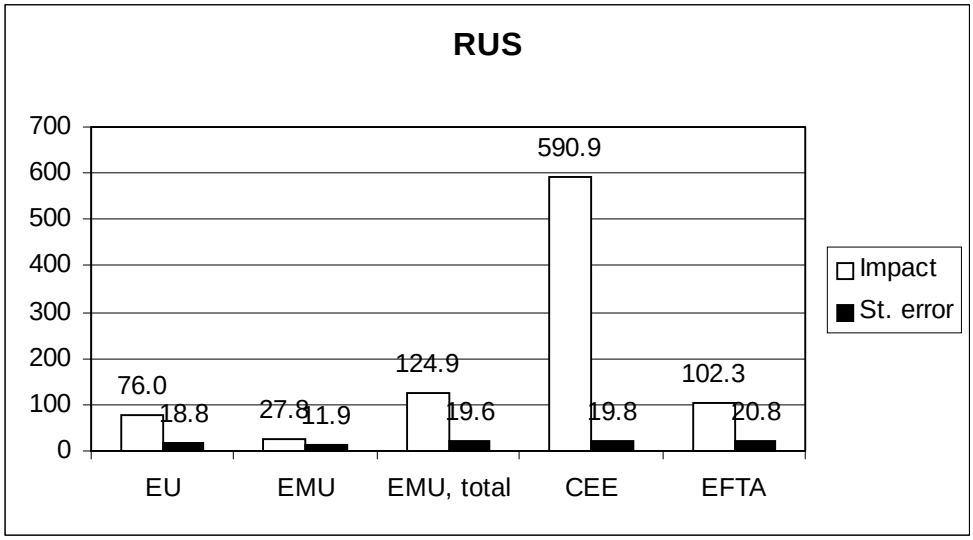
Impact
St. error



* The standard errors are the original ones multiplied by one hundred.

It is noteworthy that the EU experiences a drawback, which can be characterised as trade diversion, in all of its trade in Europe, except in imports from Russia, as all the respective intensities are below that within the EU single market. In contrast, the EMU has a higher trade intensity with all regions than that prevailing within the single market on average. The trade creating effect of EMU is clear, because the intensity is as much as 50 per cent higher among the EMU member countries than within the single market.

The effect of EMU on the total trade of its member countries is estimated by calculating the weighted sum of the above impact coefficients, using the respective export and import shares of the EMU countries as weights. The effect on total trade of the EMU countries, again as compared to the average intensity prevailing within the EU countries, is somewhat smaller than the bilateral impact, and is 44.7 per cent (t-

statistic for this weighted coefficient is 9.44) in total exports and 29.0 per cent (t-statistic is 6.61) in total imports.[3] [4] So, we have

Outcome 2. The total impact of EMU is positive on the bilateral and total European trade of its member countries, but smaller than its impact on mutual trade.

We shed some more light on this issue after commenting on the rest of the impact coefficients in Figure 2.

In terms of their exports, the CEE countries are in a slightly negative, or roughly neutral position, not differing statistically very much from zero, but the EFTA countries are clearly on the negative side throughout. The biggest positive intensity is in exports from Russia to the CEE countries. This can be explained by the fact that Russia exports a lot of its oil via the Baltic countries and that it also has at least something left of its old trading relations with the Eastern European countries. It may also be so that the definition of the distance variable for a large country, like Russia, is problematic.

Table 2 shows the results of tests for symmetry of the bilateral trade intensities, caused in part by trade barriers. As can be seen, in the majority of the cases the hypothesis of symmetry is clearly rejected. Also the joint test of equality of all the pairwise trade barriers is rejected by a wide margin. So we reach the outcome,

Outcome 3. The trade intensities in Europe are not symmetric.

[3] For calculation of the relevant standard error, see Footnote 2 above.

Table 2. Testing for symmetry of the trade intensities

Trade barriers between regions (1) and (2)	χ^2-test on the equality of the intensities
EU / EMU	43.64***
EU / CEE	41.27***
EU/EFTA	0.00
EU/RUS	59.14***
EMU/CEE	13.39***
EMU/EFTA	9.04**
EMU/RUS	1.99
CEE/EFTA	34.81***
CEE/RUS	80.10***
EFTA/RUS	80.19***
All intensities symmetric, F-test	19.24***

** $p < 0.01$, *** $p < 0.001$

Let us still return to the effect of EMU. It would not be correct to identify the above result of forming the currency union as its impact on trade, as it may also be an indication that countries that trade intensively with each other are also more prone to form a currency union and find it as a project with a small risk of asymmetric shocks. If the selection of the EMU countries in the union's initial stage in 1999 also depended on

[4] Frankel and Rose (2002), in their global trade analysis, also reached the result that belonging to a

the magnitude of their mutual trade, we would have a case of sample selection bias in our estimation. It may, however, be too far-reaching to make such a claim, as this decision is likely to have been settled more on political, non-economic grounds. If this is the case, then we should not worry about inconsistency of the above estimates. In order to shed more light on this issue, we also estimated the model with data from 1995, before EMU. The EMU dummy now receives a coefficient which is clearly lower than that estimated with the 1999 data, although remains positive; see Figure 3. Accordingly, the EMU countries had earlier, for some reason, an already high intensity of mutual trade, which dampens the impact of creation of EMU on trade as such. Comparing the regression results using 1995 data to those using 1999 data suggests then that the marginal impact of EMU on mutual trade is at most of the order of 20 per cent.

As above, we also calculated the impact of belonging to the EMU region on the total trade of its future member countries in 1995. Now, this effect is 20.5 per cent in EMU exports (the t-statistic being 4.7) and 13 per cent in imports (t-statistic 3.5). So, again, the total impact is smaller than that on mutual trade, but in both total imports and exports the trade intensity between EMU countries has risen markedly during the period from 1995 to 1999.

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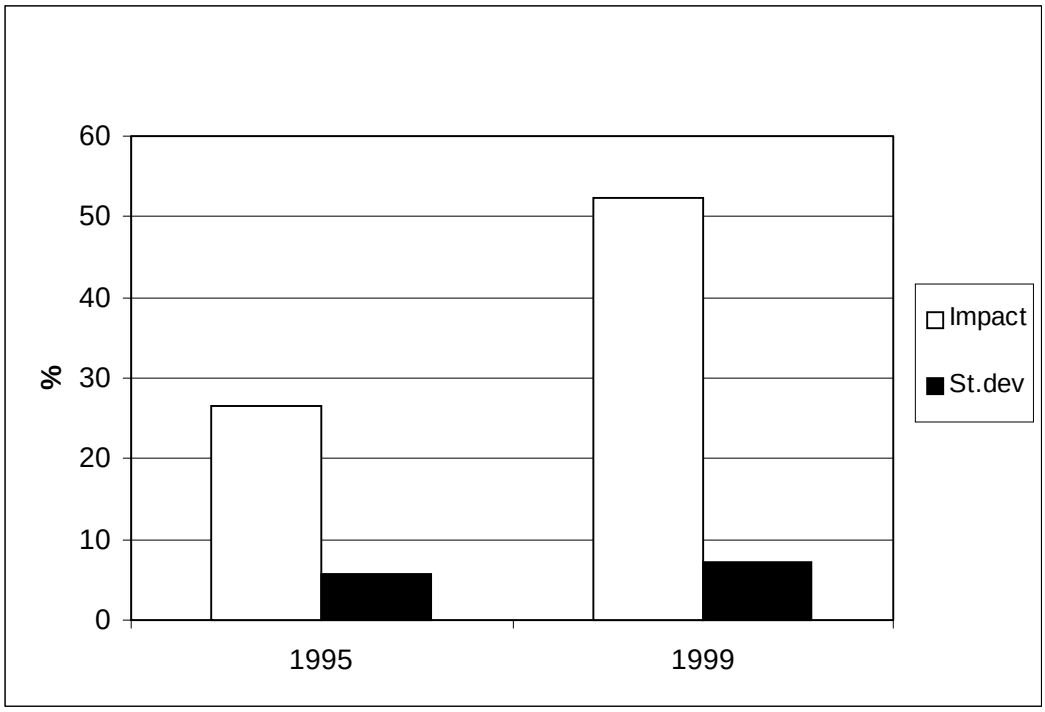
currency union points toward trade creation rather than trade diversion.

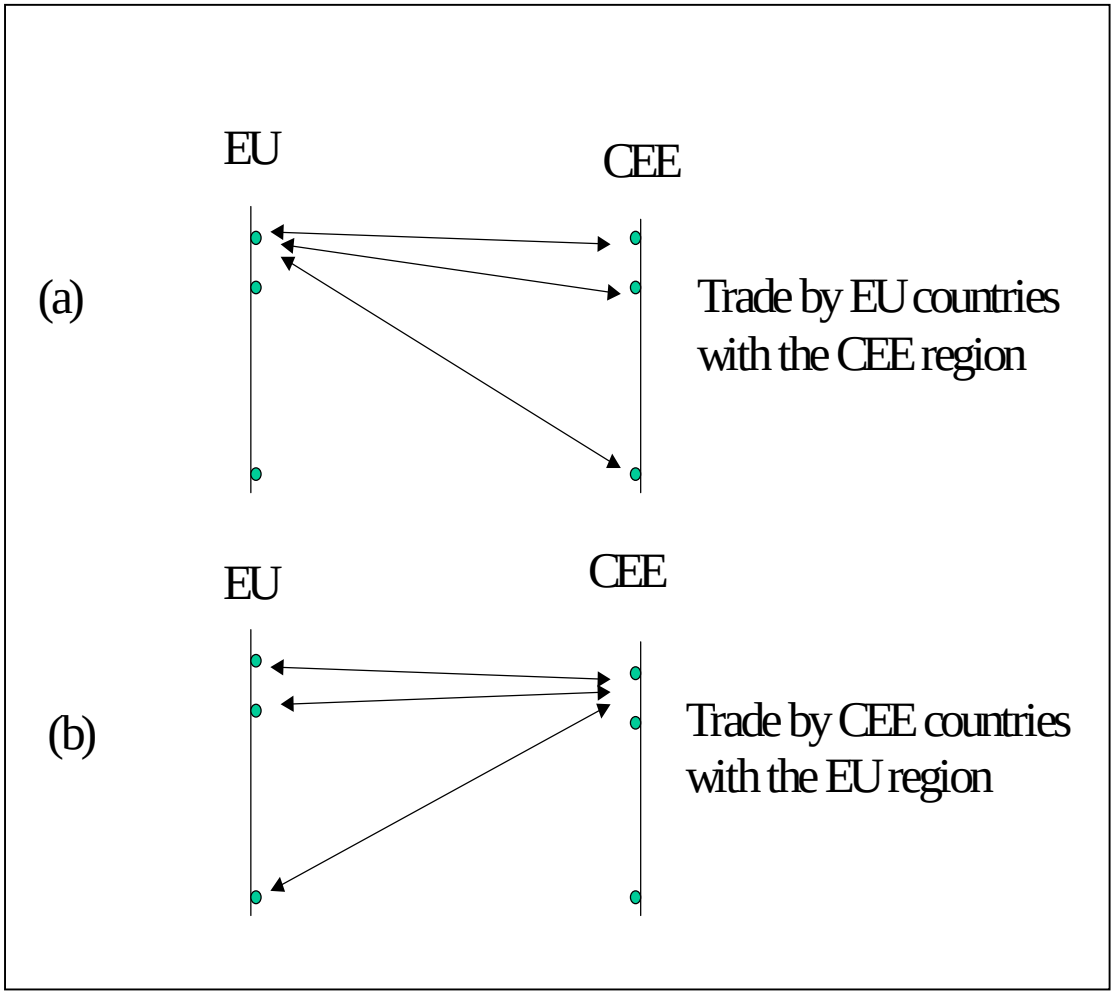
Figure 3. The bilateral trade intensity between the EMU countries in 1995 and 1999, in relation to the average intensity prevailing in the EU internal market, per cent



3. EU-CEE trade relations

The coming accession of the CEE candidate countries to the EU, being at the moment the most paramount project of the Union, has aroused a lot of interest also within the research community as to the effects of enlargement. Above we have, i.a., estimated the bloc-wise impacts between the EU and CEE as two regional units. To get a more detailed view of the structure of trade between them, we can split these relations further in two ways into country-wise effects so that we look at them from either the EU-15 countries' (a) or the CEECs' (b) point of view, as illustrated in Figure 4.

Figure 4. Disaggregation of EU-CEE into trade by individual countries



The basic model was, accordingly, enlarged to include additional dummy matrices D_{km} in equation (1) to allow for estimation of the country-wise intensities present in Figure 4. The results of these estimations are shown in Figures 5 and 6 (the exact impacts and their standard errors are reported in the Appendix). These figures report the level of intensity, in per cent, of EU-CEE trade in relation to the average intensity prevailing in the EU inner market. Again, these intensities are corrected for the influence of differences in other factors between the CEECs and the EU-15 countries, such as income levels and distances to the EU single market.

Figure 5. EU-CEE trade intensities in 1999 from the point of view of the EU-15 countries, in relation to that prevailing within EU single market, per cent

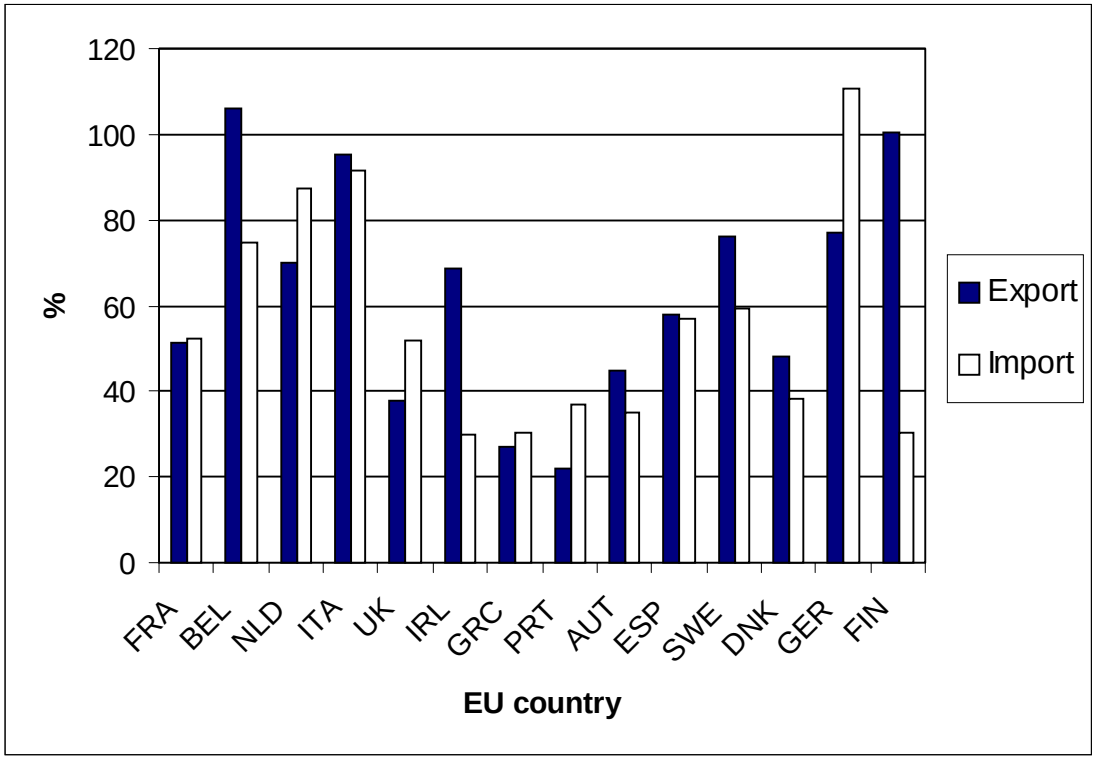
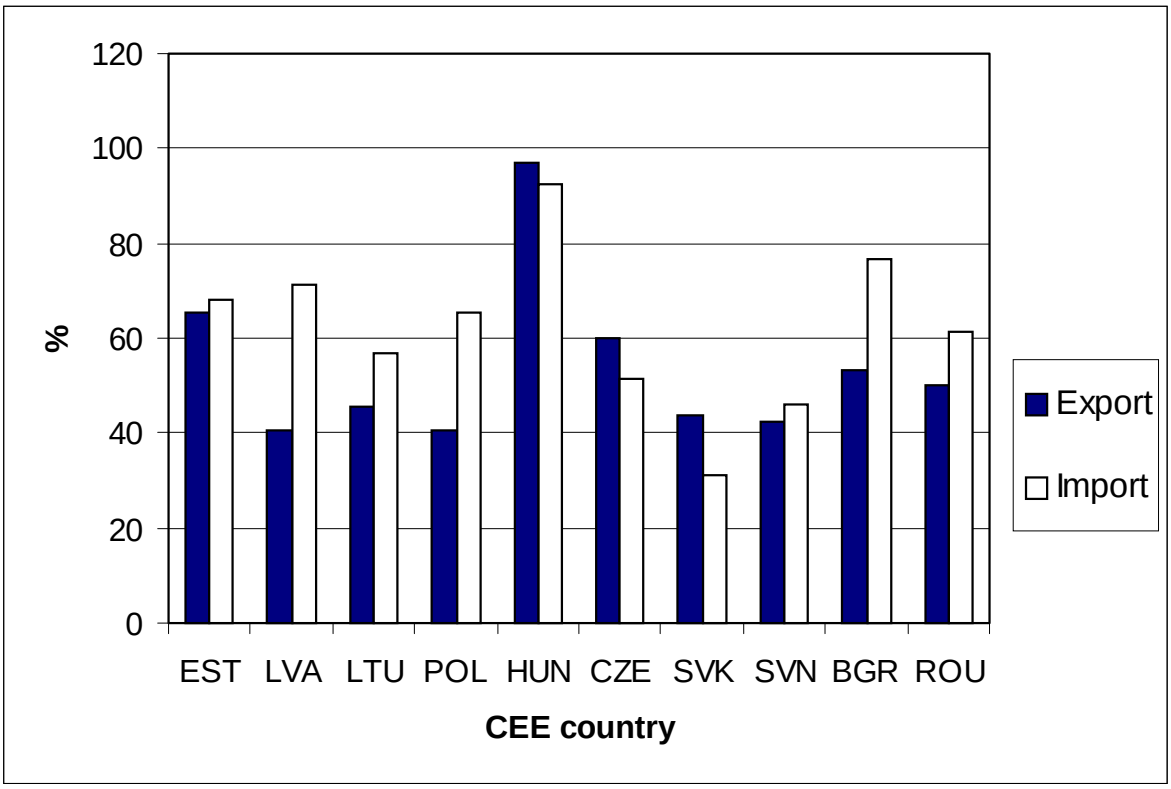


Figure 6. EU-CEE trade intensities in 1999 from the point of view of the CEE countries, in relation to that prevailing within EU single market, per cent



All the intensities are, as expected, clearly below that prevailing within the EU single market, with a few exceptions. Among the EU countries, Finland in exports and Germany in imports are at the EU level of intensity, while from the CEE countries, Hungary has integrated most intensively with the EU both in exports and imports. Let us then test formally for the equality of the intensities in Figures 5 and 6; see Table 3.

Table 3. Tests of the equality of the intensities in the EU-CEE trade split by countries

Exports from	to	F-test statistic on equal intensities by countries
EU countries	CEE region	48.00***
CEE region	EU countries	43.95***
CEE countries	EU region	58.38***
EU region	CEE countries	14.52***

*** $p < 0.001$

As shown also in Figure 6, the most similar situation prevails with respect to the intensities of the CEE countries' imports from the EU. But, overall, we see very strong evidence that, first, the EU countries differ from each other in their trade intensity with the CEE region and that, second, the CEE countries also differ from each other in their trade with the EU region. This observation may have some bearing with respect to the effects of EU enlargement. So, we obtain the following two outcomes.

Outcome 4. The EU countries differ very significantly in their mutual intensity of trade with the CEE region.

Outcome 5. The CEE countries differ very significantly in their mutual intensity of trade with the EU region.

One approach to evaluate the effects of EU enlargement on trade is to assume that the types of gaps in trade intensities seen in Figures 5 and 6 will gradually be eliminated when the CEE countries become members of the EU. This assumed impact of en-

largement can then be fed as an input into a CGE model, as done by Lejour et al. (2001), where they also disaggregated total trade by industry, or into a global economy macro model as in the Alho et al. (2001) study on enlargement.

4. Conclusions

In this paper we have presented a systematic evaluation of the various regional economic agreements on trade in Europe. Disaggregation of this kind appears to reveal significant differences in trade intensities, both within and between, the regions in Europe. The intensities are also asymmetric between countries in a region, as the diasaggregation of trade between the EU and the applicant CEE countries showed. This leads to the conclusion that there still is room and need for further European integration to produce an equal standing in trade between the participating countries.

Appendix. Estimates of the EU-CEE trade intensities and their standard errors in relation to that in the EU internal market, 1999, per cent *

Exports from i to j	Intensity	St. error	Exports from i to j	Intensity	St. error
FRACEE	51.5	9.3	CEEFRA	52.4	12.8
BELCEE	105.8	9.2	CEEBEL	74.7	15.7
NLDCEE	70.0	8.9	CEENLD	87.2	17.1
ITACEE	95.3	9.2	CEEITA	91.7	13.5
UKCEE	37.6	9.4	CEEUK	51.9	16.0
IRLCEE	68.9	9.0	CEEIRL	30.1	17.3
GRCCEE	27.0	10.8	CEEGRC	30.3	20.0
PRTCEE	22.1	9.6	CEEPRT	36.9	18.1
AUTCEE	44.9	8.8	CEEAUT	34.9	14.2
ESPCEE	58.0	9.2	CEEESP	56.8	15.1
SWECEE	75.9	9.1	CEESWE	59.2	12.4
DNKCEE	48.3	10.8	CEEDNK	38.1	14.5
GERCEE	77.2	9.7	CEEGER	110.5	11.8
FINCEE	100.6	8.8	CEEFIN	30.2	12.9

Exports from i to j	Intensity	St. error	Exports from i to j	Intensity	St. error
ESTEU	65.2	7.8	EUEST	68.1	11.5
LVAEU	40.8	7.6	EULVA	71.4	14.9
LTUEU	45.8	7.5	EULTU	56.9	14.1
POLEU	40.4	6.8	EUPOL	65.6	10.2
HUNEU	96.8	7.1	EUHUN	92.4	10.0
CZEEU	60.0	7.0	EUCZE	51.5	14.8
SVKEU	43.6	7.3	EUSVK	31.2	16.4
SLNEU	42.3	7.2	EUSLN	46.1	14.8
BGREU	53.2	7.5	EUBGR	76.5	12.7
ROUEU	49.9	7.2	EUROU	61.5	16.1

* Standard errors are the original ones multiplied by one hundred.

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