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THE POTENTIAL FOR TRADE BETWEEN AUSTRIA AND FIVE CEE COUNTRIES

RESULTS OF A PANEL BASED ECONOMETRIC GRAVITY MODEL

It can be shown that there still is a large potential for trade between the European Union (Austria) and the Central and Eastern European countries (CEECs) by using a gravity model and applying panel econometric methods. This contradicts the widespread view of recent years. The trade potential could be reached by integrating these countries into the Union. The observed rapid increase in the volume of Austrian exports to the east indicates that this process may already have begun.

Since the breakdown of the COMECON and the progressive opening of Central and Eastern European countries (CEECs) to the European Union, several estimates of the potential for foreign trade between these two blocs have been made. Initially, the unattained trade potential was regarded as large, but this evaluation has been revised in recent years. The now prevailing opinion is that the trade potential has been already fully realised as a result of the current process of integrating the Central and Eastern European countries into Europe. The purpose of the following contribution is to show that the degree of openness among the European Union and the CEECs is far from being that which is typical for foreign trade relations between Union member countries. If the degree of openness between the Union member countries and the CEECs should increase before the enlargement to the east goes into effect, then we can expect increases in the volume of exports to be similar to those in recent years.

ESTIMATING EXPORT POTENTIALS WITH A DISTANCE-BASED MODEL

The calculation of potential export flows between Austria and the five CEECs (Hungary, Czech Republic, Slovak Republic, Poland and Slovenia) up to the year 2004

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Glossary of technical terms

Gravity model: Application of Newton's law of gravitation to explain the attraction of two masses on foreign trade between two countries; in such models, both the country size (as mass) and the distances between economic centres (as trade barriers) play, among other variables, a decisive role.

Export potential: The gravity model is used to make a forecast of hypothetical export flows, taking into account the level of the independent variables (country-size, distance, etc.) and the estimated parameters (elasticities). When setting this estimated magnitude in relation to actual exports, one obtains an indicator of the extent to which the export potential has been reached. An indicator smaller than 1 means that actual exports have surpassed potential exports.

Fixed country effects: The sign and size of fixed country effects indicate whether a particular country's degree of openness toward the European Union lies above or below the average degree of openness of a group of countries. The CEECs are marked by negative fixed country effects: Even when correcting for factors such as differences between countries with respect to their size, or their factor endowments, these countries' degree of openness toward the European Union is still insufficient, in part because of their geographic proximity to the Union. We assume that this gap will be closed in the process of integrating these countries into the Union.

required, in a first step, estimating the bilateral export flows between the European Union and the CEECs as a function of several variables using a gravity model (*Linnemann,* 1966, *Helpman,* 1987, *Hamilton – Winters*, 1992, *Baldwin,* 1994). Frequently, the bilateral trade flows (exports or imports) were explained with proxies for the size of specific countries (GDP or population) and the relative factor endowment (capital stock and labour force in absolute levels or relative to per-capita GDP). Trade barriers (customs, distance between the most important economic centres of two countries, etc.) and trade preferences (common borders, common language, free trade agreements, etc.) were specified as well. Information on the level of employment was not included, because of the difficulties associated with making long-term forecasts of employment figures (or rates of unemployment). However, what did enter the analysis was GDP, per-capita capital stock (as a proxy for the capital-labour ratio), the distance between capitals (or the most important economic centres), and dummy variables reflecting prevailing trade barriers and trade preferences.

Because of econometric considerations, a panel-regression analysis assuming fixed country effects was undertaken. Cross-sectional analyses using data of a single year or an average figure based on several years – which neutralises the information contained in time – were associated with imprecise forecasts, since they involved confidence intervals taking on values of over 300 percent of the estimated levels (*Breuss – Egger*, 1997). A model with fixed country effects was chosen because more often than not, the hypothesis that group-specific country and time effects are random has to be rejected in gravity models (*Egger*, 1998). The characteristics of countries reflected in fixed country effects are inherently non random[1]; it was not possible, therefore, to rely on the type of estimation used in *Baldwin* (1994), in which he uses a random effects model. The fixed time effects of all countries in the sample were not taken into account, because they could not be determined for the forecast period. At first, it seemed appropriate to capture the international business cycle by using GDP figures of either the OECD countries or the countries of the European Union. But, this business cycle variable had the disadvantage of being strongly correlated with the GDP figures of the respective trade partners, which led to the decision of dropping this variable all together. The estimated function of bilateral export flows, which is based on *Helpman* (1987) is summarised in the box "The Gravity Function and glossary of variables".

In part, this function can be derived from a trade model based on the differences in factor endowments (the Heckscher-Ohlin model with two countries, two goods and two inputs), to which the dimension of product differentiation is added (*Helpman – Krugman*, 1985). In reduced form, the function represents the entire foreign trade volume, which encompasses intra-industrial trade (trade with differentiated products) and inter-industrial trade (trade with homogeneous products).

Whereas the equation for two countries is definitely solvable from a theoretical point of view, the multilateral case raises significant difficulties. In particular, the condition of bilateral trade or current account balances summing to zero is not necessarily met[2] . Besides, the above-mentioned theoretical model assumes abstract countries, which implies that distances and common borders have

[1] Therefore, we can proceed on the assumption that random effects models can be statistically rejected.

[2] The model implies only a weaker constraint on the trade account balance: the exports of a country into all 19 trade partners (EU and CEECs) have to be equal to the imports from all trading partners (measured as the exports of the trading partners). Due to this condition of trade account balance in all trading partners of the sample, the increase in the predicted CEEC exports into the EU countries as a result of the integration is stronger than that of the EU exports into the CEECs.

The Gravity Function and glossary of variables

The specification adopted in this study is not undisputed: *Mátyás (1997)* notes that the use of variables such as "common border" and "common language" really corresponds to a linear combination of fixed country effects, which is why one has to be careful when interpretating the corresponding coefficients. In our study, they happen to be of the right sign; but if the coefficients were not included, they still would be sufficiently captured by the fixed country coefficients.

$\ln EXP_{ij}$ $\beta_0 + \alpha_i + \gamma_j + \beta_1 (\ln GDPT_{ij}) + \beta_2 (\ln SIMILAR_{ij}) + \beta_3 (\ln RLFAC_{ij}) + \beta_4 (\ln DIST_{ij}) + \beta_5 (BORD_{ij}) + \beta_6 (LANG_{ij}) + u_{ij}$

$\ln EXP_{ij}$ natural logarithm of bilateral export flows of country i to country j;

β_0 constant;

α_i fixed country effects for group exports of country i (the same deviation from the constant is used for all trading partners)[1], measures the average degree of openness to exports toward all countries in the regression;

γ_j fixed country effects for group imports of country j (same deviation from the constant for all trading partners), measures the average degree of openness to imports toward all countries represented in the regression;

$\ln GDPT_{ij}$ ln of the sum of nominal GDP of country i and country j;

$\ln SIMILAR_{ij}$ ln of the similarity index of country i and country j. This index measures the relative size of two countries on the basis of their GDP:

$$SIMILAR_{ij} = \left(1 - \left(\frac{GDP_i}{GDPT_{ij}}\right)^2 - \left(\frac{GDP_j}{GDPT_{ij}}\right)^2\right).$$

The maximum value of the index is 0.5, and its minimum value could come close to 0 in the case of very heterogeneous countries ($0 \leq SIMILAR_{ij} \leq 0.5$).

$\ln RLFAC_{ij}$ ln of the absolute difference of the relative factor endowments of country i and country j:

$RLFAC_{ij} = \left|\frac{K_i}{N_i} - \frac{K_j}{N_j}\right|$, K . . . capital, N . . . population (as approximation for the potential labour force);

$\ln DIST_{ij}$ ln of the distance between the capitals (or most important economic centres) in the respective trading partners (see also Schumacher, 1997, p. 9):

$DIST_{ij} = r \arccos [\sin(\varphi_i) \sin(\varphi_j) + \cos(\varphi_i) \cos(\varphi_j) \cos(\lambda_j - \lambda_i)]$, r . . . earth radius (3,962.07 miles); φ_i, φ_j . . . radian measure of parallel of latitude of the two countries' capitals, $\lambda_j - \lambda_i$ . . . radian measure of the difference in the meridians of the two countries' capitals;

$BORD_{ij}$ dummy variable: $BORD_{ij} = 1$, when two trading partners share a common border, otherwise zero;

$LANG_{ij}$ dummy variable: $LANG_{ij} = 1$, when two trading partners share the same official language, otherwise zero;

u_{ij} error term of regression.

[1] The fixed country effects for imports and exports reflect latent variables, such as the costums regime or the regime of non-tariff trade barriers, geographic factors and other characteristics that do not change with the passage of time. In principle, these effects can be viewed as the deviation from the average openness to trade (via either exports or imports) in the sample.

no bearing in these models. At best, these effects can be integrated into a model that includes transportation costs. According to *Helpman – Krugman* (1985), transportation costs generate "home market effects" in that they act to increase prices for traded goods, while domestic goods become cheaper relative to foreign goods (concept of "iceberg transportation costs"). However, taking transportation costs into account eliminates the conditions for factor price equalisation (*Markusen – Venables*, 1996). The assumption of factor price equalisation adjusted for the costs of transportation would be most realistic. Therefore, although it is necessary to stray far from the described theoretical framework, these departures have been used rather frequently in the past. It became apparent that the relationship between the variables could be maintained even with multilateral trade.

DATA AND ESTIMATION RESULTS

The model was estimated on the basis of nominal data because foreign trade price indices were not available. Data on population and GDP were obtained from the OECD, the IMF and the WIIW (Vienna Institute for Comparative Economic Studies). The time series for the capital stock was compiled from investment data of the previously mentioned institutions (*Palme – Schremmer,* 1998). The point of departure for our estimations was a data set for the period from 1985 to 1996, which included all bilateral foreign trade relations between the individual countries of the European Union and the five CEECs Hungary, Czech Republic, Slovenia, Poland, and the Slovak Republic. The trade relations between the CEECs turned out to be positive outliers; they were excluded from the initial sample, because of these outliers being obviously based on structural effects related to the not yet completed transformation process of the CEECs' economic systems. The trade relations between Portugal and the five CEECs were not included as well, because they were so insignificant that they could not be captured by the model. Portugal too is currently undergoing a large scale economic transformation process and is characterised by its geographic out-lying position, which implies that Portugal's geographic co-ordinates would not adequately capture the distances based on Portugal's transportation routes.

In the end, 2,458 observations were used for the estimation. Several outliers were neutralised with the use of dummy variables. All mentioned variables were statistically significant at a 5 percent significance level.

As expected, the total size of two countries has a positive effect on the volume of trade in a multilateral world, which in our study includes 19 countries. This is the case because expanding the total size of two countries (by adding the GDP figures of both countries) by 1 percent leads to a change of roughly 1.1 percent in bilateral exports. These results hold ceteris paribus, implying that relative country-size (relative GDP) and factor endowment (expressed as the difference between the ratios of capital to potential labour force in both countries) were unchanged.

A ceteris paribus increase in the similarity index by 1 percent (meaning a convergence in the size of two countries, folding constant the bilateral economic area and relative factor endowments) is associated with a 0.4 percent increase in exports. The effect associated with an increase in the capital-labour ratio differential is positive as well, resulting in a 0.07 percent increase in exports. Therefore, the positive effect of generating inter-industrial trade outweighs the decrease in intra-industrial trade.

Both a common border and a common official language have a positive effect on the volume of exports for the trading partners. A 1 percent increase in the distance between the economic centres of two countries leads to a 0.9 percent decrease in the volume of exports.

The volume of exports in Greece, the five CEECs (especially the Slovak Republic), Denmark, Austria and Spain all lie below the sample average. The volume of imports (measured as received exports) is below average for Den-

Table 1: Panel-econometric estimates of bilateral exports as a function of fixed exporting- and importing-country effects

	Dependent variable: *LEXP*	
	Coefficient	*t* value
Independent variable		
Constant	– 3.571	– 5.273
LGDPT	1.104	43.797
SIMILAR	0.365	18.757
RLFAC	0.071	7.896
BORD	0.530	15.287
LANG	0.167	3.559
LDIST	– 0.887	–37.420
Exporting-country effect		
Austria	– 0.335	– 9.148
Belgium, Luxembourg	0.432	11.441
Czech Republic	– 1.397	–10.368
Denmark	– 0.043	– 1.152
Finland	0.083	2.099
France	0.129	2.805
Germany	0.529	8.171
U.K.	0.422	9.678
Greece	– 0.868	–20.556
Hungary	– 1.125	–14.220
Ireland	0.102	2.339
Italy	0.234	5.259
The Netherlands	0.587	15.588
Poland	– 0.675	–12.382
Portugal	0.256	5.789
Slovak Republic	– 1.903	–23.574
Slovenia	– 1.525	–17.355
Spain	– 0.042	– 1.081
Sweden	0.422	11.490
Importing-country effect		
Austria	– 0.357	– 9.751
Belgium, Luxembourg	0.212	5.423
Czech Republic	– 0.824	– 6.113
Denmark	– 0.129	– 3.438
Finland	– 0.187	– 4.731
France	0.162	3.535
Germany	0.452	6.981
Great Britain	0.426	9.857
Greece	0.135	3.196
Hungary	– 0.547	– 6.916
Ireland	– 0.567	–13.087
Italy	0.116	2.667
The Netherlands	0.450	11.952
Poland	– 0.337	– 6.139
Portugal	0.296	6.712
Slovak Republic	– 1.593	–18.472
Slovenia	– 1.260	–14.217
Spain	0.143	3.685
Sweden	0.228	6.202
Number of observations	2,458	
R^2	0.960	
F (51, 2,406)	1,172.1	
Prob value	0	
Jarque-Bera statistic	3.972	

Source: Corrected for outliers; heteroscedasticity-consistent estimation. *LGDPT* . . . sum of bilateral GDP, *SIMILAR* . . . similarity in the size of GDP, *RLFAC* . . . similarity of relative factor endowments, *BORD* . . . common border, *LANG* . . . common language, *LDIST* . . . distance between the most important economic centres.

mark, Finland, Ireland, Austria and again, the five CEECs (Table 1).

LARGE EXPORT POTENTIAL ASSOCIATED WITH INTENSIFICATION OF EU TRADE RELATIONS WITH THE CEECS

The integration effect of trade on the European Union was not measured using dummy variables, because such a model had a major drawback: the time of the CEECs' accession to the Union does not coincide with the time of the economic integration process associated with the enlargement. In part, the integration effects were taken into account in our GDP estimations for the year 2004[3]. It was implicitly assumed that the convergence process of actual to potential trade flows will occur before the accession of the CEECs to the Union. We therefore assumed that the trade potential will be entirely reached (actual trade flows will equal estimated trade flows) by the time horizon of the forecast. In addition, the effect of a change in the CEECs' fixed country effects on a hypothetical value (for example Spain's) was measured, meaning that the fixed country effects were held constant in the reference scenario. For population forecasts in individual countries, we extended the series using the average rate of growth of the previous two years. The forecast of the capital stock is based on the assumption that capital intensity will remain unchanged starting with the last year for which data were available (1996).

This estimated export potential was compared with the actual export data of 1996. Within the group of CEECs, only Poland and the Slovak Republic failed to reach their export potential in the reference scenario. However, keeping the country effects constant captures only the deviation from the average degree of openness for exports or imports in the sample, and therefore fails to adequately mirror the dynamic process at work: there are only few data entries for the five CEECs and these countries are in the midst of not only economic changes, but also radical institutional changes. As a result, we can expect fixed country effects for the CEECs to be altered. And yet, the present econometric model cannot capture this kind of process[4] . The more recent development of foreign trade between the EU countries and the CEECs cannot be regarded as typical because of the business cycle-related slump of CEEC exports to the west.

Table 2: Forecasted nominal GDP growth rates

	Average year-to-year percentage changes 1997-2004
Austria	+ 3.9
Czech Republic	+ 9.6
Hungary	+15.0
Poland	+15.0
Slovak Republic	+11.2
Slovenia	+12.8

Source: OECD, WIIW, WIFO.

With the exception of Slovenia, the export potential of all countries increases rapidly, primarily because of the exceptionally high GDP growth rates (both in nominal and real terms) in the five CEECs.

In the reference scenario, in which the estimation is carried out without changing the fixed country effects for imports and exports, Hungary and Slovenia's exports to Austria barely increase through and including the year 2004. The results suggest about a doubling of nominal exports from Poland and the Slovak Republic to Austria. In the reference scenario, the predicted Czech exports amount to only two thirds of actual nominal exports in 1996.

Austria's trade balance surplus[5] relative to the five CEECs increases as a result of the previously described changes from roughly USD 2 to 3 billion up through the year 2004; only relative to the Slovak Republic does the prediction forecast the surplus to be cut in half.

Because of the above-mentioned systematic underestimation of the degree of openness in the five CEECs, we assumed that starting with the effective date of accession to the Union, the fixed country effect (both for imports and exports) of each CEEC would equal the sample average, and would, therefore, equal to zero. In the framework of a ceteris paribus analysis, we examined how Austria's bilateral trade flows with the five CEECs would change up through the year 2004, the hypothetical time of accession to the Union. According to this analysis, the five CEECs' openness to EU exports (and as such to Austrian exports) would increase without altering the bilateral degree of openness to trade among the countries of the European Union. A forecast of such structural shifts will not be undertaken in this study, but it seems plausible for the structure of fixed country effects to change in this direction. According to the assumptions of the model, the geographic structural shift of the degree of openness (i.e., the fixed

[3] The source used were forecasts of the OECD, WIIW and WIFO (Table 2). To extend the series, the average rates of change in the last two years were used. It was not assumed that the integration process will be associated with an acceleration of inflation, which would ceteris paribus lead to an increase in nominal GDP.

[4] The estimation of a model in first differences with fixed effects (that is, under the assumption of country-specific steady-state growth rates) did not yield satisfactory results, which is partly due to the few data entries associated with the five CEECs. As a result, only level estimates are presented here.

[5] In the trade balance accounts for example, Austria's exports to Hungary are compared to Hungary's exports to Austria. These calculations deviate somewhat from the standard definition.

Table 3: Export potentials of EU countries and Austria: comparing the results of various studies

		9 CEECs[1]	Former Czechoslovakia			Hungary	Poland	Slovenia
			Total	Czech Republic	Slovak Republic			
		Ratio of potential exports to actual exports						
Wang – Winters (1991), *Hamilton – Winters* (1992)[2]	EU	–	9.5	–	–	3.9	6.7	–
Schumacher (1997)[3]	EU 12	–	–	0.9	1.5	0.9	0.8	1.0
Baldwin (1994)[4]	EU 12	2.0	–	–	–	–	–	–
	Austria	2.8	–	–	–	–	–	–
Breuss – Egger (1997)[5]	EU 12	–	–	0.7	1.1	0.7	0.7	0.9
	Austria	–	–	0.5	1.7	0.4	1.2	0.4
Egger (1998)[6]	Austria							
Reference scenario		–	–	1.0	2.2	1.1	1.9	0.8
Alternative scenario		–	–	2.3	8.2	1.9	2.6	2.8

[1] Albania, Bulgaria, Croatia, Romania, Slovenia, Hungary, Czech Republic, Slovak Republic and Poland. – [2] Cross-section regression analysis based on average figures from 1984 to 1986 in 76 countries (19 industrialised and 57 developing countries). – [3] Cross-section estimate for 1994, 22 OECD countries (report countries and partner countries) and 40 developing countries (partner countries). – [4] Panel-based regression analysis (random-effects model) of foreign trade flows between the EU and the EFTA countries (17 report countries and 20 partner countries) for the period from 1979 to 1988; in real terms at 1985 prices. – [5] Cross-section analysis based on average figures from 1990 to 1994. Base estimate for bilateral export flows between 24 OECD countries. – [6] Panel-based regression analysis (fixed-country effects) for the years 1985 to 1996, 15 EU countries (report countries and partner countries) and 5 CEECs (partner countries). In contrast to the alternative scenario, the reference scenario does not allow for the negative country effects of the CEECs to be decreased up through the year 2004, the hypothetical year of accession to the EU. The decrease is such that the change in the degree of openness relative to the EU countries corresponds to the average degree of openness in the analysed countries.

country effects) will be completed by the time of the respective countries' accession to the Union, and these shifts will not have any feedback effects on the explanatory variables of the model, in particular on GDP and the capital stock. For the Slovak Republic, the chosen time of membership to the Union is the year 2010; as such, 8/14ths of the fixed country effects for imports and exports would be eliminated. In an alternative scenario, the fixed effects of the remaining CEECs would be totally eliminated by the year 2004, the year of accession to the Union.

Because the change in fixed effects occurs ceteris paribus, it does not have an impact on the bilateral trade relations between Austria and the other Union countries. The changes in the trade relations between Austria and the CEECs are long-lasting. Without changing the fixed effects (constant country effects), the model predicts approximately a doubling of Austrian exports between 1996 and 2004 to Poland and the Slovak Republic, and a small increase of exports to the Czech Republic and Hungary. Based on the model, Austria's exports to Slovenia would even decrease relative to the year of reference (1996). According to the model simulations of the reference scenario (without changing the fixed effects of the exporting and importing countries), Austria's exports to the CEECs would increase overall by about 26 percent up through the year 2004. As already mentioned, the membership effects to the Union are, in part, included in the underlying GDP forecasts. However, the geography-related structural changes of the export-GDP ratio and thus the bilateral degree of openness of the five CEECs were not anticipated.

Such effects are captured by changes in the fixed effects. Under the assumption of changing fixed effects, the volume of Austrian exports to the five CEECs would increase threefold relative to its 1996 level. Again, it should be pointed-out that this ceteris paribus analysis is based on the premise that such an increase in Austria's exports will not have any repercussions on the GDP of Austria or on its trading partners.

In this scenario, the change in nominal exports is most striking for those into the Slovak Republic; they increase eightfold up through the year 2004, assuming full membership will occur in the year 2010, when the fixed country effects will be completely reduced. The exports to Slovenia would be 2.8 times as high, Poland 2.6 times as high, the Czech Republic 2.3 times as high and Hungary not quite 2 times as high as in 1996. In some cases, this corresponds to an advantage relative to the reference scenario by a factor of more than three.

The underlying model predicts a quadrupling of exports from the five CEECs to Austria in the year 2004, which is more than three times the level in the reference scenario without altered fixed country effects. The increase of Slovak Republic exports is particularly strong, and is expected to be 9 times the level of nominal exports of 1996. The multiple increase for Poland and Slovenia is 4.5, 3 for Hungary, and 2.5 for the Czech Republic.

The result is an overall decrease in Austria's trade account surplus by about USD 784 million to the level of 1.3 billion. This corresponds to 44 percent of the level prevailing in the reference scenario. Only relative to the Slovak Republic does the forecast predict an improvement in the trade balance relative to 1996 (a fivefold increase). The model predicts a drastic reduction in the trade account position relative to the other four CEECs.

DISCUSSION OF THE RESULTS IN THE LIGHT OF THE RELEVANT LITERATURE

According to *Baldwin* (1994), which represents one of the most important publications addressing the trading poten-

Table 4: Growth rate of exports necessary for actual exports to equal potential exports within eight years

Ratio of potential exports to actual exports	Average year-to-year percentage changes in the volume of exports
1	± 0.0
2	+ 9.1
3	+14.7
4	+18.9
5	+22.3
6	+25.1
7	+27.5
8	+29.7
9	+31.6
10	+33.4

Source: Own calculations.

tial between western and eastern Europe, the studies made on the basis of data from the 1980s (*Wang – Winters*, 1991, *Collins – Rodrik*, 1991) point to considerable potentials for both exports and imports between western and eastern Europe, or between the OECD countries and the CEECs. The ratio between the potential for exports and actual exports represents the degree to which this potential was reached.

The results of this study are set against those of other studies in Table 3. The estimates are not directly comparable, for a number of reasons. For one, they are based on data sets of different time periods, which implies that the structural break in the foreign trade of the CEECs with the European Union was either not yet considered, or only partly considered in those quoted studies. Another reason is that in some studies, the trade potential is defined as a structural deviation of the predicted "ideal" trade flows generated by the model, without taking the future changes of the explanatory variable (such as GDP) into consideration (see for example *Breuss – Egger*, 1997). With a ratio of potential and actual exports of 2 : 1 and with the given levels of the dependent variables, the level of exports should be twice as high.

Included in other studies are calculations of the medium-run development of the explanatory variables (especially in *Baldwin,* 1994, including estimates based on these calculations). Table 4 shows the average yearly growth rates of exports necessary to achieve convergence toward their respective potential level within eight years. Cross section analyses *(Wang – Winters,* 1991*, Hamilton – Winters,* 1992, *Schumacher,* 1997, *Breuss – Egger,* 1997) were not carried out because of the already mentioned wide confidence intervals and the large probability of forecast errors. Therefore, the pool of available estimates is limited to *Baldwin* (1994) and the estimates presented here. *Baldwin* relies on less recent data and on a random effects model. He then calculates the real export potential at 1985 prices. This latter step was not taken here, because

Table 5: Austrian export potential into the CEECs with and without catching-up effects in the CEECs

	Without catch-up process (A)	Partial catch-up process (B)	Ratio of B to A
	Million USD, at 1985 prices		
Hungary	864	4,674	5.41
Czech Republic	1,067	4,003	3.75
Slovak Republic	1,859	8,315	4.47
Poland	541	2,652	4.90

Source: *Baldwin* (1994). Catch-up process measured relative to real per-capita GDP.

the available capital stock and foreign trade deflators did not seem sufficiently reliable. The use of GDP deflators was not considered either, because the price deflators of exports, imports and capital stocks can deviate from the GDP deflator.

And yet, it is possible to obtain important pieces of information by comparing the results of different studies. Baldwin relies on per-capita GDP as explanatory variable. To estimate the trade potential, he uses 1989 figures for the dependent variables. His rationale is that the volume of 1989 CEEC exports can be regarded as a medium-term equilibrium, because exports decreased significantly afterwards. The volume of exports should converge back to this point only after a longer process of convergence. Baldwin calculates the export potential for the Czech Republic, Hungary, Latvia, Lithuania, Estonia, and the Slovak Republic, which he carries out by assuming that the per-capita GDP of these countries would converge to Spain's GDP level in the medium run. A comparison of these potentials with actual 1989 exports at 1985 prices was not possible, because the data contained in the quoted sources were hard to reproduce. The average yearly real growth rates of 9.1 percent in the European Union and 14 percent in Austria can be expected to eliminate the difference in the relative magnitudes of export potentials and actual exports within eight years.

The reference scenario of the present study predicts that the increases in Austrian exports to the Slovak Republic will take the largest value (average 1996-2004 nominal +10 percent per year). However, this forecast is based on the assumption that complete convergence will occur only by the year 2010. According to the model simulations, the volume of exports to the Slovak Republic will decline in nominal terms. This unrealistic forecast shows that Austria's exports to the Slovak Republic are, at least for now, disproportionately high.

As already mentioned, we pointed to country-specific deviations from the average degree of openness between the "present" and the "future" member countries of the European Union on the one hand, and in the group of present Union members on the other. In the alternative scena-

rio, these deviations are set to equal zero (ceteris paribus), which means that the structural deviation from the average is eliminated in the course of the convergence process. Similarly, *Baldwin* (1994) compares these export potentials to estimations simulating a partial catching up of per-capita GDP in the CEECs to the Union average, which is at Spain's per-capita GDP level of 1989, evaluated at 1985 prices. This leads to significantly higher export potentials. Within eight years, Austria's exports into the CEECs would increase in addition to the above mentioned growth rates in real terms by an average of over 16 percent for the Czech Republic, and more than 23 percent for Hungary (Table 5).

The present study finds similarly high, if not higher differences between the reference scenario and the alternative scenarios, but calculates these in nominal terms and allows for explicit structural effects associated with the Union membership in the CEECs. The data used in this study are more recent and should take into account, therefore, part of Baldwin's anticipated membership effects. On the other hand, Baldwin was not able to delineate the country specific influences as precisely as the fixed effects model presented in this study, because of his choosing a random-effects model (which combines a model without fixed effects with a fixed effects model). Also, the country-specific geographic attributes of export relations were clearly identified, and turned out to be significant. Primarily, this raises the question of how long it will take to significantly reduce the differences between the regional structure of foreign trade in the member countries of the European Union and the structure prevailing in the five CEECs. We chose to estimate a version associated with a very fast adjustment process. In contrast to Baldwin's calculations of export potentials, the present study is based on calculations of potentials not primarily based on the convergence process (as measured with per-capita GDP), but on the change in the bilateral degree of openness, as indicated by tariff and non-tariff trade barriers, institutional factors and other "latent" variables of foreign trade between the European Union and the five CEECs.

CONCLUSION

In order to estimate the potential for Austria's foreign trade with the CEECs, it is necessary to evaluate in a first step the institutional and economic transformation process. In any case, this process seems to go hand in hand with further changes in the orientation of the degree of openness of these countries toward the European Union. Without such structural changes, most estimated foreign trade potentials will not exceed the current volume of exports. More specifically, Austria's exports to the five CEECs would then increase on average at a yearly nominal rate of only 3 percent from 1996 to 2004. The dynamic of foreign trade with these countries would be driven primarily by nominal GDP growth. Under the extreme assumption of a total elimination of the highlighted differences in the geographic structure of foreign trade in the CEECs from the European average by the time of accession to the Union (Hungary, Poland, the Czech Republic and Slovenia in the year 2004; the Slovak Republic in 2010), the model predicts significantly higher nominal growth rates ranging from 13.2 to 14.4 percent. Such structural changes usually require a longer period of time than specified in the simulation presented here. However, the rapid growth of foreign trade with the five CEECs in recent years (since 1992, the rates vary between 15 percent and 24 percent; see Table 6) indicates that the discussed structural change is already taking place. We can expect this change to continue in the coming years, due to the start of negotiations surrounding Union membership and the agreements preceding those negotiations, such as the elimination of tariffs and other trade barriers, aid for infrastructure investments, the inflow of direct foreign investment and the transfer of know-how associated with it.

Table 6: Development of Austria's exports into the five CEECs

	Period	Average year-to-year percentage changes
Poland	1989-1997	+11
Hungary	1989-1997	+19
Czech Republic	1993-1997	+17
Slovak Republic	1993-1997	+24
Slovenia	1992-1997	+18

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The Potential for Trade between Austria and Five CEE Countries – Summary

This article attempts to assess the potential for foreign trade in five of the ten Central and Eastern European countries (CEECs) using a foreign trade model. The main exogenous variables in this model are the size of the countries (as captured by the sum of the GDP of a pair of trading partners as well as by the GDP ratio), each country's factor endowment (population, capital), a geographic variable (the distance between the economic centres of two trading partners as an approximation for transportation costs in foreign trade), and various other variables that reflect trade preferences between countries (e.g., common language and common border). The approach chosen for the model specification allows the identification of country-specific deviations from the average export relations in intra-EU trade and in the trade between the EU and the five CEECs.

The question raised in this contribution is whether the structural backwardness (small degree of openness toward the EU) of the five CEECs (qua exporters to the EU and importers from the EU) will be gradually reduced by the process of accession itself. In order to evaluate the effects of a ceteris paribus reduction in these deviations, the simulations were based on the assumptions that the structural differences of the CEECs would be completely eliminated by the hypothetical time of accession (2004 for Hungary, Poland, the Czech Republic and Slovenia, and 2010 for the Slovak Republic). The average annual growth rates predicted by the model for bilateral trade flows between Austria and the five CEECs are very high (between 14.4 and 13.2 percent), but they do not deviate in a striking way from the growth rates of Austria's nominal exports to these countries actually observed during the 1990s: Poland 15 percent (1993-1997), Hungary 19 percent (1989-1997), the Czech Republic 17 percent (1993-1997), Slovak Republic 24 percent (1993-1997), and Slovenia 18 percent (1992-1997). Even though the structural weaknesses of the CEECs will probably be eliminated over a long time period, it should be emphasised that the growth rates recorded for trade with the CEECs indicate that structural change is already under way; this process is likely to continue and is being facilitated by the current accession negotiations and by the so-called Europe Agreements, which would facilitate the reduction of tariffs and other barriers to trade, the support for infrastructure investment, the inflow of foreign direct investment the related transfer of know-how.