The Design of the *EU* after Enlargement: Customs Union or Common Market with New Members ?

Ibolya Mile

Gerhard-Mercator-University,Duisburg

Abstract

The present paper tries to give support for the decision whether to let the candidates for European Union get members of the Single European Market or just build a customs union with them and hinder free migration while capital movements were still allowed for. On the basis of a simple theoretical analysis we will see that there is no rationale for the EU not to let the new members get full members of the Union. As soon as capital is free to move, it can serve for factor price equalisation even if mass immigration to the Union is kept away.

- **JEL-Classification:** F10, F15

- **Key Words:** comparative advantages, factor movements, integration, *EU* enlargement

I. Introduction

At present, five Central European countries are negotiating accession into the European Union. One of the most controversial questions is whether they should immediately join the Single European Market which was established through granting for free movement of not only all goods and services across the borders of member countries but also for free movement of capital and persons. The reason for this debate lies less in a fear of each side from direct investment flows, but in the intention of the European Union to hinder immigration flows from the new members to the union, in order not to worsen the situation on its labour

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*Corresponding address: Gerhard-Mercator-University Duisburg, Faculty of Economics, Lotharstr. 65, 47057 Duisburg, Germany; Tel: +49-203-379-2758, Fax: +49-203-379-1786, E-mail: mile@uni-duisburg.de.

markets. As a result, the accession candidates would not get members of a fully fledged common market. They would be a part of a customs union in which foreign direct investment is possible but there is a barrier to free movement of persons.

Factor movements would be needed in order to increase allocation efficiency in case free trade in goods within an integration area is not sufficient to equalise factor prices. This was first demanded by Meade (1953). Grossmann (1984), however, shows that the positive effects of factor reallocation may be countervailed by trade volume and terms of trade effects. Wooton (1988) describes this context in an equilibrium model with many goods and factors and concludes that, in particular, welfare loss is to be feared if the reallocation leads to an extended production of import substitutes. Wooton starts out from existing factor price differentials in his analysis leaving the production side unspecified. Though, a well-founded decision about the form of integration requires a reflection on the supply side, too. The most important general knowledge about the relation of goods and factor flows stem from Markusen and Svensson (1985)[2], which has to be supplemented by conclusions about production possibilities and by a third country outside the integration area. A special emphasis has to be taken on the changes in distribution of income between the factors of production, an aspect that has so far been neglected by common market models. However, they may play a crucial role for the outcome of the accession negotiations.

Sections 2 and 3 provide an analysis of the changes in factor endowments, in the structure of production and in factor income induced by factor movements. It will be assumed that factor movements are free of charge and produced solely by factor price differences. Section 2 assumes a factor proportion model, whereas section 3 considers the case of technological differences by product-augmenting technical change. The analysis starts with a simple model with two goods which differ in their intensities using the primary factors, labour and capital, during the production process and three countries, two of which create a customs union by eliminating all barriers to the movement of goods and services among themselves and by unification of trade policy measures, that is establishing a common external tariff vis-à-vis the third country, which stands for the rest of the world. This model allows for a simple theoretical analysis of welfare effects of factor mobility in a customs union and is presumably widely taken into consideration when arguing

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[2]Further detailed analysis of various aspects concerning international mobility of goods and factors can be found in Wong (1995).

against free movement of persons between the candidates and the European Union. In the next section, empirical data about the trade structures of the European Union and the accession candidates, the Czech Republic, Hungary, and Poland will be exploited to detect comparative advantages of the candidates and compared with the simple theoretical analysis. The last section concludes and makes recommendations to the decision about the way of integrating the Central European accession candidates.

II. Factor Proportion Model

First we consider the case where the two members of the integration area have identical production technologies with constant return to scale. They differ in their factor endowments: country A is relatively rich of capital (K) and country B is relatively rich of labour (L). Free trade between the two countries leads to an equalisation of commodity prices. The factor price equalisation theorem tells us that factor prices will be equalised through free trade in goods as long as both countries produce both commodities. It may occur, however, that the terms of trade represent a situation where at least one of the countries is completely specialised on the production of the commodity which intensively uses its abundant factor. The factor price ratio in this country will be determined by the full employment condition, that is the commodity will be produced with a factor intensity which equals to the relation of its overall endowment. The country with diversified production structure performs a factor price ratio that corresponds to the terms of trade. The same ratio would be achieved if factor prices were equalised between the countries. This is important to state if we consider the adjustment process during factor movements. Without factor mobility, the capital abundant country will always perform higher reward to labour and the labour abundant country will perform higher reward to capital independent of the specialisation pattern.

There will be no factor movements in case free trade alone can serve for factor price equalisation even after dismantling barriers to mobility. Then, a common market will show no difference to a customs union. Though, if factor price differences will not be offset, it will come to a reallocation of input factors across the borders to where they get higher real income as they can be used with higher marginal productivity so that production possibilities of the integration area increase. The pattern of factor movements is determined by the difference in factor prices between the members of the customs union: workers will move to the

capital abundant country and capital will move in the opposite direction. The gap between factor price ratios will be closed by an adjustment of the factor prices of the specialised country to those of the diversified country whose factor prices remain unchanged during this process.

Let country B be completely specialised on the production of the labour intensive commodity y so that the capital intensive commodity x is produced only in country A. The factor intensity of production in country B and the factor price ratio respectively are given by:

$$\left(\frac{a_{y,L}}{a_{y,L}}\right)^{B} = \left(\frac{L}{K}\right)^{B} \tag{1}$$

where a means the amount of the production factor used to produce one unit of a commodity.

In country A the factor price ratio is given by the function:

$$\frac{W_L}{W_K} = G\left(\frac{p_x}{p_y}\right) \text{ with } G'\left(\frac{p_x}{p_y}\right) < 0 \tag{2}$$

where w means the reward to a production factor and p is the world market price of a commodity. G is determined by the production functions that is the marginal productivity of the input factors.

This context is shown in Figure 1 in a box diagram. The specialisation of country B will not be changed by factor movements as they will end as soon as point $F^{A,B}$, which represents the factor endowments of the members of the integration area and lies outside the factor price equalisation region, moves towards the line $O^B D$ and arrives at point F_1, F_2 or at any point on this segment. Reward to capital will decrease and reward to labour will increase in country B regardless whether both factors or only one of them are allowed to be mobile across the borders. If terms of trade is held constant, the adjustment leads to an increase in total quantity of the labour intensive commodity and to a decrease in total quantity of the capital intensive commodity. This we can see if we compare the input vectors in Figure 1 recalling that we assumed identical technologies with constant return to scale for both countries:

$$O^A C > O^A D \tag{3}$$

$$O^B F^{A,B} + F^{A,B} C < O^B D \tag{4}$$

Analogously, if country B had a diversified production structure and country A

Figure 1. Integrated equilibrium in a factor proportion model
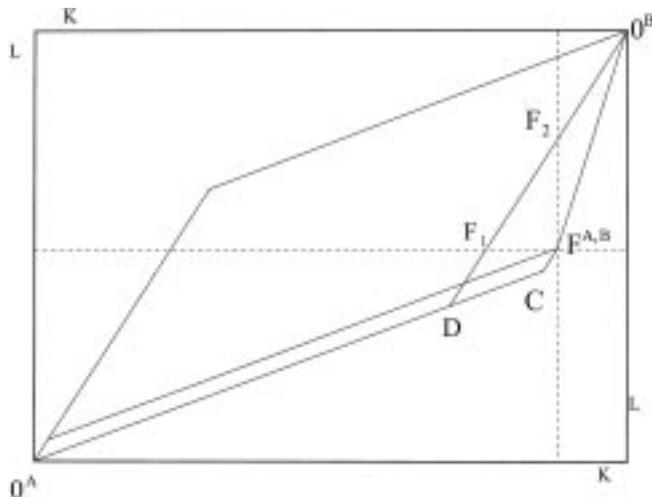
was completely specialised on the production of the capital intensive good, we can state an increase in the quantity of the capital intensive good and a decrease in the quantity of the labour intensive good after labour moves to the capital abundant country *A* and capital moves to the labour abundant country *B*. Again, during the adjustment process, the factor prices of the diversified country - this time it is country *B* - remain unchanged, whereas reward to labour falls and reward to capital rises in country *A* regardless which factor is allowed to move.

We state that changes in income distribution from labour to capital threaten to occur in the capital abundant European Union - which can be represented by country *A* - only in case of full specialisation on the capital intensive production. Nevertheless, it is sufficient to allow for capital movements, which would go from the European Union to the new members, to achieve this result and barriers to movement of persons would not be of much help.

III. Technological Differences

While in a factor proportion model factor prices will be equalised across countries as long as both countries produce both commodities, they are generally not equalised if there are differences in technology between the members of the integration area. In the case of product augmenting technical advantage in at least one industry in one country, factor price equalisation solely by trade would be an exception as long as both countries perform diversified production structures.

Factor movements would always be needed and they would lead to a complete specialisation of at least one of the partner countries on one good.

For a simple analysis we assume that there are two countries with identical factor endowments. The production functions contain a technology coefficient which implicates at least in one country in one industry a product augmenting technical advantage:

$$x = \lambda_i \, f(L,K), \tag{5}$$

$$y = \mu_i \, g(L,K) \tag{6}$$

with $i=A,B$. The technology coefficients will be set as follows:

$$\lambda_A > 1, \tag{7}$$
$$\lambda_B, \ \mu_A, \ \mu_B = 1.$$

Factor price ratios in the two countries will differ if commodity prices are equalised. Equation (2) still holds for country B, while in country A the factor price ratio is given by the function:

$$\frac{W_L}{W_k} \ = \ G\!\left(\frac{p_x}{p_y \lambda_A}\right) \tag{8}$$

Following the considerations of Findlay and Grubert (1959), fulfilling of the zero profit requirements after the increase of production efficiency in one industry calls for a rise of reward to the factor which is used intensively in this industry if terms of trade are held constant, while the quantity of this good will be higher and the quantity of the other will be lower than in the other country. Under the above specification of the technology coefficients, capital in country A will get higher reward than in country B et vice versa, while country A produces more of x and country B produces more of y. Opening the borders for factor movements brings about reallocations of capital towards country A and of labour towards country B. This process will come to an end, only if country B is completely specialised on the production of the labour intensive commodity, whereas country A may produce both goods or be completely specialised on the production of the capital intensive commodity depending on the grade of mobility of workers, that is which point of the segment F_1F_2 in Figure 2 will be reached. Factor prices in country B will adjust to the unchanged prices of the country A so that workers of country B will be forced to accept lower relative wages. It is important to state that this result

Figure 2. Integrated equilibrium in a model with product augmenting technical advantage
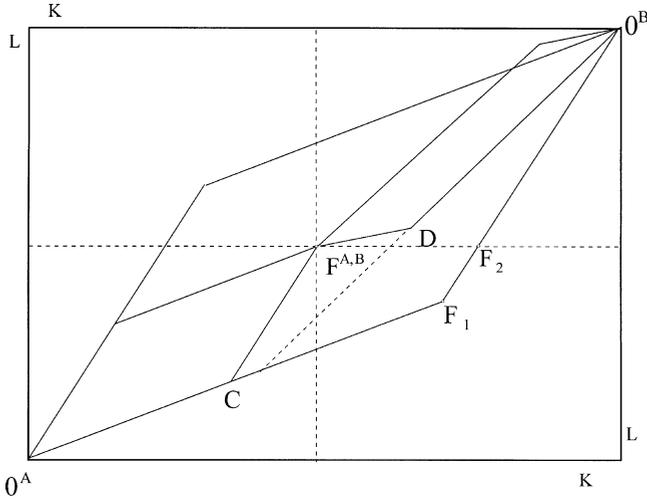
cannot be achieved if only labour is mobile, albeit capital movements are sufficient to bring about factor price equalisation. Total quantity of the capital intensive good will expand as it will only be produced by the country which can do it more effectively, while total production level of the labour intensive commodity will dwindle[3]:

$$O^A C + F^{A,B} D < O^A F_1 \tag{9}$$

$$C F^{A,B} + O^B D > F_1 O^B. \tag{10}$$

In case the advantage of one of the countries is based on product augmenting technical advantage in the labour intensive commodity, again, a full specialisation will occur in this good. Though, this time it will be the country which performs the advantage. We consider the case: $\mu_B > 1$, λ_A, λ_B, $\mu_A = 1$, where again capital reward in country B will be lower than in country A and reward to labour will be higher. Capital will move to country A and workers to country B as they are directed to higher marginal productivity and real reward. The process will again end if $F^{A,B}$ has arrived at the segment $F_1 F_2$. Country B will again be forced to accept lower relative wages of the country A. The results are the same as above concerning the adjustment process of the factor prices, but total quantity changes differ in the way that this time both industries are likely to expand: $O^A C + F^{A,B} D < O^A F_1$ and most of $O^B F_1$ is used in the more effective production process, therefore, if labour is mobile, this will substantially increase the amount produced of the labour inten-

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[3]The reason for it is also explained by the thesis of Findlay and Grubert (1959).

sive commodity.

Comparing the two cases we can see that the results are very similar. The labour markets of country *B* which could represent the *EU* will anyhow be affected by factor movements, however, factor price equalisation can evenly be achieved by direct investment if freedom of movement of persons would not be allowed for. However, no one would regard a technical advantage of the candidates over the present members of the *EU* in the capital intensive production as a realistic scenery. As regards trade structures, we may rather assume a technical advantage of the *EU* in the labour intensive production.

IV. Trade and Price Effects[4]

Realignments on the factor markets increase allocation efficiency and income, as well as lead to changes in the production structure of the integration area as a whole. Assuming identical and homothetic preferences, demand of consumers all over the area will increase proportionally with increased income, so that demand and supply will drift apart if the price ratio is held constant.

In case the production of the import substitute commodity expands and production of the exportable dwindle, this will possibly lead to less trade with the rest of the world. Trade diversion effects of building an integration area will then remain. In a simple two-good-three-country case it means in particular that if the members of an integration area trade with each other, there will be no exchange of goods between the area and the rest of the world et vice versa.[5] The price of the import substitute will fall and the price of the exportable will rise in the integration area. This could mean that imports at world price plus tariff are not competitive within the integration area and exportables are not competitive on the world market. Then country *A* exports the capital intensive commodity to country *B* and imports the labour intensive commodity from country *B* regardless factor mobility.[6] The welfare effects of factor reallocation will be countervailed by the change of the price ratio.

Though, if the production structure moves towards the production of the

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[4]A more detailed analysis can be found in Wooton (1988).

[5]In case of a model with *n* countries a number of n(n-1) commodities is needed to model trade relations between all countries. [See also Wooton (1986).]

[6]Note that in the above analysis, the characteristics of country A and B were set that they always indicated a comparative advantage of country A in the production of the capital intensive commodity and country *B* in the production of the labour intensive commodity.

Table 1. Hungary's comparative advantage and trade structures
Part I. Comparative advantages

RCA in EU-trade*	1992	1993	1994	1995	1996	1997	1998	1999
Food and live animals	1	1	1	1	1	1	1	1
Beverages and tobacco	1	1	1	1	1	1	1	1
Crude materials, inedible, except fuels	1	1	1	1	1	1	1	1
Mineral fuels, lubricants and related materials	1	1	1	1	1	1	1	1
Animal and vegetable oils, fats and waxes	1	1	–1	–1	–1	–1	–1	–1
Chemicals and related products, n.e.s.	–1	–1	–1	–1	–1	–1	–1	–1
Manufactured goods classified chiefly by material	–1	–1	–1	–1	–1	–1	–1	–1
Machinery and transport equipment	–1	–1	–1	–1	–1	1	1	1
Miscellaneous manufactured goods	1	1	1	1	1	1	1	1
Commodities and transactions n.c.e. in SITC	1	1	1	1	1	1	1	1
RCA*	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**
Food and live animals	1	1	1	1	1	1	1	1
Beverages and tobacco	1	1	1	1	1	1	1	1
Crude materials, inedible, except fuels	1	1	1	1	1	1	–1	–1
Mineral fuels, lubricants and related materials	–1	–1	–1	–1	–1	–1	–1	–1
Animal and vegetable oils, fats and waxes	1	1	1	1	1	1	1	1
Chemicals and related products, n.e.s.	–1	1	–1	–1	–1	–1	–1	–1
Manufactured goods classified chiefly by material	–1	–1	–1	–1	–1	–1	–1	–1
Machinery and transport equipment	–1	–1	–1	–1	–1	1	1	1
Miscellaneous manufactured goods	1	1	1	1	1	1	1	1
Commodities and transactions n.c.e. in SITC	1	1	1	1	1	1	1	1

*The value 1 indictes: RCA>0, and the value-1 indicates: RCA<0.

Part II. Total trade

Imports (% of total)	1992	1993	1994	1995	1996	1997	1998	1999
Food and live animals	4.77	5.04	5.78	4.74	4.35	3.73	3.34	2.67
Beverages and tobacco	0.73	0.57	0.65	0.52	0.62	0.49	0.39	0.36
Crude materials. inedible. except fuels	3.97	3.07	4.14	4.09	3.74	2.81	2.49	2.06
Mineral fuels. lubricants and related materials	15.02	13.38	11.59	11.64	13.54	9.66	6.58	6.09
Animal and vegetable oils. fats and waxes	0.13	0.18	0.43	0.35	0.31	0.47	0.48	0.18
Chemicals and related products. n.e.s.	12.93	11.95	13.37	14.29	13.92	11.34	10.27	9.56
Manufactured goods classified chiefly by material	20.37	18.31	21.45	23.00	22.25	19.79	19.17	17.77
Machinery and transport equipment	29.95	36.79	31.72	30.75	30.63	41.90	46.53	50.34
Miscellaneous manufactured goods	12.12	10.71	10.87	10.60	10.63	9.80	10.61	10.96
Commodities and transactions n.c.e. in SITC	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Exports (% of total)	1992	1993	1994	1995	1996	1997	1998	1999
Food and live animals	20.33	16.80	16.48	17.78	15.82	11.55	9.52	7.36
Beverages and tobacco	1.50	2.30	1.99	2.40	2.46	1.37	1.02	0.62
Crude materials. inedible. except fuels	5.52	5.70	5.23	4.79	4.52	2.88	2.30	2.02
Mineral fuels. lubricants and related materials	3.45	4.06	3.99	3.22	4.06	2.66	1.89	1.63
Animal and vegetable oils. fats and waxes	1.20	0.99	0.88	0.68	0.75	0.95	0.64	0.43
Chemicals and related products. n.e.s.	10.82	12.15	11.27	11.84	11.13	8.60	7.05	6.16
Manufactured goods classified chiefly by material	16.07	16.20	16.60	17.43	17.76	13.38	12.44	11.50
Machinery and transport equipment	20.87	24.18	25.70	25.63	25.57	45.08	51.94	57.21
Miscellaneous manufactured goods	20.20	17.55	17.80	16.19	17.88	13.48	13.16	12.98
Commodities and transactions n.c.e. in SITC	0.05	0.07	0.06	0.04	0.05	0.05	0.04	0.09

exportable after factor movements, the rise of the import substitutes price will be prevented by shifting of demand to the world market. The fall in the price of the exportable makes it more profitable for producers to sell on the world market so that the price will not get below the world price level. In this case, the members of the integration area will not trade with each other but with the rest of the world. The trade pattern depends on the world price ratio.[7] The welfare of the integration area will improve through the abolition of trade diversion and gains from

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[7]In a two-commodity-three-country case, it may occur that one of the member states only exports goods to and the other member only imports goods from the world market, which disturbs current account equilibrium.

Part III. EU trade

Imports (% of total)	1992	1993	1994	1995	1996	1997	1998	1999
Food and live animals	3.58	4.80	4.95	3.28	2.79	2.29	2.05	1.57
Beverages and tobacco	0.50	0.56	0.53	0.47	0.53	0.32	0.22	0.19
Crude materials. inedible. except fuels	2.82	2.37	2.69	2.62	2.32	1.69	1.42	1.16
Mineral fuels. lubricants and related materials	1.50	1.75	2.12	1.72	1.19	1.70	1.23	1.03
Animal and vegetable oils. fats and waxes	0.13	0.16	0.26	0.31	0.29	0.42	0.31	0.19
Chemicals and related products. n.e.s.	14.71	14.31	14.33	15.57	15.99	12.51	11.14	10.65
Manufactured goods classified chiefly by material	24.70	24.25	25.05	26.23	26.25	22.01	20.96	19.55
Machinery and transport equipment	36.64	37.25	36.73	36.81	37.58	48.02	51.90	54.50
Miscellaneous manufactured goods	15.40	14.55	13.33	12.98	13.03	11.03	10.77	11.16
Commodities and transactions n.c.e. in SITC	0.02	0.01	0.01	0.01	0.02	0.01	0.01	0.01
Exports (% of total)	1992	1993	1994	1995	1996	1997	1998	1999
Food and live animals	16.80	16.46	13.93	12.70	12.45	6.83	5.76	4.77
Beverages and tobacco	0.72	0.74	0.60	0.63	0.91	0.59	0.53	0.33
Crude materials. inedible. except fuels	5.63	6.49	6.34	5.80	5.14	3.01	2.45	2.13
Mineral fuels. lubricants and related materials	3.71	4.43	3.88	3.30	4.28	2.39	1.77	1.45
Animal and vegetable oils. fats and waxes	0.49	0.38	0.22	0.12	0.16	0.07	0.07	0.05
Chemicals and related products. n.e.s.	8.80	9.23	8.39	9.23	7.61	4.96	4.13	3.49
Manufactured goods classified chiefly by material	17.21	17.29	18.32	19.73	18.90	12.83	11.62	10.36
Machinery and transport equipment	19.30	20.28	25.40	27.61	27.43	53.66	58.67	63.00
Miscellaneous manufactured goods	27.28	24.61	22.84	20.83	23.07	15.60	14.97	14.36
Commodities and transactions n.c.e. in SITC	0.06	0.08	0.08	0.04	0.05	0.05	0.04	0.06

Source: Foregn Trade by Commodities, OECD; own calculations.

exchange.

The above analysis has not yet considered effects on the world price ratio following from the changes in demand and supply on the world market. These lead to terms of trade worsening for a big integration area. Though, this effect may be neglected regarding the importance of the candidate countries in global merchandise, even if the European Union itself accounts for about 20 per cent of global trade.

V. Trade Structures of the Candidates with the European Union

In this Chapter the trade structures of three Central European candidate countries, the Czech Republic, Hungary and Poland, will be analysed. These three countries are already members in the OECD-group so that data sources of the

Table 2. Poland's comparative advantage and trade structures
Part I. Comparative advantages

RCA in EU-trade*	1992	1993	1994	1995	1996	1997	1998
Food and live animals	1	1	1	1	1	1	1
Beverages and tobacco	−1	−1	−1	−1	−1	−1	−1
Crude materials. inedible. except fuels	1	1	1	1	1	1	1
Mineral fuels. lubricants and related materials	1	1	1	1	1	1	1
Animal and vegetable oils. fats and waxes	−1	−1	−1	−1	−1	−1	−1
Chemicals and related products. n.e.s.	−1	−1	−1	−1	−1	−1	−1
Manufactured goods classified chiefly by material	1	1	1	1	1	1	1
Machinery and transport equipment	−1	−1	−1	−1	−1	−1	−1
Miscellaneous manufactured goods	1	1	1	1	1	1	1
Commodities and transactions n.c.e. in SITC	−1	−1	−1	−1	−1	−1	−1
RCA*	1992	1993	1994	1995	1996	1997	1998
Food and live animals	1	1	1	1	1	1	1
Beverages and tobacco	−1	1	1	−1	−1	−1	−1
Crude materials. inedible. except fuels	1	1	−1	−1	−1	−1	−1
Mineral fuels. lubricants and related materials	−1	−1	−1	−1	−1	−1	−1
Animal and vegetable oils. fats and waxes	−1	−1	−1	−1	−1	−1	−1
Chemicals and related products. n.e.s.	−1	−1	−1	−1	−1	−1	−1
Manufactured goods classified chiefly by material	1	1	1	1	1	1	1
Machinery and transport equipment	−1	−1	−1	−1	−1	−1	−1
Miscellaneous manufactured goods	1	1	1	1	1	1	1
Commodities and transactions n.c.e. in SITC	1	−1	−1	1	−1	−1	−1

*The value 1 indicates: RCA>0, and the value-1 indicates: RCA<0.

Table 2. Part II. Total trade

Imports (% of total)	1992	1993	1994	1995	1996	1997	1998
Food and live animals	9,63	9,74	8,76	8,06	8,45	6,83	6,30
Beverages and tobacco	1,02	0,77	0,86	0,75	0,67	0,71	0,64
Crude materials, inedible, except fuels	5,45	4,59	5,14	5,39	4,68	4,16	3,52
Mineral fuels, lubricants and related materials	16,81	12,48	10,48	9,17	9,13	8,78	6,30
Animal and vegetable oils, fats and waxes	0,66	0,61	0,73	0,65	0,58	0,56	0,60
Chemicals and related products, n.e.s.	13,51	13,32	14,67	15,00	13,79	13,80	13,61
Manufactured goods classified chiefly by material	11,82	18,46	20,15	21,63	20,07	19,57	20,64
Machinery and transport equipment	30,70	29,60	28,85	30,02	33,06	36,01	38,85
Miscellaneous manufactured goods	10,33	10,14	9,86	9,32	9,24	9,34	9,37
Commodities and transactions n.c.e. in SITC	0,07	0,29	0,49	0,01	0,33	0,25	0,18
Exports (% of total)	1992	1993	1994	1995	1996	1997	1998
Food and live animals	12,84	9,95	10,05	9,15	10,08	11,83	10,05
Beverages and tobacco	0,56	0,96	1,39	0,72	0,53	0,40	0,34
Crude materials, inedible, except fuels	8,65	5,57	4,70	4,49	3,37	3,18	2,84
Mineral fuels, lubricants and related materials	10,72	9,74	9,10	8,20	6,89	6,69	5,49
Animal and vegetable oils, fats and waxes	0,15	0,11	0,11	0,15	0,17	0,17	0,13
Chemicals and related products, n.e.s.	8,59	6,81	6,73	7,74	7,71	7,86	6,72
Manufactured goods classified chiefly by material	27,15	26,47	27,49	27,56	25,82	26,48	25,20
Machinery and transport equipment	19,26	20,98	19,79	21,09	23,39	21,56	28,43
Miscellaneous manufactured goods	11,72	19,38	20,57	20,85	22,01	21,77	20,77
Commodities and transactions n.c.e. in SITC	0,35	0,02	0,06	0,04	0,04	0,05	0,02

OECD can be exploited. I apply a method of revealed comparative advantages (RCA) which bases on the relation between trade flows of a special industry and the trade flows of the country. The index detects a comparative advantage of the industry if it performs higher relative exports than in the overall trade of the country. Taking the natural logarithm positive values of the index mean comparative advantage. I calculate RCA-indices for each of the main commodity groups sorted by standard international trade classification (SITC) using the following formula:

$$RCA_i = \ln\left[\frac{x_i}{m_i} \div \frac{X}{M}\right] \tag{11}$$

with $i=0, ..., 9$, which indicate the index of the *SITC* section. The indices for the

trade structure of the candidates under examination with the *EU* are calculated by using values of imports from and exports to the *EU*:

$$RCA_i^{EU} = \ln\left[\frac{x_i^{EU}}{m_i^{EU}} \div \frac{X}{M}\right] \tag{12}$$

Trade flow data of Hungary from 1992 to 1999 show that the country revealed comparative advantage in the industries producing food and live animals, beverages and tobacco, crude materials, inedible, except fuels, and miscellaneous manufactured goods as stated by positive signs of *RCA*-indices listed in Table 1.

Table 2. Part III. EU-TRADE

Imports (% of total)	1992	1993	1994	1995	1996	1997	1998
Food and live animals	8,52	9,11	7,98	6,65	5,93	4,98	4,54
Beverages and tobacco	1,00	0,55	0,48	0,45	0,39	0,41	0,36
Crude materials, inedible, except fuels	2,30	2,07	2,45	2,54	2,42	1,98	1,81
Mineral fuels, lubricants and related materials	6,95	4,98	2,61	1,32	2,79	3,04	2,21
Animal and vegetable oils, fats and waxes	0,71	0,63	0,74	0,57	0,45	0,42	0,55
Chemicals and related products, n.e.s.	12,97	13,51	14,22	14,22	13,50	13,96	15,09
Manufactured goods classified chiefly by material	21,20	22,08	23,85	24,68	22,37	21,81	23,95
Machinery and transport equipment	34,24	35,32	35,20	37,70	40,93	42,07	42,44
Miscellaneous manufactured goods	11,13	10,84	11,50	10,97	10,52	10,65	8,95
Commodities and transactions n.c.e. in SITC	0,97	0,91	0,98	0,89	0,70	0,68	0,10
Exports (% of total)	1992	1993	1994	1995	1996	1997	1998
Food and live animals	12,13	10,09	9,05	7,36	7,41	7,23	6,12
Beverages and tobacco	0,10	0,11	0,09	0,07	0,07	0,08	0,14
Crude materials, inedible, except fuels	8,92	6,37	5,51	4,98	3,90	3,85	3,35
Mineral fuels, lubricants and related materials	8,85	9,19	9,45	8,32	6,97	7,35	5,56
Animal and vegetable oils, fats and waxes	0,27	0,18	0,11	0,10	0,09	0,08	0,08
Chemicals and related products, n.e.s.	6,89	5,24	4,78	5,67	5,45	5,10	4,51
Manufactured goods classified chiefly by material	26,07	23,52	27,82	29,55	26,53	26,55	25,82
Machinery and transport equipment	13,31	17,89	16,61	18,86	22,79	24,59	30,80
Miscellaneous manufactured goods	23,14	27,15	26,33	24,90	26,59	24,92	23,60
Commodities and transactions n.c.e. in SITC	0,31	0,26	0,25	0,19	0,20	0,23	0,03

Source: Foreign Trade by Commodities, OECD; own calculations.

Table 3. Czech Republic's comparative advantage and trade structures
Part I. Comparative advantages

RCA in EU-trade*	1993	1994	1995	1996	1997	1998	1999
Food and live animals	−1	−1	−1	−1	−1	−1	−1
Beverages and tobacco	−1	−1	−1	−1	1	1	1
Crude materials, inedible, except fuels	1	1	1	1	1	1	1
Mineral fuels, lubricants and related materials	1	1	1	1	1	1	1
Animal and vegetable oils, fats and waxes	−1	−1	−1	−1	−1	−1	−1
Chemicals and related products, n.e.s.	−1	−1	−1	−1	−1	−1	−1
Manufactured goods classified chiefly by material	1	1	1	1	1	1	1
Machinery and transport equipment	−1	−1	−1	−1	−1	1	1
Miscellaneous manufactured goods	1	1	1	1	1	1	1
Commodities and transactions n.c.e. in SITC	1	−1	1	1	1	1	1
RCA*	1993	1994	1995	1996	1997	1998	1999
Food and live animals	1	−1	−1	−1	−1	−1	−1
Beverages and tobacco	1	−1	1	1	1	1	1
Crude materials, inedible, except fuels	1	1	1	1	1	−1	1
Mineral fuels, lubricants and related materials	−1	−1	−1	−1	−1	−1	−1
Animal and vegetable oils, fats and waxes	−1	−1	−1	−1	−1	−1	−1
Chemicals and related products, n.e.s.	−1	−1	−1	−1	−1	−1	−1
Manufactured goods classified chiefly by material	1	1	1	1	1	1	1
Machinery and transport equipment	−1	−1	−1	−1	−1	1	1
Miscellaneous manufactured goods	1	1	1	1	1	1	1
Commodities and transactions n.c.e. in SITC	1	−1	1	1	1	1	1

*The value 1 indicates: RCA>0, and the value-1 indicates: RCA<0

We have to state, however, that disadvantage in machinery and transport equipment turned into an advantage in the last three years of the period and an advantage in crude materials, inedible, except fuels disappeared in 1998 and 1999. Though, these developments have to be confirmed in the next years. On the other side, the sign of *RCA* is opposite in the *EU*-relation to overall trade flows in several cases. The most surprising one is that trade with the *EU* reveal comparative advantage of Hungary in mineral fuels, lubricants and related materials lacking substantial oil stocks.

   Unfortunately, up to now, no data is available for Poland for 1999. The countrys

Table 3. Part II. Total tade

Imports (% of total)	1993	1994	1995	1996	1997	1998	1999
Food and live animals	6,30	6,96	6,56	5,72	5,17	4,79	4,61
Beverages and tobacco	1,06	1,29	0,94	0,87	1,06	0,81	0,79
Crude materials, inedible, except fuels	5,06	4,93	5,01	3,68	3,73	3,71	3,11
Mineral fuels, lubricants and related materials	10,86	10,02	9,49	8,72	8,64	6,14	6,53
Animal and vegetable oils, fats and waxes	0,36	0,36	0,34	0,29	0,24	0,29	0,25
Chemicals and related products, n.e.s.	12,15	13,21	13,29	11,80	12,22	11,72	12,02
Manufactured goods classified chiefly by material	15,85	16,55	17,96	19,29	19,33	21,24	20,58
Machinery and transport equipment	35,92	34,83	35,33	38,14	38,00	40,22	40,37
Miscellaneous manufactured goods	11,67	11,79	11,04	11,46	11,57	11,03	11,71
Commodities and transactions n.c.e. in SITC	0,76	0,06	0,05	0,03	0,03	0,05	0,03
Exports (% of total)	1993	1994	1995	1996	1997	1998	1999
Food and live animals	6,52	5,35	5,88	4,03	3,66	3,24	2,83
Beverages and tobacco	1,22	1,24	1,02	1,02	1,27	1,02	0,84
Crude materials, inedible, except fuels	5,85	6,97	6,10	4,85	4,03	3,24	3,69
Mineral fuels, lubricants and related materials	6,08	5,77	5,34	4,53	3,76	2,97	2,85
Animal and vegetable oils, fats and waxes	0,25	0,30	0,16	0,17	0,16	0,15	0,10
Chemicals and related products, n.e.s.	9,32	10,10	10,45	9,03	8,80	7,35	7,21
Manufactured goods classified chiefly by material	30,40	31,03	32,87	28,81	26,77	25,61	25,50
Machinery and transport equipment	26,18	25,04	25,79	32,73	37,72	42,58	43,20
Miscellaneous manufactured goods	12,42	14,15	12,35	14,71	13,73	13,73	13,69
Commodities and transactions n.c.e. in SITC	1,76	0,05	0,06	0,12	0,10	0,10	0,09

trade flows between 1992 and 1998, as shown in Table 2 state comparative advantages of the country in the industries food and live animals, manufactured goods classified chiefly by material, and miscellaneous manufactured goods. Again, we see opposite signs in many cases as regards trade with the *EU*. Other than in Hungary, Polish trade structures with the *EU* have not changed.

Data for the Czech Republic were first available for the year 1993, when the former *CSFR* was divided into the Czech and the Slovak Republics. The results for 1993 to 1999 are listed in Table 3. The country revealed comparative advantage in the industries beverages and tobacco, crude materials and manufactures. The weight of machinery and transport equipment grew over the observed period and since 1998, the country revealed comparative advantage in

Table 3. Part III. EU trade

Imports (% of total)	1993	1994	1995	1996	1997	1998	1999
Food and live animals	5,72	6,93	6,44	5,20	4,35	3,72	3,54
Beverages and tobacco	0,92	0,96	0,83	0,67	0,57	0,40	0,42
Crude materials, inedible, except fuels	2,63	2,66	2,85	1,97	1,98	1,99	1,99
Mineral fuels, lubricants and related materials	1,62	2,46	1,67	1,61	1,72	1,34	1,90
Animal and vegetable oils, fats and waxes	0,54	0,63	0,55	0,36	0,27	0,33	0,27
Chemicals and related products, n.e.s.	13,99	14,68	14,38	12,70	13,61	12,79	13,30
Manufactured goods classified chiefly by material	14,61	16,56	17,69	20,10	20,57	22,14	21,90
Machinery and transport equipment	45,85	42,15	43,76	44,96	44,94	46,04	45,47
Miscellaneous manufactured goods	13,65	12,84	11,72	12,39	11,95	11,21	11,18
Commodities and transactions n.c.e. in SITC	0,48	0,14	0,09	0,04	0,04	0,05	0,04
Exports (% of total)	1993	1994	1995	1996	1997	1998	1999
Food and live animals	5,31	4,90	4,87	2,51	1,91	1,34	1,31
Beverages and tobacco	0,73	0,59	0,57	0,60	0,80	0,55	0,51
Crude materials, inedible, except fuels	9,63	11,37	9,10	6,71	5,36	3,99	4,31
Mineral fuels, lubricants and related materials	5,74	6,06	5,74	4,20	3,41	2,45	2,52
Animal and vegetable oils, fats and waxes	0,18	0,19	0,12	0,08	0,08	0,06	0,05
Chemicals and related products, n.e.s.	9,37	8,04	8,81	7,12	6,79	5,10	4,82
Manufactured goods classified chiefly by material	31,68	33,48	34,75	28,48	26,47	24,39	24,59
Machinery and transport equipment	22,12	20,01	21,83	33,83	39,29	46,62	46,99
Miscellaneous manufactured goods	14,57	15,24	14,08	16,30	15,78	15,44	14,83
Commodities and transactions n.c.e. in SITC	0,68	0,11	0,12	0,15	0,11	0,06	0,06

Source: Foreign Trade by Commodities, OECD; own calculations

this industry. Trade structures with the *EU*, however, show again inverse reactions in mineral fuels and lubricants. In the industry beverages and tobacco, the Czech Republic was able to exploit its comparative advantage also in relation with the *EU*.

To sum up, we can say that the candidates were not always able to use their comparative advantages in trade relations to the *EU*. All three countries reveal comparative advantage in mineral fuels and lubricants inversely to their overall trade structures. Their export goods were mainly products requiring little technological skills or much labour, albeit in recent years, we can feel a

wind of change to more technology, which can be lead back to substantial capital inflow during the last decade and does not confirm a technological advantage of the candidates in the capital intensive production but states identical technologies.

As a consequence of inward foreign direct investment real wages in the candidate countries increased. Most of this capital originated in the *EU*, so that real wages there should have fallen. Although, the fact that this did not happen may be drawn back on minimum wage regulations or be seen as a support for the central thesis of the present paper which regards the possibility that the wage gap will be closed by an upward adjustment of the wages of the candidates to the *EU* level.

VI. Conclusion

An assessment of empirical data about trade structures of the European Union and the candidates, the Czech Republic, Hungary and Poland with the simple theoretical analysis shows that it seems more likely that factor price differentials are based on differences in factor endowment rather than technological differences. Because of the high grade of diversification of the *EU* economy no large changes in factor rewards must be awaited by reallocation of production factors across borders if labour is sufficiently mobile between industries. Though, in case factor price adjustments in the *EU* would be needed, capital movements alone could serve for factor price equalisation even if mass immigration to the Union is kept away. Then, as soon as the *EU* allows for capital to move across borders, it has to face decreasing wages or, in case of minimum wage regulations, increasing unemployment. From this point of view, a full participation of the new members in the Single European Market from the time of accession can be supported.

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