Jørgen Ulff-Møller Nielsen*

Price-Quality Competition in the Exports of the Central and Eastern European Countries

In the decade since the fall of the Berlin Wall the number of CEEC products able to compete in export markets has steadily increased. The quality level of these products still lags substantially behind that of EU products, however. The quality level of new CEEC products coming into the market is, in fact, lower than that of older surviving products, indicating that the CEEC countries are increasingly specialising in price-sensitive sectors. The following article uses the concept of unit value to analyse the changes in the price-quality competitiveness of CEEC exports.

The external economic relations of the Central and East European countries (CEECs) were changed dramatically by the political events of 1989. Before that date, their trade policies towards the rest of the world were of a highly protectionist nature. Inward foreign direct investment (FDI) was practically forbidden and, at best, limited to joint ventures, with foreigners restricted to holding a minority share in enterprises in the CEEC countries. After the fall of the Berlin Wall, however, the climate changed. The CEECs have tried to follow a strategy both of participating in the multilateral system (WTO, IMF, etc.) and of applying for the more regional EU membership, with cooperative agreements with the EU and with each other in the interim period.

The orientation of the trade policies of the CEECs towards the EU has resulted in a marked change in the geographical distribution of each Central and East European country's trade. From the period 1989 to 1996/97 for example, Poland's exports to the EU increased from 30 to 65 per cent of its total exports.[1] From almost nil inflow of FDI, the CEEC countries experienced increased significant investment in the years after 1989. From 1989 to 1997 Hungary, in absolute terms, attracted the largest chunk, greater than those of both Poland and the Czech Republic.[2]

With the opening of their economies for goods, capital and technology, it is expected that some quality or technology "catching-up" will occur. Without this process it is also difficult to imagine that the CEEC countries will be able to integrate fully with the EU countries. A catching-up process, in relation to international trade, can be defined as a process where the producers in a less developed country are "climbing up" in vertically differentiated markets and/or "climbing closer" to the technological frontier. The catching-up process will be realised by narrowing the gap between the quality of exported and imported products. It can further be accomplished by narrowing the gap between the quality of export products relative to competitors in third country markets or through a relative reduction in export prices in price-sensitive markets. For the CEEC countries the final aim of catching-up in foreign trade is to obtain a similar standard of living to that in the EU. Seen from a European Union perspective, it is necessary to ensure cohesion when the CEEC countries become EU members.

How far has the process of quality integration or catching-up progressed in the CEEC countries? This is the main question which we will try to answer in this paper. The answer, however, will be tentative for two reasons. First of all because quality or technology gaps cannot be measured in any direct way. Second, the time elapsing since 1989, when the market liberalisation process with significant inward direct investment began, has been relatively brief.

First, we give a short description of theories relevant for understanding the relation between quality and trade. Second, we discuss how to measure the quality and price competitiveness of the CEEC countries relative to other countries and third, we present the quality levels and the price-quality profiles of the CEEC countries relative to three control groups:

* The Aarhus School of Business, Aarhus, Denmark. The author wishes to thank Daniel O'Boyle Kelly for doing the statistical calculations and for improving his English.

[1] IMF: Direction of Trade Statistics Yearbook, 1995 and 1998.

[2] European Bank for Reconstruction and Development: Transition Report 1998.

some dynamic Asian economies (DAE) and both the rich EU countries (EU10) and relatively poor EU countries (EU4).

Quality and Technology Gaps

Until new trade theory entered the scene around the early 1980s, factor endowment theory dominated international trade theory. Technological and product quality differences did not play any significant role in explaining trade, with the exception perhaps of Linder in 1961 and Vernon in 1966.[3] Around 1979, things changed. Falvey, building on a factor endowment approach, introduced trade in products of different qualities and Krugman, building on Vernon, formalised the product cycle theory.[4] With the inspiration of the new endogenous growth models by Romer, a new class of models followed after 1986.[5] Put simply, Romer stated that if technological change is driven by conscious R&D behaviour based on expectations, these subsequent innovations will, at least, temporarily give a monopoly profit. The contributions of Grossman and Helpman are especially important.[6] In their model they introduce the concept of vertical innovation, the result of the development of a variety of different qualities from the existing ones. The rich countries continuously upgrade their qualities through investing in R&D while poorer countries, through imitation, threaten the competitive position of the rich countries because of their lower wages.

The firms in the rich countries, e.g. Western Europe, are primarily supposed to create their competitive advantages through continuously upgrading their technological capabilities. By selling their high quality products at high prices, the products' "quality" pays for R&D expenses. On the other hand, firms in the relatively poor countries, e.g. the DAE countries and CEEC countries, are to a great extent obliged to specialise at the lower end of the quality ladder, but create their competitive advantage through utilising "free" technology combined with low wages. Their competitiveness is based on prices and cost. The distance along the quality spectrum between the DAE, the CEEC and the EU countries will determine to what extent they are competitors.

However, the relative positions concerning technology and quality are not given forever. There is a constant race for improvements in relative positions and therefore, within a given industry, the dominance of either quality or price competitiveness. A country's effort to upgrade through domestic R&D and increase its ability to appropriate foreign technology through investment in human capital combined with the pace of technology transfer through direct investment are decisive factors for "catching-up".

Multinational companies may have strategic incentives not to transfer state-of-the-art technology either to safeguard themselves against future competition or because the limited absorptive capacity of the receiving countries can act as a constraint. For investment in the CEEC countries, both aspects can play a role depending on the size of the technology gap, which can be changed over time by the rate of innovation in the Western countries and the rate of imitation in the CEEC countries.[7] If the rate of imitation is high in the CEEC countries – itself a function of the FDI activities – the technology gap will shrink, and more advanced technology can be exported because the absorptive capacity is increasing. Strategic factors, however, can widen the gap. If R&D activities in the Western countries are being implemented at great speed, the absorptive capacity of the CEEC countries lends itself to the export of more primitive technologies.

The general market liberalisation process, as well as FDI, promotes the ability of firms in the receiving country to imitate and, in this way, technology and quality gaps should shrink. At the same time, this means that the ability to host FDI and transfer superior technology should increase. There is, therefore, reason to expect that both the DAE countries (rapid industrialisation) and the CEEC countries (market liberalisation) will be quality upgraded, resulting in more intense competition both between them and in relation to the EU countries.

Measuring the Quality Gaps

There has been a long tradition in the Central and Eastern European countries of using unit values or kilogram prices as a tool for analysing the "effectiveness" of manufacturing industries. Relatively low unit values have been explained by the lower technological characteristics of the products; by an incentive

---

[3] S. B. Linder: An Essay on Trade and Transformation, Uppsala, Almqvist & Wiksells, 1961; R. Vernon: International Investment and International Trade in the Product Cycle, in: The Quarterly Journal of Economics, 1966, Vol. 80, pp. 190-207.

[4] R. Falvey: Commercial Policy and Intra-industry Trade, in: Journal of International Economics, 1981, Vol. 11, pp. 495-511; P. Krugman: A Model of Innovation, Technology Transfer, and the World Distribution of Income, in: Journal of Political Economy, Vol. 87, pp. 253-266.

[5] P. M. Romer: Increasing Returns and Long-run Growth, in: Journal of Political Economy, 1986, Vol. 94, pp. 1002-1037.

[6] G. Grossman and E. Helpman: Innovation and Growth in the Global Economy, MIT Press, Cambridge, Massachusetts 1991.

[7] A. J. Glass and K. Saggi: International Technology Transfer and the Technology Gap, in: Journal of Development Economics, 1998, Vol. 55, pp. 369-398.

Table 1
The Competition Profile of a Country

	$T_{EU}/T_{CEEC}<1$	$T_{EU}/TC_{CEEC}>1$
$UV_{EU}/UV_{CEEC}<1$	(a) CEEC successful quality competition	(b) CEEC deficit in price competitiveness
$UV_{EU}/UV_{CEEC}>1$	(c) CEEC successful price competition	(d) CEEC structural problem area

Note: UV indicates unit value and T tons.

system which rewarded plan fulfilment in terms of physical indices such as weight and with little importance assigned to quality control; by poor marketing and servicing, by unattractive design and by consumer prejudice.[8]

In the 1990s, there has been a revival in the use of unit values to investigate the quality dimension in international trade. Two main types of investigation have been carried out. One, starting with Abd-el-Rahman, has used unit values to distinguish between horizontal and vertical intra-industry trade. The latter consists of an exchange of similar goods of different quality and the former comprises an exchange of similar goods that are differentiated by characteristic rather than quality. Abd-el-Rahman, Greenaway et al. and others have used unit values for exports relative to imports with a dispersion of 15% as an (arbitrary) limit for the separation into goods of similar and different qualities.[9] The underlying assumption is that relative prices tend to reflect relative qualities.[10] A recent study by Aturupane et al. shows that vertical intra-industry trade accounts for 80 to 90 per cent of total intra-industry trade between the CEECs and the EU, with the CEEC countries primarily responsible for the lower quality segments inherited from the central planning period.[11] The problem with this type of analysis is that it does not separate the cases where unit values primarily represent cost indicators and where they are quality indicators.

A somewhat different type of investigation initiated by Aiginger uses relative unit-values *and* relative traded quantities to distinguish between product markets where unit values signal costs and those where they reflect quality.[12] A country is cost or price competitive in a market if it has lower unit values (costs) than its competitors and at the same time has larger export quantities. This type of market is price elastic and the products are fairly homogeneous. On the other hand, a country is competitive in quality if it has both higher unit values and higher quantities than its competitors, due to different types of non-price components of competitiveness, such as image, quality, etc. typically found in heterogeneous and price inelastic markets. Aiginger's competitiveness profiles for a country relative to another country (or groups of countries) are shown in Table 1, where the competitiveness profile of the CEEC countries relative to the EU countries is taken as an example.[13]

In the following empirical investigation of the quality catching-up of the CEEC countries in foreign trade we will use elements of both types of research. From the intra-industry tradition we expand Aiginger's price-quality profiles with division of unit value ratios (and quantity ratios) into three intervals: one where product qualities (unit values) of CEECs relative to their competitors are assumed to be more or less equal (+/-15% around equality of unit values) and the other two where the unit value of CEECs is at least 15% higher (lower) than that of their competitors. We look at the quality gap of CEEC relative to some dynamic Asian economies (DAE), and relative to poorer and richer European Union countries, EU(4) and EU(10) respectively.[14] The DAE and EU(4) countries are chosen to represent the countries most likely to be comparable to the CEEC countries concerning their level of development and therefore competitors at the same level of quality. Naturally, there are considerable differences in the level of development and the pro-

[8] S. R. Amann and J. Slama: The Organic Chemical Industry of the USSR: A Case Study in the Measurement of Comparative Technological Sophistication by Means of Kilogramprices, in: Research Policy, 1976, Vol. 5, pp. 302-326.

[9] K. Abd-el-Rahman: Firms' Competitive and National Comparative Advantages as Joint Determinant of Trade Competition, in: Weltwirtschaftliches Archiv, 1991, Vol. 127, pp. 83-97; D. Greenaway, R. Hine and C. Milner: Vertical and Horizontal Intra-industry Trade: A Cross Industry Analysis for the United Kingdom, in: Economic Journal, 1995, Vol. 105, pp. 1505-1518.

[10] J. E. Stiglitz: The Causes and Consequences of the Dependence of Quality on Price, in: Journal of Economic Literature, 1987, Vol. 25, pp. 1-48.

[11] C. Aturupane, S. Djankov and B. Hoekman: Horizontal and Vertical Intra-Industry Trade between Eastern Europe and the European Union, in: Weltwitschaftliches Archiv, 1999, Vol. 135, pp. 62-81.

[12] K. Aiginger: The Use of Unit Values to Discriminate Between Price and Quality Competition, in: Cambridge Journal of Economics, 1997, Vol. 21, pp. 571-592.

[13] In his article of 1997, Aiginger compared export and import unit values and not, as we do, export unit values for two groups of countries in a third country market. We therefore change Aiginger's formulation of price versus quality competition to the following: if unit values reflect costs and the product is homogeneous, then countries with lower costs should have the biggest export quantity and countries with the higher costs the smaller one. If a country has the bigger export quantity despite the fact that it has higher unit values, then this must be due to quality differences.

[14] CEEC consists of Bulgaria, Czechoslovakia, Hungary, Poland and Romania. DAE consists of China, Indonesia, Korea, Malaysia, Philippines, Taiwan and Thailand. EU(4) consists of Greece, Ireland, Portugal and Spain, and EU(10) consists of the EU minus EU(4) and Denmark.

duction and export structures within the four country groups, but in this investigation our aim is only to look at differences among the country groups to get an average picture of the catching-up process of the CEEC countries.

We use Denmark as the reference country, by comparing the quality levels and the price-quality competitiveness profiles of CEEC relative to DAE, EU(4) and EU(10) in their exports to Denmark.[15] Denmark, as a test country, has both advantages and disadvantages. The advantage of using the Danish (import) trade statistics is that it ensures consistency concerning trade classifications etc. At the same time, price discrimination between markets is eliminated and by using only export data we avoid the cif versus fob problems of many other investigations which use both import and export data.[16] The disadvantage is that the Danish economy is relatively small and, hence, the size of trade will be relatively modest and may also limit the number of product groups.

The Quality Level of CEEC Exports

An indication of the quality position of CEECs relative to the three control groups can be found by calculating the quality index (QU_C)

$$(1)\quad QU_C = \Sigma_i^n (UV_{i,C} / UV_{i,CEEC}) w_i$$

with C the control groups (DAE, EU(4) or EU(10)), *CEEC* CEEC countries, i the product group, and n the number of products, which theoretically can be up to 10,000 when using the combined trade classification of the EU, the Combined Nomenclature (CN), at the 8 digits level. We use three alternative weights w_i^0, w_i^1 and w_i^2. w_i^0 gives equal weight to each product group; w_i^1 is equal to the exports from both CEECs and the control country group (to Denmark) in the given product group (for the given year) relative to the total exports of the two country groups (to Denmark) where they are in competition; and w_i^2 is based solely on the exports (to Denmark) from CEECs. If QU_C is greater than one, this indicates that CEEC exports are of lower quality than the exports of the control group. The results are presented in Table 2.

The first conclusion from Table 2 is that the number of products where CEECs are in competition with the countries in the control groups increased significantly from 1988 to 1996, i.e. the export structure of CEECs became more differentiated. The second conclusion is that the unit value levels interpreted as quality levels are significantly higher in the control groups than in CEECs. In 1988, just before the significant change, CEEC countries were lagging from 30 to 111 per cent behind the control groups (the exact number depending on the weights used). The lag was smaller relative

Table 2
Quality Indices for Dynamic Asian Economies, EU(4) and EU(10) Relative to CEECs for 1988, 1992 and 1996 (alternative weights)

		1988		1992		1996	
		QU_C	*n*	QU_C	*n*	QU_C	*n*
DAE	w^0	1.49	291	1.38	452	1.42	506
	w^1	1.30	291	1.19	452	1.33	506
	w^2	1.32	291	1.20	452	1.25	506
EU(4)	w^0	2.00	315	2.05	464	2.06	508
	w^1	1.88	315	1.85	464	2.07	508
	w^2	1.81	315	1.76	464	2.01	508
EU(10)	w^0	2.03	744	2.05	996	2.02	1088
	w^1	2.11	744	1.85	996	1.88	1088
	w^2	1.65	744	1.80	996	1.70	1088

Notes: The calculation of the quality indicator, QU_C, is made under the restriction that $0.1 < QU_C < 10$ and that the export value to Denmark from a given country within the country group is at least DKK 200,000. *n* = number of product groups.

Table 3
Quality Indices for Common Product Groups

Control groups		DAE			EU(4)			EU(10)		
Years		1988	1992	1996	1988	1992	1996	1988	1992	1996
88,92,96	QU_C	1.44	1.15	1.03	1.96	2.01	1.82	2.10	1.90	1.80
	(n)		(121)			(118)			(256)	
88,92	QU_C	1.19	1.01		1.63	1.68		1.70	1.62	
	(n)		(178)			(176)			(436)	
92,96	QU_C		0.99	0.95		1.70	1.61		1.73	1.58
	(n)		(243)			(231)			(494)	
88,96	QU_C	1.12		0.88	1.71		1.57	1.78		1.53
	(n)		(140)			(142)			(309)	

Note: The QU_C-indices are all calculated on the condition that the same product groups are included in the selected years. w_i^0 weights are used. Using the weights w_i^1 and w_i^2 we get the same the same weight dependence as in Table 2.

[15] The Danish trade statistics for 1988, 1992 and 1996 at the most detailed level, that is 8-digits in the EU Combined Nomenclature (CN), have been used to calculate the quality indices and the competition profiles. The CN divides products according to the materials from which they are made, and is therefore especially useful in unit-value calculations. The values are cif values at current prices and weight in tons. Even though the 8-digits level operates with about 10,000 product groups and we can escape the sectoral aggregation problems seen in other studies, some unwanted heterogeneity problems cannot be avoided. We have tried to avoid problems with outliers because of faults in customs classification by demanding a minimum export value of 200,000 DKK for each country within each country group and by discarding unit value ratios larger than 10 and smaller than 0.1.

[16] When comparing a country's import and export unit values there will be a difference related to cost, insurance and freight (cif minus fob) which is not related to the quality difference of the country relative to it competitors.

to the DAE countries, in accordance with the neo-Heckscher-Ohlin model,[17] which explains quality differences between countries on the assumption of differences in capital relative to labour.

Relative to EU(4) and EU(10) there is an approximately 100% quality lag to both country groups in spite of differences in their level of development. This surprising result, apparently in contradiction to the neo-Heckscher-Ohlin model,[18] covers very different quality/price competitiveness profiles, as shown in Tables 8 and 9, with EU(10) having both a better price and a better quality competitiveness than EU(4) relative to CEECs. The third conclusion from Table 2 is that CEEC countries only show a statistically significant catch-up relative to DAE countries (for all three weights), but only in the first period (1988-92), and then lag behind in the next. Relative to EU(4) and EU(10) the picture is more mixed depending on the weights used. But given that the quality indicator using w_i^0 does not show catching-up, and nor does w_i^2, which emphasises the current export structure of the CEEC countries, it seems reasonable on the basis of Table 2 to conclude that there is no significant catching-up relative to EU(10) and EU(4).

It should be mentioned that changes in the size of the QU_C-indicators over time and between control countries should be interpreted with care because they partly include different products. In Table 3 we have to some extent corrected for this problem by calculating the QU_C-values (with weight w_i^0) on the condition that the product groups are common in the indicated years.

We see that, contrary to Table 2, CEEC countries are unambiguously catching up relative to DAE countries but with a decreasing catching-up rate over time. Relative to EU(4) Tables 2 and 3 give the same result for 1988-92 – a relative loss in quality level for CEEC – but for 1992-96 and for the whole period (1988-96 and 1988-92-96) CEECs are catching up. This result indicates that when we look only at products inherited from before 1989, i.e. keeping products "born" and "dead" over the period 1988-92 out of the calculation, CEEC countries lag behind EU(4) at the beginning of the market liberalisation period. Or expressed in another way, the central planning products can only survive by means of a relative reduction in prices. But the loss in the period 1988-92 is followed by a significant catching-up in the second period. Relative to EU(10) where the indicators in Table 2 show no significant changes, we now see clear signs of catching-up for all periods.

For all three groups of control countries we see that the longer the life span of a product, the more CEEC countries are catching up. That the level of the QUC indicators is more favourable for CEECs in Table 3 than in Table 2 points in the same direction, indicating that surviving products have more favourable quality levels than newcomers and leavers. That newborn products pull the quality average downwards points to the fact that CEECs are, to an increasing extent, specialising in price-sensitive products.[19]

Table 4
Death and Birth Frequencies for Common Competition Product Groups – CEEC versus Control Groups

	1988-92		1992-96		1988-96	
	death	birth	death	birth	death	birth
DAE	0.30	0.74	0.10	0.21	0.38	0.92
EU(4)	0.36	0.74	0.17	0.26	0.42	0.89
EU(10)	0.35	0.64	0.24	0.33	0.47	0.85

Note: The death frequency is calculated as $d_{t,t+1}/[1/2(n_t+n_{t+1})]$, where $d_{t,t+1}$ is the number of products (gross) where the common competition comes to an end over the period from t to t+1, and $1/2\,(n_t+n_{t+1})$ is the average of the stock of products with common competition in the years t and t+1. Similarly the birth frequency is calculated as $b_{t,t+1}/[1/2(n_t+n_{t+1})]$, with $b_{t,t+1}$ the newborn products with common competition. The numbers are based on Tables 2 and 3. Comparison of 1988-96 with 1988-92 and 1992-96 should take the length of the period into consideration.

Table 5
The Stability of Unit Value Differences

	1988-96				1988-92				1992-96			
	α	β	R^2	n	α	β	R^2	n	α	β	R^2	n
DAE	0.19	0.55	0.19	140	0.16	0.52	0.28	178	0.02	0.59	0.24	243
EU(4)	0.34	0.42	0.16	142	0.31	0.34	0.11	176	0.35	0.39	0.13	231
EU(10)	0.35	0.52	0.24	309	0.37	0.42	0.18	436	0.35	0.44	0.18	494

Notes: The numbers are based on the regression $\ln[UV_C/UV_{CEEC}]_t = \alpha + \beta \ln [UV_C/UV_{CEEC}]_{t+1}$, with t = 1988, 1992 and t+1 = 1992, 1996. β is the regression coefficient, R^2 is the adjusted coefficient of determination and n the number of observations. All β's are significant at the five per cent level at least (but typically at the one per cent level). α for DAE and 1992-96 is not significant.

[17] See R. Falvey: Commercial Policy and Intra-industry Trade, in: Journal of International Economics, 1981, Vol. 11, pp. 495-511.

[18] But the quality index for EU(10) relative to EU(4) in the Danish market (weight w_i^0) shows a quality lead for EU(10) of 20% to 30% in line with the neo-Heckscher-Ohlin model. Another fact is that Ireland, as an outward processing area for American and Japanese multinational companies, to some extent increases the quality level of EU(4). Calculating QU_C for Ireland relative to CEEC shows a quality premium for Ireland of 140-180 per cent!

Table 6

Crude Quality Indicators for the Dynamic Asian Economies, EU(4) and EU(10) relative to Poland for 1988, 1992 and 1996, divided into 20 Product Groups

Combined Nomenclature Groups		DAE			EU(4)			EU(10)		
		1988	1992	1996	1988	1992	1996	1988	1992	1996
I	Livestock and animal products	2.2	0.8	1.2	3.0	1.5	1.2	1.7	1.6	1.2
II	Crop products	2.3	1.7	3.0	1.7	2.1	2.1	1.7	2.0	2.1
III	Fats and oils	–	0.9	–	–	–	–	0.9	1.1	–
IV	Food products	1.0	1.1	1.1	1.4	1.9	1.1	1.6	1.4	1.3
V	Mineral products	1.0	0.9	1.0	2.4	1.0	2.5	1.3	1.5	1.6
VI	Chemical products	1.3	1.4	0.9	1.4	1.9	2.0	1.4	1.7	1.5
VII	Plastics and products	1.8	1.7	1.7	2.4	2.4	2.2	2.0	2.1	2.1
VIII	Leather and products	0.8	1.1	0.9	2.4	3.0	2.7	1.7	2.0	1.6
IX	Wood and wood products	2.4	1.5	1.6	2.0	1.4	1.9	1.9	1.8	1.7
X	Pulp, paper, board, and products	4.3	3.4	1.7	2.6	1.5	1.9	2.0	1.5	1.6
XI	Textiles and products	0.9	1.0	1.1	1.5	1.8	1.8	2.3	2.2	2.0
XII	Footwear and headgear	1.6	1.2	0.9	1.9	1.9	1.9	1.8	1.8	1.7
XIII	Stone and ceramic products, glass	1.6	1.1	1.3	1.5	1.8	1.9	1.8	1.9	1.9
XIV	Pearls, gemstones, precious metals and products	0.8	0.8	0.6	1.7	2.2	1.1	1.3	1.2	0.7
XV	Base metals and products	2.4	1.6	1.6	2.1	2.0	2.2	1.8	1.7	1.7
XVI	Machinery and plant, electrical and electronic equipment	1.8	1.8	2.4	2.5	2.5	3.0	2.8	2.7	3.0
XVII	Transportation equipment	0.8	1.6	1.3	2.8	2.4	1.7	2.8	2.8	1.8
XVIII	Optical, photographic, measuring, control instruments and apparatus	1.1	2.0	1.7	0.2	2.0	2.1	1.5	1.9	2.2
XIX	Weapons and ammunition	–	–	–	–	–	–	1.9	1.2	1.8
XX	Miscel. finished goods, furniture, building elements, toys	2.2	1.6	1.3	3.4	2.9	2.1	2.5	2.1	2.0
I-XX	**All groups**	1.5	1.4	1.4	2.0	2.1	2.1	2.0	2.0	2.0

Note: See Table 1. CN group XXI, which includes a mixed group of not newly produced goods such as antiques etc. is not included.

In Table 4 we take a closer look at the dynamics of the death and birth of products where CEECs and the groups of control countries are in competition. We see a rather consistent pattern for CEEC countries relative to control groups with very high product birth rates and somewhat lower product death rates in the years following the fall of the Wall with decreasing birth rates as well as death rates in the later period, i.e. death and birth rates converging at a relatively low level. This picture tells us that the CEEC countries in the years immediately after the beginning of the transition period in 1989 moved into an era with very dynamic changes in their export competition pattern in relation to the number of products, followed by more moderate changes in 1992-96. Another look at the dynamics of the CEEC countries' exports is presented in Table 5, where we regress the unit value ratios for the two periods, so the same product groups are included in the start and end periods.

Table 5 indicates that there is a tendency to stickiness in quality product specialisation over time, i.e. when e.g. DAE countries have a quality premium in 1988 in a given product group and above a given (break-even) level, this premium will increase ($\beta<1$) in the following years.[20] The estimated coefficients are relatively stable and strongly significant, but the coefficients of determination (R^2) are low, so factors other than the historical quality difference determine the present level.[21] In relation to CEECs, this result indicates that they will, over time, specialise in product groups where the quality lag in 1988 was smallest.

In Table 6, the quality indicators (with weight w_i^0) are calculated for the 20 main product groups in the CN classification system. There is some variation around the average for all product groups. In a single product group XIV, "pearls, gemstones, precious metals and products" the quality level of CEEC countries in 1996 is higher than in DAE countries, and in a number of low-tech product groups such as food, minerals, leather and textiles, the DAE and CEEC are competing in the same quality segments. In XVI, "machinery and plant, electrical and electronic equip-

[19] Calculations of the QU_C indices for newborn and dead products over the periods 88-92, 92-96 and 88-96 confirm that surviving products of the CEEC have a more favourable quality level than newcomers and leavers.

[20] The break-even level is equal to the intersection of the regression line and a line with slope equal to one.

[21] The stickiness hypothesis is also confirmed by comparing the QU_C in Table 2 and in Table 3 with the quality level of CEEC relatively more favourable in Table 3 indicating that calculations based on surviving products give better price/quality levels for CEEC, i.e. the price/quality level for the more unstable products coming and leaving are not favourable to CEECs.

Table 7
Price versus Quality Competition for DAE and CEEC in the Danish market.
Distribution of Product Groups and of the Value of the CEEC Exports (in parentheses)
(in per cent)

Trade overlap / Unit-value overlap	$T_{DAE}/T_{CEEC}<1/1.15$ 1988	1992	1996	$1/1.15<T_{DAE}/T_{CEEC}<1.15$ 1988	1992	1996	$1.15<T_{DAE}/T_{CEEC}$ 1988	1992	1996	Total 1988	1992	1996
$UV_{DAE}/UV_{CEEC}<1/1.15$	6.5	10.0	10.0	0.7	1.8	1.8	25.8	30.3	29.4	33.0	42.0	41.3
	(13.0)	(25.4)	(32.8)	(0.3)	(2.9)	(1.9)	(8.9)	(16.1)	(12.2)	(22.2)	(44.4)	(46.9)
$1/1.15<UV_{DAE}/UV_{CEEC}<1.15$	3.1	5.1	4.2	1.7	1.1	1.8	14.4	10.6	9.5	19.2	16.8	15.4
	(26.0)	(20.2)	(13.6)	(0.4)	(0.2)	(2.6)	(10.7)	(5.2)	(4.0)	(37.1)	(25.7)	(20.2)
$1.15<UV_{DAE}/UV_{CEEC}$	22.3	21.5	20.6	2.4	3.1	1.8	23.0	16.6	20.9	47.8	41.2	43.3
	(30.5)	(20.1)	(23.5)	(0.7)	(1.9)	(5.0)	(9.5)	(7.9)	(4.3)	(40.7)	(29.9)	(32.9)
Total	31.9	36.5	34.8	4.8	6.0	5.3	63.2	57.5	59.9	100.0	100.0	100.0
	(69.4)	(65.7)	(69.9)	(1.5)	(5.1)	(9.5)	(29.1)	(29.2)	(20.5)	(100.0)	(100.0)	(100.0)

Notes: The calculations are based on the restrictions that $0.1<UV_{DAE}/UV_{CEEC}<10$, and that the export values from each individual country in the country groups are at least DKK 200,000. T is the quantity in tons and UV the unit value. The total number of product groups for the years 1988, 1992 and 1996 respectively are 291, 452, 506. The total export value for the given product groups in the years 1988, 1992 and 1996 is DKK 1.1, 2.1 and 3.6 billion respectively.

Table 8
Price versus Quality Competition for EU(4) and CEEC in the Danish Market.
Distribution of Product Groups and of the Value of the CEEC Exports (in parentheses)
(in per cent)

Trade overlap / Unit-value overlap	$T_{EU(4)}/T_{CEEC}<1/1.15$ 1988	1992	1996	$1/1.15<T_{EU(4)}/T_{CEEC}<1.15$ 1988	1992	1996	$1.15<T_{EU(4)}/T_{CEEC}$ 1988	1992	1996	Total 1988	1992	1996
$UV_{EU(4)}/UV_{CEEC}<1/1.15$	1.6	3.5	2.4	1.0	0.6	0.8	7.0	8.0	9.6	9.5	12.1	12.8
	(2.2)	(7.6)	(2.7)	(0.5)	(0.1)	(1.1)	(3.2)	(2.3)	(3.1)	(5.9)	(10.0)	(6.9)
$1/1.15<UV_{EU(4)}/UV_{CEEC}<1.15$	7.3	6.3	5.5	1.0	0.9	1.4	9.5	5.6	7.3	17.8	12.7	14.2
	(21.2)	(15.1)	(7.0)	(0.7)	(2.2)	(1.7)	(5.9)	(2.5)	(1.6)	(27.8)	(19.8)	(10.3)
$1.15<UV_{EU(4)}/UV_{CEEC}$	40.6	42.7	46.7	5.4	5.8	3.3	26.7	26.7	23.0	72.7	75.2	73.0
	(46.4)	(54.3)	(72.5)	(8.7)	(4.1)	(1.3)	(11.3)	(11.9)	(8.9)	(66.4)	(70.2)	(82.7)
Total	49.5	52.4	54.5	7.3	7.3	5.5	43.2	40.3	40.0	100.0	100.0	100.0
	(69.8)	(76.9)	(82.3)	(9.9)	(6.4)	(4.1)	(20.3)	(16.6)	(13.6)	(100.0)	(100.0)	(100.0)

Notes: The calculations are based on the restrictions that $0.1<UV_{EU(4)}/UV_{CEEC}<10$, and that the export values from each individual country in the country groups are at least DKK 200,000. T is the quantity in tons and UV the unit value. The total number of product groups for the years 1988, 1992 and 1996 respectively are 315, 452, 508. The total export value for the given product groups in the years 1988, 1992 and 1996 is DKK 0.9, 2.1 and 3.2 billion respectively.

ment", product groups normally characterised by high-tech components, CEECs lag farthest behind the three control groups. Looking at the quality catching-up there are only weak signs for all product groups aggregated, but for the disaggregated CN groups in Table 6, CEECs are catching up in 8 out of 20 groups relative to DAE, but fewer relative to EU(4) and EU(10), with only 3 product groups common for the three control country groups.

Price-Quality Profiles

Tables 7 to 9 detail the price-quality competitiveness profiles of CEECs relative to the control countries. The structures in the tables are based on Aiginger's classification (see Table 1) extended, so both unit value ratios and weight ratios are divided into three intervals. The interval for unit value ratios of +/-15% indicates unit values at comparable levels of quality. We interpret CEEC firms as showing good quality competitiveness if the CEECs have a high unit value relative to a control group (UV_C/UV_{CEEC} <1/1.15), and at the same time take the bigger market share measured in tons ($T_C/T_{CEEC}<1/1.15$); if the market share is small, there is poor price-cost competitiveness.[22]

[22] The robustness of the classifications in Tables 7-9 is to some extent confirmed by the fact that the regression $\ln(T_C/T_{CEEC}) = \alpha + \beta \ln (UV_C/UV_{CEEC})$ over cells (a) plus (d) and (b) plus (c) respectively in Table 1 gives the expected signs and significant values of β and acceptable R2s for DAE and EU(4), but in the case of EU(10) only for the price competitiveness cell (c) plus (d).

Table 9
Price versus Quality Competition for EU(10) and CEEC in the Danish Market. Distribution of Product Groups and of the Value of the CEEC Exports (in parentheses)
(in per cent)

Trade overlap / Unit-value overlap	$T_{EU(10)}/T_{CEEC}<1/1.15$			$1/1.15<T_{EU(10)}/T_{CEEC}<1.15$			$1.15<T_{EU(10)}/T_{CEEC}$			Total		
	1988	1992	1996	1988	1992	1996	1988	1992	1996	1988	1992	1996
$UV_{EU(10)}/UV_{CEEC}<1/1.15$	0.7	0.8	0.5	0.3	0.0	0.6	9.3	11.0	11.8	10.2	11.8	12.8
	(1.4)	(0.5)	(1.0)	(0.1)	(0.0)	(0.9)	(2.7)	(4.5)	(6.3)	(4.2)	(5.0)	(8.2)
$1/1.15<UV_{EU(10)}/UV_{CEEC}<1.15$	1.7	0.8	1.1	0.4	0.6	0.8	9.7	10.1	11.1	11.8	11.5	13.1
	(19.6)	(0.6)	(12.9)	(1.0)	(0.4)	(3.3)	(7.5)	(14.0)	(7.8)	(28.2)	(15.1)	(24.0)
$1.15<UV_{EU(10)}/UV_{CEEC}$	12.6	14.4	13.5	4.3	4.6	2.9	61.0	57.6	57.7	78.0	76.6	74.2
	(23.1)	(34.7)	(28.4)	(4.2)	(9.9)	(4.9)	(40.4)	(35.3)	(34.6)	(67.7)	(79.9)	(67.8)
Total	15.0	16.0	15.1	5.0	5.2	4.3	80.0	78.8	80.6	100.0	100.0	100.0
	(44.1)	(35.8)	(42.3)	(5.3)	(10.4)	(9.1)	(50.6)	(53.8)	(48.7)	(100.0)	(100.0)	(100.0)

Notes: The calculations are based on the restrictions that $0.1<UV_{EU(10)}/UV_{CEEC}<10$, and that the export values from each individual country in the country groups are at least DKK 200,000. T is the quantity in tons and UV the unit value. The total number of product groups for the years 1988, 1992 and 1996 respectively are 744, 996, 1088. The total export value for the given product groups in the years 1988, 1992 and 1996 is DKK 2.4, 3.7 and 5.4 billion respectively.

Within a number of product groups, CEECs have strong competitiveness both in price and quality relative to the DAE countries (see Table 7). The relative number of product groups, as well as the export value in which CEECs have strong quality competition, increased significantly over the period 1988 to 1996, while there has been a decrease in the number of product groups and export values where CEECs are dominant in price/cost competitiveness. For the DAE countries the picture is the opposite, with the importance of product groups with DAE dominating quality competition decreasing and the importance of product groups with price competition increasing. Competition within the intermediate range with the "same" unit values (competition in horizontally differentiated products or largely homogeneous products) has decreased significantly in value terms. Generally, the CEEC competitiveness profile seems to be progressing more favourably in the sense of an upgrading of the quality competitiveness profile.

Relative to the competitors in the EU(4), CEECs are generally weak in quality and strong in costs with the intermediate range of some importance (see Table 8). Over the period 1988 to 1996, there has been an increase in product groups and values where CEEC price competitiveness dominates and only an insignificant increase in quality competitiveness. The importance of competitiveness in the intermediate range of unit values is decreasing.

The EU(10) is, not surprisingly, strong in quality and CEECs in cost/prices, but the intermediate range also plays a significant role where comparative costs are essential (CEEC or EU(10) dominates in quantities, but prices are the "same" – see Table 9). Competition with horizontally differentiated products (both quantities and prices are the "same"), on the other hand, is not of any importance. For the whole period, CEEC competitiveness increases somewhat in price elastic product groups, and decreases in the intermediate range with no improvement in quality competition.

Conclusion

In this paper we have tried to show that the concept of unit value can be a useful tool in analysing changes in the export structure of countries, in this case the Central and East European countries. We have emphasised the dynamic aspects of changes in export patterns.

Our general conclusions are that the quality level of CEEC export products lags greatly behind the countries in the European Union and to a lesser extent the dynamic Asian economies, with some signs of catching-up and with stickiness in quality product specialisation over time. The birth and death frequencies of products where CEECs compete with DAE, EU(4) and EU(10), are high, but the quality levels are lower for both new and dying products than for surviving products, indicating that CEECs are increasingly specialising in price-sensitive markets.

At the existing level of development, such a specialisation in sectors where CEECs have comparative advantages can contribute to growth and capital accumulation and, over time, to technological upgrading.