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***Anna Wziątek-Kubiak***

**On Essence and Measurement of Changes  
in Competitiveness of the Accession Countries.  
Critical Review of Literature**

*Warsaw, March 2006*



Materials published here have a working paper character. They can be subject to further publication. The views and opinions expressed here reflect the author(s) point of view and not necessarily those of CASE.

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## **Abstract**

Although competitiveness is a word very often used in literature it is seldom to be found in economic textbook which prefer the term comparative advantage much narrowly defining formula describing international specialization. As Porter underlines comparative advantage and competitiveness (competitive advantage) do not overlap because competitiveness is much wider concept. Competitiveness is an ambiguous notion. In literature there are many approaches to competitiveness and many ways of defining and measuring it. Partly it is a result of the lack of general theory of competitiveness and the fact that this category is of business rather than theoretical origins. Paper systematizes and presents results of analysis on competitiveness of the accession countries which are based on three approaches to competitiveness: macro, micro and trade approach.

## Introduction

Virtually all debates on competitiveness have been conducted using measures of competitiveness rather than definitions. Application of different measures is the result of different ways of understanding this notion. Ambiguity of competitiveness results from attempts to derive it from various theories, which – with the exception of the Austrian school [Kirzner, 1973; 2000] – do not consider the dynamics of the process of competition and its effects. Even if it is not exactly true that competitiveness “is not a concept invented by theorists but by those with a practical approach, connected with creation of politics” [Fagerberg, 1996, p.56] then it is certain that failing to include categories of competition as a dynamic process within the mainstream theory helps to increase confusion around the subject. This makes it difficult to review literature on competitiveness of the accession countries and requires its systematisation.

Although competitiveness is contained in many theories *implicite*, there are no theoretical bases to analyse it, as there is no formalised theory of competitiveness. Competitiveness is a category used more in business and management than in economics. In the former, it has become synonymous to competitive advantage, as opposed to comparative advantage, as it is seen in the context of means of winning the competition on the microeconomic level. In case of economics, competitiveness is understood in various ways. It is limited to signifying growth, or even the economic situation, foreign trade performance and efficiency. This category is attached to theories of growth or economic development, trade and international economic relations, although none of these theories have ever used competitiveness as explanatory variable [Gomory, Baumwall, 2000]. Each of these theories marks the boundaries of analysis which are reflected in ways of understanding, methods of research, and measurements of competitiveness. They are so strikingly diverse that it often seems that the subject of analysis is entirely different, though related by name.

The aim of the paper is to show main approaches to competitiveness prevailing in the literature, their weaknesses and strengths. Focusing on the accession countries we intend to introduce systematisation of research on their competitiveness. Presentation of different approaches to competitiveness and their measurements allows for in-depth analysis of one of the most fashionable notion of the 90s in the European Union.

Paper contains 5 parts. In the first three main approaches to competitiveness are selected. In part from 2 to 4 each of the separated approach is analysed. Conclusions wrap up the paper.

# I. Approaches to competitiveness in literature

Measurements of competitiveness are developed and performed mainly by mainstream economists whose basic foundations rest on theories of growth, trade, competition and microeconomics. There are at least three major approaches to competitiveness: (1) macro, (2) micro including dynamic approach to competition, and (3) trade approach. Some of them are applied for evaluation of the changes in competitiveness of the accession countries.

Ad.1. Defining competitiveness as “the ability of a nation’s economy to make rapid and sustained gains in living standard” [The Global Competitiveness... 1996, p.8], in the macro economic approach competitiveness of the countries’ entire economy is evaluated. The criterion for grading competitiveness is “eight clusters of structural characteristics (...) which are termed the eight factors of competitiveness: openness of the economy to international trade and finance, role of the government budget and regulation, development of financial markets, quality of infrastructure, quality of technology, quality of business management, labour market flexibility and quality of judicial and political institutions” [p.9]. Based on indicators commonly used for evaluation of economic development, in this approach competitiveness is synonymous with the level and factors of development. The Competitiveness Index serves to “assess which countries have the best prospects for economic growth over the period of the next five to ten years” [p. 14]. The Growth Index in turn “depends on score on the Competitiveness Index and level of per capita income” [p. 19]. The definition of competitiveness as formulated by the World Economic Forum is one of variations of the macro approach. Among many others the European Commission [200-2004] definition seems especially popular. It defines competitiveness as “the ability of an economy to provide its population with high and rising standards of living and high rates of employment on a sustainable basis”. So it refers to “aggregate competitiveness”.

Ad. 2. In micro approach to competitiveness the framework of microeconomic and competition theory is applied. In this approach the subject of analysis is not the national economy but the tradable sector and its parts (branches and companies). The non-tradable sector, in which competition processes are limited to the domestic market, is thus omitted. Secondly, research is limited to analyses of competitiveness of export and productivity of industry.

In many analyses, competitiveness is directly linked to the process of competition. In terms of ability to sell, competitiveness reflects the companies’ ability to compete; that is to retain and strengthen their market position. Since on the one hand the effect of competition among players is the “seizure of subject’s market by other subjects” [Reynauld, Vidal 1998, s. 59], then the result of competition is the change of competitive position on the market [Frischtak 1999, s. 86]. On the other hand, however, a company is competitive if it is willing to accept the return available from selling its product at the prevailing market price. Uncompetitive companies make inadequate returns and are therefore forced to withdraw from the market. Competitiveness is then synonymous with a company’s long-term profit performance and its ability to compensate its employees and provide its owners a superior return. Companies whose sales bring losses are not competitive. They should be excluded from analyses of competitiveness changes. What surprises in actually performed micro approach analyses the competitiveness of the entire export and productivity of industry are evaluated, regardless of profitability or non-profitability of their sectors.

In the microeconomic approach, forms<sup>1</sup> and factors<sup>2</sup> of competitiveness are defined by forms, factors and effects of competition. This includes rivalry in prices, in improved techniques of

<sup>1</sup> Price and non-price competitiveness

<sup>2</sup> Cost and productivity of labour, material, capital, technology

productions for the given market or for the productive resources. On the other hand prices are affected by costs, efficiency and productivity of factors of production, these factors are also analysed. In Schumpeterian world, the concept of competition is grounded in costs and quality advantage which Schumpeter felt is much more important than price competition of transitional theory and is the basis for the “creative destruction”. It produces an internal efficiency. On the other hand, results of competition (final performance criterion or performance competitiveness), assessment of which is based on market share, are also considered.

Within research on export competitiveness, constant market share and shift and share analysis are also used. They constitute a sort of residual approach to competitiveness. In estimating the influence of demand and structural factors on changes in market share, competitiveness changes are considered as the residual.

Ad. 3. In the trade approach to competitiveness the subject of research is foreign trade performance, especially the structure of exports of a given country. Domestic market sales are not considered. The trade approach to competitiveness is based on the classical theories of international trade – the Comparative Advantage Theory and the Factor-Proportions Theory. This is why until the mid-nineties the concept of “Revealed Comparative Advantage” (RCA), created by Balassa to measure specialisation, was often used in this approach. Although since then the RCA has been losing its importance as an indicator of competitiveness, and the opinion that it measures specialisation has become more generally accepted [OECD from 1996; Audretsch 1993; Porter 1986; Sheehy 1995; Dobrinsky 1995<sup>3</sup>] (annex, table A1) there are still some proponents for using it for evaluating changes in competitiveness of the accession countries (Landesmann, Misala).

Most of the aforementioned approaches to competitiveness are used with valuation of changes in competitiveness of the accession countries. However, because of the variation in their internal conditions, inherited from the times of planned economy and particularly the very strong liberalisation of their economies during transition and their dual character, interpretation of results of competitiveness research is much complicated and ambiguous. It follows to say that it requires considering factors that only marginally affect competitiveness changes in developed economies, but strongly affect the accession countries.

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<sup>3</sup> „The concept of “Revealed Comparative Advantage” (RCA), first introduced by Balassa (1965) and further elaborated on in a number of studies. (...) The introduction of the “Revealed Comparative Advantage” concept (as opposed to the theoretical concept of comparative advantage) was mainly justified by the failure of the traditional theoretical approaches to generate quantifiable indicators of comparative advantage which could be used in applied studies” [Dobrinsky 1995, p 88].



## 2. The macroeconomic approach to competitiveness used for evaluating changes in competitiveness of the accession countries, their results and deficiencies.

Since 1990's, the economies of the Czech Republic, Hungary and Poland were subject to competitiveness assessment by the World Economic Forum. In 1999 Slovakia and Bulgaria joined the list of countries whose competitiveness was being evaluated, and in 2001 Lithuania and Latvia were further added<sup>4</sup>. These countries have since kept a far position down the list.

**Table 1. Competitiveness position of the Czech Republic, Hungary and Poland, based on the Growth Competitiveness Index Ranking:**

Years	Czech Republic	Hungary	Poland
1993-1995	35	45	37
2000	32	26	35
2001	37	28	41
2002	40	29	51

The Global Competitiveness Report, 1996, 2000, 2001, 2002. World Economic Forum, Geneva.

In 2001, according to the World Economic Forum, Hungary was the most competitive out of the accession countries, significantly ahead of the Czech and Polish economies.

The macroeconomic approach limits competitiveness to economic conditions for medium-term growth. A question arises however, whether competitiveness is in fact the same as economic growth, or is it just one of variables influencing economic growth. If both are the same, that creates a question of why use two different-sounding terms to identify and assess growth factors, which does not introduce anything new but only serves to perpetrate confusion. Our doubts then concern the very notion of understanding competitiveness.

<sup>4</sup> For Slovenia – see Stanovnik and Kovacic 2000.

### 3. Does trade approach to competitiveness reveal its changes?

For many years the trade approach was the most popular way of evaluating changes in competitiveness of the accession countries. The popularity of this approach resulted from wide availability of international trade statistics and the notion that competitiveness is only reflected in foreign trade performance.

In the trade approach, changes in competitiveness of the accession countries were assessed based on trade performance with EU countries. Three countries were the main subjects of analysis: the Czech Republic, Hungary and Poland (CEE-3). Slovakia and Slovenia (known as CEE-5 when grouped together with the CEE-3) and Bulgaria and Romania (CEE-2) (known as CEE-7 together with the previous groups) were included less frequently. These analyses were conducted at various times between 1989 and 1998 (annex, table A1). Various versions of the RCA index [CUP] were derived in the trade approach evaluation of competitiveness.

When using the RCA index to evaluate competitiveness the intensiveness of use of factors of production was frequently analysed. Using the Heckscher-Ohlin model, which suggests that comparative advantage tends to be determined by factor proportions, factor content of trade flows of the accession countries was estimated [Landesmann, 2000; 2002; Havlik, 2000; Misala, 1996] (Annex table A1). Assessments of levels and changes in competitiveness of accession countries conducted during 1988-1998 with the use of the RCA index were intended to demonstrate changes in the countries' specialisation on the EU market. If until 1992 the CEECs were highly specialised in comparison with other non-EU countries exporting to the EU [Sheehy 1995], and they faced strong competition of the other CEECs [Dobrinsky 1995], then with time their specialisation (measured with the RCA index) across-industry and across-accession countries has changed. This was demonstrated by a differentiation in export specialisation between the various CEECs present on the EU market. However, the results of research on the directions and sources of changes in export specialisation conducted using classification of industry based on the criterion of factor intensity were not clear-cut. According to Landesmann [2002], during 1989-1998 the more advanced of the CEECs changed their specialisation profile. Their large specialisation disadvantages in R&D, in skill-intensive and capital-intensive industries – declined, while specialisation in labour-intensive branches was substantially reduced. According to Havlik [1998] though, the CEE-7 increased its disadvantages in capital intensive and skill-intensive industries over the period of 1989-1995. These countries are still characterised by comparative disadvantages in R&D and by a comparative advantage in the energy-intensive and labour intensive industries.

Differentiation in export specialisation between the accession countries over time is one aspect stressed by all researchers. If however according to Havlik [1998] Hungary's progress in changing directions of specialisations has been the most pronounced of all CEECs, then Polish and Romanian specialisation patterns have hardly changed in comparison. In other words, the progress in areas of specialisation changes was greater in the Czech Republic and Bulgaria than in Poland. This is confirmed by research conducted in Poland during 1992-1995 [Misala 1996]. But Landesmann [2000; 2002] is of another opinion. While he confirms Hungary's exceptional progress in specialisation changes and notes the substantial progress achieved by the Czech Republic and Slovenia, he believes that Bulgaria and Romania seem to be stuck in the specialization profile typical for a less developed economy. Poland, according to Landesmann, occupies a position somewhere in between.

There are six serious objections regarding the use of the RCA index as a tool to measure competitiveness of the accession countries.

1. These estimates concern exclusively this part of domestic production, which participates in international trade. In this approach one assumes that the level and changes in competitiveness of the accession countries' production are the same on both domestic and foreign markets. They therefore exclude most of production confined to the domestic market. In Poland this represents around  $\frac{3}{4}$  of the total value of production. Field research on 200 Polish manufacturers, conducted between 1990 and 1998, questions the principles of accepting such approach. As opposed to companies who sold most of their products on the domestic market, Polish exporters had no problems with sustaining a competitive position on both domestic and foreign markets. The former systematically worsened their competitive position on the domestic market, and developed their export only to a small degree. [Wziątek-Kubiak 2001]. Since the economy is of a dual character in at least some accession countries, then the level and changes of competitiveness of production on the domestic market differs from the level and changes of competitiveness of export [Wziątek-Kubiak 2003]. This questions the validity of assessing the competitiveness of the accession countries based on foreign trade results and on the competitiveness of export alone.
2. Using trade indicators to assess competitiveness of the accession countries one forgets that it is possible to export with a loss or with dumping prices. For many years the lack of competitiveness of some sectors of the accession countries (such as the coal-mining industry in Poland) was accompanied by their strong export specialisation. One cannot treat its stabilisation as a symptom of stabilisation of competitiveness. Empirical research shows that part of the production potential of the accession countries is uncompetitive. In Poland for example, out of 108 sectors (3-digit NACE Rev. 1 classification) during the period of 1994-2000 as many as 12 sectors made losses from sales for a period of over 3 years, and 6 sectors for a period of over 6 years (out of 7 years during which this research was conducted). Tolerating loss-making export for a period of time allows the company to retain specialisation, but that does not mean upholding its level of competitiveness.
3. When researching competitiveness changes with the RCA index one assumes that – as opposed to the foreign market – the domestic market is distorted. If that however is true, it means that the assessment of competitiveness of the country's entire production is distorted, and that includes export.
4. Researchers assessing competitiveness with the RCA index do not define the notion of competitiveness. They assume that the results of foreign trade reflect changes in competitiveness. Neither theoretical research [Wziątek-Kubiak 2001a; 2003] nor empirical research confirm the validity of using this assumption not only for the accession countries, but also for most OECD countries. When assessing competitiveness changes using the RCA index, one tends to forget that Balassa formulated this index to assess specialisation, not competitiveness. According to Balassa, "competitiveness means the ability to sell, to compete on the market. But since international trade is determined by relative rather than absolute advantages, this concept does not fit well into classical comparative-cost theory" [Balassa 1963, p. 29]. Balassa, similarly to Porter, rejects the validity of using the theory of international trade to assess competitiveness. Porter introduces the notion of competitive advantage, which is principally different from the notion of comparative advantage [1986, p. 15, 17-18]. The notion of comparative advantage is derived from the theory of international trade, which however does not consider the competition processes, and should therefore be modified [Gomory and Baumol 2000, p. 4]. In attempts to modify the classical theory of trade, Gomory and Baumol stress, "there are in fact inherent conflicts in international trade (...). An improvement in the productive capacity of a trading partner that allows it to compete effectively with a home country industry, instead of benefiting the public as a whole, may come at

the expense of the home country overall” [p.4]. They were thus the first to introduce processes of competition into foreign trade models.

The inconsistency between changes in competitiveness as measured in unit labour cost, unit total cost, productivity, profitability on the one hand and dynamics of exports and RCA on the other, are confirmed by empirical research conducted for the OECD countries and for Poland [Wziątek-Kubiak 2003]. With the exception of Japan’s trade with the US [Tange 1992], very weak (if any) correlation was discovered to exist between the performance of exports and the changes in efficiency, profitability, and unit total and unit labour costs [Meeusena and Raypa, 2000; Kaldor, 1978; Fagerberg].

5. The inconsistency between changes of productiveness and foreign trade performance results, among others, from the fact that the latter are influenced by changes in domestic and foreign demand, which do not affect changes in productivity. Declining RCA can be a result of an increasing supply to the domestic market, which in turn can result from high dynamics of growth of domestic demand. A quick rise in internal demand aids “suction” of not only import, but also of exportable production and exports by the domestic market. If it is accompanied by a quick rise in overall domestic production and the increase of its share of global production, then we are dealing with an improvement, rather than deterioration, of competitiveness. This can be confirmed by the example of German car manufactures in the years immediately following the German unification. “From 1989 to 1990 the RCA index fell from 0.81 to 0.66. At the same time total turnover of German car producers increased by around 8%. Thus, the German car sellers proved to be internationally competitive when the (repressed until 1989 demand for cars in Germany, mainly in the former GDR) expanded” [Dlugosch, Freytag, Kruger 1996, s. 75]. Overall cyclical conditions translate into changes of intensiveness of international trade and specialisation, but do not influence the assessment changes of production competitiveness, which could remain unchanged. This implies a weakening of relationship between changes in specialisation and changes in relative productivity.
6. Government policies also influence inconsistency between changes in export performance and competitiveness. Government policies differentiate activities of domestic and foreign companies both on local and foreign markets [see Feenstra 1989; Eichengreen, Parry, Caldwell 1988, s. 319...], influence profits and incomes of local companies [Pearce, Sutton, Batchelor 1985, s. 169; Toner, Webster 2000, s. 243], which implies that they “influence the competitiveness of domestic companies in comparison with foreign companies” [Martin, Valbonesi 2000, p. 177]. Similarly, changes in government policy of a foreign country impact changes in competitiveness of local production. Any distortions incorporated into trade flow and trade balance are also incorporated into the RCA index. In order to draw correct conclusions, it is necessary to include information on the trade policy applied to all industries. Moreover, an implicit assumption of the analysis is that the country’s exports are subject to the same level, structure and changes of protection in every country of destination. Strong liberalisation of the accession countries, particularly Poland and Hungary, meant a very strong drop in effective protection. During 1994-1998 effective protection of Polish economy decreased by nearly 70%. By resulting in a fall of value added it directly influenced the assessment of changes in competitiveness, and – to a much smaller extent – changes in export. Similarly, differentiation of pro-export policies between countries aided expansion or preservation of specialisation, which is a process not necessarily accompanied by improved competitiveness.
7. Some statistical problems also arise. The RCA index is sensitive to the level of aggregation [Donges and Riedel 1977, p.69]. Too high an aggregation can provide too much information, not always of the relevant kind.

## 4. Micro economic approach to competitiveness

In microeconomic approach, changes in competitiveness of the accession countries are evaluated by (a) relative prices, (b) productivity and (c) market share.

### 4a) Relative prices as measure of changes in competitiveness of the accession countries

Three types of price indicators were used to evaluate the changes in competitiveness of the accession countries (annex, table A2):

- a) The unit value of export (nominal sales divided by export volume, expressed in kilograms). This indicator is also available for imports.
- b) “Pure” price, free of influence of structural factors.
- c) Combination of unit export value and other indicators.

The export unit value was evaluated for the period of 1992-1995 Polish exports to Germany as compared with German export to the EU [Burzyński 1997]. For the periods 1989-1991 and 1992-1996, this index was for the Polish export to the EU assessed in comparison with intra-EU and extra-EU trade [Burzyński 1998]. In 1993 low export unit value for 17 out of 20 Polish export sectors, as compared with Germany’s exports, was interpreted as an indication of lower competitiveness of the Polish export. The rise of the export unit value in 17 sectors before 1995 was considered a sign of improvement of its competitiveness [Burzyński 1997].

The export unit cost was used for evaluation of changes in competitiveness of Polish export to the EU as compared against intra- and extra- EU exports [Burzyński 1997, 1999]. Whereas during 1988-1991 this index improved for only 4 out of 20 sectors, from 1992 to 1994 improvement could be seen in 15 sectors. During 8 years (1989-1997), the export unit cost changed very little<sup>5</sup>. Based on this it was assumed that the competitiveness of the Polish export had improved only slightly [Burzyński 1999].

Using export unit cost as measure of competitiveness is intended for heterogeneous markets and differentiated goods. Since all sectors are included in the research, it means that in using the export unit cost one does not consider the differences between homogenous and heterogeneous goods. Changes in this index can also be the result of changes in the export’s production structure, the shifting of export between different market segments that can differ in quality of goods sold [Yoshitomi 1996, p. 68 and later]. These changes – as Marsh and Tokarick [1994, s. 10] stress – do not have direct association with changes in competitiveness.

A more precise tool to measure export competitiveness is using the “pure” price factor, as it is not influenced by changes in export’s commodity and geographical structure on relative prices. It is a type of export unit value weighted by a commodity structure of exports [Burzyńskiego 1997; Marczewskiego 1998]. Using Poland as an example, comparing assessments conducted using this indicator and the export unit cost<sup>6</sup> shows large distortions in values of changes in export competitiveness derived by the latter index.

<sup>5</sup> Compared to intra-EU trade the unit value of Polish exports increased in 9 sectors, while compared to extra-EU trade – in 5 sectors.

<sup>6</sup> During 1992-1994 the rise of competitiveness of the Polish export to Germany measured by export unit cost equalled 1%, but only 0.1% when measured using price indicator.

First of all, the interpretation of changes of relative prices of homogeneous and differentiated goods varies significantly.

Secondly, price differences may be the result of many factors, such as variations in quality and the specialisation of export. An example of the latter would be a segment of cheaper products for which the competitive position of the country's export could be high.

Thirdly, price indicators of export competitiveness do not consider the valuation of changes in competitiveness of production for the domestic market, including exportable production [Marsh, Tokarick 1994].

Recognising the aforementioned shortcomings of price indicators when used to measure evaluation of changes in competitiveness resulted in combining the export unit value with other indicators. For example, aside from the exports unit value Landesmann and Burgstaller [1997] explored the product quality segmentation indicator. Showing extremely high price/quality gaps of CEE-7 and very little representation in the high quality segments of trade with the EU, Landesmann and Burgstaller noticed bifurcation in the trade development of the two groups of CEECs – the “Western” CEECs (Czech Republic, Hungary, Poland, Slovenia) and the “Eastern” CEECs (Bulgaria, Romania and Slovakia).

When assessing competitiveness of CEE-7 for the period of 1989-1994, next to export and import unit value Aiginger [1998] also evaluated indicators of export quality. He revealed price elasticity (allowing to distinguish price – and quality-sensitive markets) as well as indicators of heterogeneity and fragmentation of markets. Basing on the four abovementioned indicators Aiginger concluded that firstly – unit values of exports of the accession countries were very low and did not change over time (with the exception of Hungary). Secondly, the sectors with successful price competition and those with structural problems were much larger for the CEECs-7 than the corresponding sectors in EU countries. “These two differences – small out priced sector, but large structural problem sector – is that which is expected for the countries with low wages and insufficient structural change” [p. 109]. Thirdly, all accession countries perform well in industries highly sensitive to price, but have an extremely high deficit in quality-sensitive industries. They have substantial deficit in moderately quality-intensive industries and a large deficit in qualitatively elastic industries. Fourthly, the accession countries experience deficit in differentiated industries and enjoy surplus in homogeneous industries.

A question then arises whether the aforementioned valuations concerned changes in competitiveness or rather specialisation of the accession countries.

#### **4b) Productivity and unit labour costs as indicators of changes in competitiveness of the accession countries**

Commonly used indicators of changes in competitiveness are: productivity, wages and unit costs including unit labour costs (ULC). Recognising the key role of these indicators in assessing competitiveness changes results both from their strong influence on price changes, as well as assigning them the principal part in winning the competition. These indicators were explored not only for use with evaluation changes in competitiveness [Havlik 2000; 2001], but also for identification of determinants of comparative advantage of the accession countries [Landesmann 2000; 2002; Wolfmayr-Schnitzer 1998; Havlik 1998] (annex, table A3, A3a) or in other words of specialization.

Assuming that the dynamics of comparative advantage rely on the process of levelling-out of uneven productivity, as well as a wage drift across branches, Landesman [2000; 2002] evaluates the branch pattern of productivity, wage and ULC growth of CEE-5 relative to Austria, over the periods of 1991-1998 [2002] and 1991-1999 [2000]. Productivity levels were expressed at constant prices, output

levels compared at purchasing power parity rates, while wage levels were compared at current exchange rates. A cross-industry and cross-country analysis showed that productivity rate growth was more dispersed than wage growth. During the evaluation period, the strongest growth of productivity, slowest rise of wages and largest drop in ULC was experienced by Hungary, particularly in the electronic equipment and transport industries, leaving behind both Poland and the Czech Republic. On the other hand, in 1993 Hungary on average had the highest ULC level in manufacturing, higher than that of the Czech Republic, Poland, Slovakia and Romania [Havlik 1998a, p.170].

Basing on analyses of factor intensities of EU's industry Landesmann distinguished 3 groups of industries: low-tech, resource-intensive and high-tech. Comparing the initial gap in labour productivity and wages and their growth rate, he concluded that the catching-up process in terms of productivity levels was relatively faster in the more technologically-sophisticated industries than in the low-tech industries of the CEE-5. In his opinion, these countries have the potential to increasingly gain comparative advantage in the technologically advanced industries. The principal shortcoming of this type of approach is its basic assumption<sup>7</sup>. Compiling the factor intensities of different industries within the EU and defining the R&D intensity as cumulative R&D flows (five years per employee), Landesmann assumed that cumulative R&D flow per employee and its branch structure in the EU and the CEECs are the same. In reality, not only the R&D level per employee, but the very branch structure of R&D are substantially different in the accession countries than in the EU. Many branches of industry that in the EU are predominantly high-tech may lean towards a more labour intensive profile in the CEECs.

Among unit cost measures the most popular are the ULCs (annex, table A3a). The usage of this indicator is based on an assumption that a high mobility of capital and materials leads to their prices levelling-out on a global scale. However, a relatively low level of workforce mobility causes its price not to level out on that scale. This leads to a variation of ULC between different countries and – after taking into account the differences in work productivity – also to a variation of ULC itself.

The most comprehensive evaluation of changes in labour costs and productivity of the CEE-4 (CEE-3 and Slovenia) for the period of 1990-1998 was presented by Havlik [2000]. In assessing productivity, wages and UCL, while omitting changes in the unit intermediate, unit capital and unit total costs, Havlik points out two important issues. Firstly, that the assessment of wage development varies widely depending on the type of comparison made. In CEE-3, wages paid in foreign currencies have been growing faster than wages paid in domestic currencies. Secondly, the relative unit labour costs (compared to Austria) in more sophisticated branches of industry are lower in the accession countries than in the EU. Simultaneously there are significant differences in magnitude, direction and dynamics of changes between the various accession countries. Since the early 1990s until 1998, the labour cost competitiveness, measured by changes in ULC, has deteriorated in the Czech Republic, Poland and Slovenia, and improved in Hungary. On the other hand, in 1993 Hungary's average ULC for most manufacturing branches of industry was higher than that of other accession countries. If then Hungary has substantially improved its wage competitiveness (measured in ULC), it is still unknown whether at the end of the last decade it has achieved a competitive advantage against the other accession countries.

Different approach to competitiveness measured by productivity (productivity competitiveness) was applied by Monnikhof and Ark [2000]. They present relative levels of manufacturing productivity between the Czech. Rep., Hungary and Poland on the one hand, and Germany on the other, for 1996 and treat productivity as an important component of competitiveness. Concentrating on about 200 products matches of Hungary, the Czech Republic and Poland on the one hand and Germany on the

<sup>7</sup> Production and trade structure analysis is based on the classification method introduced by Legler [1982] building on data from Germany which was further elaborated on by others, to discriminate between high-tech and low-tech sectors and the different sophistication levels of goods. The classification is based on factor intensities across product groups in developed countries.

other they show the differences in unit value between 12 branches of manufacturing of the three accession countries compared to Germany. Quite large differences in relative price levels between them<sup>8</sup> were accompanied by differences in prices structure between two of the (Poland and the Czech Rep.) and Germany. In 1996 for total manufacturing Hungary showed a clear productivity advantage. It was strong in 6 branches out of 12 while in the Czech Rep. – in two branches and in Poland in one branch of manufacturing. The price structure in Hungary was more alike that of Germany than of other two East European countries. Besides Hungary was characterised by relatively low price levels in 5 out of 12 branches while Czech in one branch and Poland – in 2 branches of manufacturing. Making this evaluation Ark states that competitiveness is determined not only by productivity but factors such as customisation of products, after-sales services and quality aspects [Wagner, Ark 1996, p.4] as well as by costs, especially unit labour costs [Monnikhof and Ark 2000, p. 14]. So in his opinion price and productivity do not provide a full picture of competitiveness. This would also require measures of costs, especially ULC.

One of the primary deficiencies of the most of cost analysis is not considering the influence of other unit cost elements, particularly unit intermediate and unit capital costs [Wziątek-Kubiak, Lipowski 2001; Wziątek-Kubiak 2003]. What strongly influenced changes in unit total costs of some accession countries was – aside from changes in ULC – also unit intermediate costs, which are nearly twice as high as ULC. For example, between 1994 and 2000 Polish manufacturing unit intermediate costs increased in a greater number of sectors (three digit NACE Rev. 1) than ULC. In other words, companies in some accession countries have greater problems decreasing unit intermediate costs than ULC. This in turn demonstrates the validity of additionally researching unit intermediate costs in the accession countries, since – as Japan's example [Tang 1992] proves – they are an important element of changes in product competitiveness [see also Kuroda 1996].

Another form of an effectiveness-type indicator for assessing export competitiveness is the index of relative domestic export prices. It is the relation between export transaction prices and costs of production [Marczewski 1998, p. 9-11]. Unit labour costs were assumed to represent domestic costs. It has then been assumed that low labour factor mobility – on a global scale – leads to preserving differences in labour costs. It follows that unification of prices of materials and production factors has occurred also in Poland – up to global levels – labour costs remaining the sole exception. However, in many branches of the industry unit labour costs are lower than unit intermediate costs, and a differentiation of directions of changes in these costs can be seen. The index of relative domestic export prices may, in our opinion, be used to assess changes in competitiveness of export of labour-consuming products.

#### **4c) Changes in market share as measures of changes in competitiveness of the accession countries**

A third method of valuating changes of competitiveness, understood as the result of competition, is the research on changes in market shares (annex, table A4). In literature, market share is seen as the final performance criterion, which reflects the definition of competitiveness as “capacity to sell at a profit” [Artto, 1987, p.47] or to compete in the market [Wziątek-Kubiak 2003]. In this approach, changes in participation of accession countries' export in EU extra-trade are assessed [Sheehy 1995; Landesmann 1995; Havlik 2000], less frequently – their share in apparent consumption of the EU [Graziani 1995] and in OECD countries' import [Wolfmayr-Schnitzer 1998]. Changes in share of production of the accession countries on their domestic markets [Wziątek-Kubiak, Lipowski 2000;

<sup>8</sup> Relative price levels for total manufacturing was of about 50% of the German level for three accession countries.



Wziątek-Kubiak 2003] are altogether rarely considered, although the need for such research is recognised [Durand, Simon, Webb 1992]. Aside from the aforementioned indicators, two other valuations of changes in market share of accession countries' export to the EU have been used: the constant market share analysis (CMSA) and shift and share analysis.

The indicator of share of accession countries' export in EU imports gained some popularity in connection with the EU's fears of the accession countries' expansion onto EU markets [Dobrinsky 1995; Sheehy 1995]. This is why most of these assessments have been conducted in the first half of the last decade, such as periods of 1988-1991 [Landesmann 1995], 1989-1992 [Graziani 1995], 1988-1993 [Sheehy 1995] and 1989-1994 [Wolfmayr-Schnitzer 1998]. Newer assessments have been conducted for periods of 1995-1998 (Hunya 2000), 1989-1997 Havlik [2000] and 1989-1998 [Wziątek-Kubiak, Lipowski 2000] as well as 1994-1999 [Wziątek-Kubiak 2003]. All these assessments include the Czech Republic, Hungary and Poland. Bulgaria and Romania are included less frequently, and Slovakia, Slovenia and Estonia – very rarely (see annex table A4). Using Poland as an example, changes in participation of low – and high-processed products on the domestic market were calculated and analysed for years 1994-1999 [Wziątek-Kubiak, Lipowski 2000] and changes in production of separate sectors of industry (3-digit NACE Rev. 1) were calculated and analysed for years 1994-2000 [Wziątek-Kubiak 2003].

The analysis of changes of share of accession countries' export in EU's external export was combined with assessments of:

- The influence of foreign direct enterprises on changes in market share [Hunya 2000.
- Differentiation of adaptation of product structure of accession countries (CEE-3) to changes in import demand in the EU and their influence on the aforementioned share in market [Wziątek-Kubiak 2000a].
- The change in export specialisation of transformation countries [Grazini; Wolfmayer-Schnitzer; Landesmann, Sheehy], which was measured by: the quality/price gap [Landesman 1995], indicator of ESI [Graziani 1995], structure of exports by factor intensity [Wolfmayr-Schnitzer 1998] and commodity structure of trade [Sheehy 1995].
- The constant market share analysis (CMSA) and shift and share analysis [Halvik 1995; 2000].
- Changes in share of locally produced goods on their domestic market, also including changes relative to ULC and unit intermediate costs [Wziątek-Kubiak 2003].

The aim of research had then been to discover sources of differentiation of changes in market shares between accession countries, but also to find the relationship between these changes and changes in product specialisation of the accession countries on the EU market. The research showed a lack of correlation between changes in market shares and changes in specialisation of the accession countries. Simultaneously, analyses of Polish industry, conducted between 1994 and 2000, demonstrated that in most branches of the industry (around 60% of sectors) there occurred a differentiation of direction of changes between domestic and UE market production. The production's market share was substantially more prone to fall on its domestic market. As research shows, this process is connected with differences in liberalisation of some transformation countries' domestic market with respect to UE products, compared with the liberalisation of the UE market with respect to products of accession [Wziątek-Kubiak 2003].

The results of research on changes in market share as indicators of changes in competitiveness of accession countries have been confirmed by CMSA and shift and share market analyses (annex, table A5). According to the latter, the main source of growth of market share for accession countries' export in the EU extra-import was their improvement of competitiveness.

All conducted assessments of changes in market share of transformation countries' export in the EU extra-trade point to this share rising. According to Graziani this growth started in 1990, when CEE-3's export, combined with that of Bulgaria and Romania, constituted only 0.52% of EU's apparent consumption (in comparison to the developing countries' share, over 5 times as high). Since then, this value has significantly increased, at the expense of other countries. However, its growth varied substantially among the different accession countries and their particular sectors of industry. In this aspect, Hungary progressed most, leaving behind both Poland and the Czech Republic.

The second method of assessing changes in competitiveness as an effect of competition is to use the CMSA and shift and share.

CMSA breaks down the changes in country's share in total EU exports into 5 components: scale effect, regional effect, commodity composition effect, interaction effect and competition effect. Hoen [1998] calculated them for the period of 1985-1995, broken down into three sub-periods. The results show that between 1990 and 1995 competition effects were the principal contributors to changes in export of the Czech Rep., Hungary, Poland and Slovakia, and there were no significant differences among the four countries. The significant impact of competitiveness changes on growth of export of some accession countries to the EU is also confirmed by results of calculations performed by Havlik [1995, p. 145], based on the shift and share analysis. They reveal that 85% of the total increment in UE imports from the CEE-3 during 1989-1992 and 70% in 1993-1997 was attributed to improved competitiveness of these countries' industries on the EU market.

## 5. Conclusion

Research on competitiveness changes of accession countries was conducted within 3 literary approaches to competitiveness: macro, micro and trade. Researchers concentrated mainly on 3 countries – Poland, Hungary and the Czech Republic, while Slovenia, Slovakia, Bulgaria and Romania were less often included. The majority of research was conducted for periods before 1995. In most evaluations of competitiveness their authors based on few criteria of assessment, out of which the one indicator had prime importance. It often occurred that in introducing industry classification based on factor intensity, changes in competitiveness of particular sectors were also assessed. However, industry was not classified based on the level and changes in productivity of the accession countries.

1. Research conducted within the macro approach showed that Hungarian economy's competitiveness position was improving against that of Poland and the Czech Republic. It was only in the year 2000 that the other accession countries had first been included in the ranking.
2. In the trade approach the competitiveness of the accession countries was assessed using the RCA index, which is also considered an indicator of specialisation. This research was conducted until 1998, with most assessments concentrating on the period before 1995, and classifies industry based on factor intensity. It showed that CEE-3 countries have decreased their competitiveness supremacy in labour-consuming products, but were closer to closing the gap in the high-tech sector. The continuing differentiation in specialisation (also described as competitiveness) between the accession countries, particularly the CEE-3 and CEE-2, has been underlined, as has Hungary's outstanding position in this respect.
3. In the micro approach assessments of changes in competitiveness of the accession countries have been conducted based on the following indicators: (a) price, (b) productivity, wages, ULC and (c) market share.

Using unit values to assess changes in competitiveness, it has been found that the strongest growth in terms of export goods occurred in Hungary. It was relatively smaller in the case of the other accession countries. This assessment of competitiveness, conducted with the use of unit values of exports, was supplemented with other indicators, such as the unit value of imports, trade balance, price elasticity and the level of market segmentation. Classification of industry based on factor intensity was also used.

In researching changes in productivity and ULC, a significant drop in ULC, resulting from quick growth of productivity in manufacturing, has been found to have occurred in Hungary. In Poland, and particularly in the Czech Republic, the ULC worsened. Thus in the period before 1998 Hungary was making up the ULC and productivity gap which separated it from Poland and the Czech Republic. With the exception of research on Polish industry, changes in unit intermediate, unit total cost and profitability of the manufacturing sectors have not been analysed in research on unit cost changes. The research on Polish industry proves the strong influence of unit intermediate costs on changes in industry's competitiveness, but also demonstrates the lack of profitability of some sectors of industry in medium-term.

In market structure assessments authors concentrated on analyses of changes of market share of accession countries' export in EU extra-trade. However, changes in participation of these countries' exports in the total trade of the EU or EU's apparent consumption have not been evaluated (with the exception of Graziani's research for the year 1990). The majority of research was conducted for periods before 1995. In the few valuations concerning years up to 1999 their authors stressed the differentiation between market shares of accession countries' exports in EU's extra-import. The

biggest improvement in this respect was achieved by Hungary, ahead of Poland, the Czech Republic and Slovenia. With the exception of analyses of the Polish industry, changes in local production's domestic market shares were not analysed for the accession countries, and these changes were not compared against changes in their export's participation in EU's extra-import or changes in productivity. With the exception of analyses of the Polish industry, the influence of market liberalisation in accession and EU countries on changes in competitiveness values was not considered. What was however considered was the influence of foreign investment on differentiations of changes in market share for accession countries' export in EU's extra-import.

This research on literature concerning competitiveness of the accession countries demonstrates that further research in this area should include assessments of:

1. Performance competitiveness; mainly assessments of changes in market share of accession countries' export in the apparent consumption and total trade of the EU, as well as changes in participation of these countries' production on their domestic markets.
2. Factor competitiveness; particularly changes in productiveness, unit labour, unit intermediate and total factor productivity – using a subjective approach, that is compared with other countries, particularly those that form the EU.
3. A confrontation of changes in performance and factor competitiveness and an explanation of the sources of their differentiation, including the influence of factors unrelated to effectiveness
4. Factor intensity of particular branches of manufacturing industry in accession countries, in order to verify whether it is the same as in the EU.

On the other hand there is an urgent need to continue theoretical research on relationship between competition and competitiveness as well as need to introduce the competition processes into the theory of integration.

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**Table AI. RCA in trade between the CEECs and the EU as a measurement of competitiveness of the accession countries**

Author	Countries	Years	Sectors	Measures	Results
Sheehy [1995]	CEE-3, CEE-2	1988-1992	Industry (NACE 2-digit level)	RCA called export performance ration and export specialization index	a) Very strong specialization of CEECs in comparison with non-EU countries exporting to the EU. b) Significant changes in export specialization of CEECs on the EU market. Mineral products, clothing and footwear remain a CEECs specialization while specialization in food and wooden products decreased. Specialization increased in metal products. c) Trade restructuring is very dependent on domestic industrial restructuring.
Dobrinsky [1995]	CEE-5 (Poland, Czech Rep., Hungary, Bulgaria, Romania)	1984-1985 and 1991-1992	Manufacturing (NACE 3-digit sectors)	a) RCA as a static measure of specialization b) ESI – dynamic measure, c) concentration of exports index	a) Export structures of the CEECs are quite similar in many aspect. CEECs face strong competition in the part of the other CEECs and protectionist measures on the part of the EU in sectors of absolute competition b) CEECs are in not homogenous with respect to their trade performance vis a vis the EEU. c) Hungary and the Czech Rep. appeared as the most advanced in the process of their trade restructuring. Bulgaria and Poland have highest concentration of exports in sectors with dynamic RCA
Misala [1996]	Poland	1992-1995	Polish industry	RCA and coverage ratio (CR)	a) Worsening RCA index for total exports b) Improving CR for material-, labour and high-tech-intensive sectors, while worsening for capital-intensive exports
Havlik [1998]	CEE-7	1989-1995	Manufacturing (NACE 3-digit)	RCA revealing emerging specialization pattern versus x-factor-intensities	a) Most CEECs display highly significant positive correlations between RCA and labour- and energy-intensive industries while having comparative disadvantages in skill-, R&D- and capital-intensive industries b) Little changes in specialization patterns in the Czech Rep., Slovakia and Slovenia. c) Hungary's trade restructuring the most pronounced of all CEECs while Polish and Romanian specialization patterns hardly changed
Wolfmayr-Schintzer [1998]	CEE-7	1989-1994	Manufacturing by technology classes classification	a) RCA index (in trade with OECD) as a measure of trade specialization b) Share in OECD market	a) In terms of RCA Poland ranking was behind Hungary, Slovenia and the Czech Rep. but better performs with respect to market shares b) The Slovak Rep. – extremely high share in the OECD market for human capital intensive industries as Bulgaria and Romania do. c) Slovenia's market share – high for medium technology products
Freudenberg, Lemoine [1999]	CEE-7 And 3 Baltic States	1993-1996	Industry (NACE 2- and 3-digit)	RCA index and trade balance as measures of specialization	a) CEE – increased their comparative advantage in some tradition industries while sectors which are at the core of structural weaknesses are responsible for large and widening structural deficit (like chemicals in Hungary, Czech Rep. Slovakia and machinery and equipment in Hungary and Poland b) The Baltic states strengthen their comparative advantage in sectors intensive in natural resources. Lithuania and Estonia increased comparative disadvantage in engineering industries while Latvia decrease its disadvantages
Landesmann (2000; 2002)	CEE-7 compared to Greece, Portugal, Spain, Ireland and Turkey	1989-1998	a) Exports of manufactures (NACE 2 digit level);	RCA of trade flows between the CEECs and the EU were calculated for the representation of the 10,20 or 30 most x-factor-intensive branches (x stands for capital, labour, R&D, skill and energy) out of the full sample of 3-digit NACE industries	a) Differentiation among the CEECs in trade performance with the EU. b) The more advance of the CEECs change their specialization profile relative to the EU. Specialization in labour-intensive branches was substantially reduced while specialization disadvantages in other branches declined substantially. Particularly remarkable are the developments in Hungary's trade structure with the EU. c) The CEE-2 specialization profile is typical for less developed economies. Poland occupies a position in between
Havlik [2000]	CEE-4 (Poland, Czech Rep., Hungary, Slovenia)	1989-1997		RCA versus x-factor intensities	a) 80% of all CEECs' industries in 1996-1997 as compared with 1993-1994 experience declining RCA and aggregate competitiveness of manufacturing worsened b) An improvement of RCA in a small number of industries (more in Poland and less in Hungary and Slovenia). c) No apparent general pattern in RCA changes either in the correlation among individual CEECs or in the correlation with different x-factor intensities d) Most CEECs display highly positive correlations between RCA and labour- and energy-intensive industries, while having comparative disadvantages in skill-, R&D-, and capital-intensive industries

CEE-3 comprises the Czech Republic, Hungary and Poland.

CEE-5 comprises the Czech Republic, Hungary, Poland, Slovenia and Slovak Republic.

CEE-2 comprises Bulgaria and Romania.

**Table A2. Price competitiveness of the accession countries**

Author	Countries	Years	Sectors	Measures	Results
Landesmann (2002)	CEE-7	1989-1996	a) Exports of manufactures (NACE 3 digit level)	export unit value	Very fast catching-up process in export unit values for CEE-5 while CEE-2 lag far behind
Ladesmann, Burgstaller [1997]	CEE-7	1988-1990, 1992-1994	Exports of manufacture (at the 8-digit CN) and 3-digit NACE	Export unit value, product quality segmentation indicator (high, medium- and low-quality)	a) Extremely high price/quality gaps of CEECs and very little representation in the – high quality segments of trade with the EU b) Bifurcation in the trade development of the groups of CEECs - the “Western” CEECs (the Czech. Rep., Hungary, Poland, Slovenia) and the “Eastern” CEECs (Bulgaria, Romania and Slovakia)
Aiginger K. [1998],	CEE-7	1989-1994	Exports of manufactures (SITC 5-8)	1. exports unit value 2. revealed prices elasticity 3. market heterogeneity and fragmentation	a) Very low exports unit value of the accession countries b) The unit value of exports did not change (with the exception of Hungary) c) The sectors with successful price competition is larger for the CEECs, with structural problems is the largest, d) Positive performance in highly price sensitive industries and an extremely high deficit in the quality sensitive industries
Burzyński [1997]	Poland	1989-1991, 1992-1998	Exports of manufactures (at 2-digit CN)	1. Export unit value (EUV) 2. Export prices indicator	a) EUV very low in 1993 in 17 out of 20 sections b) Increase of EUV in 17 sections c) A strong impact of changes in commodity structure of exports on EUV
Burzyński [1998, 1999],	Poland	1989-1997	Exports of manufactures (at 2-digit CN)	Export unit value (EUV)	a) Improvement in EUV to 1995 and its stability till 1997

**Table A3. Evaluation of changes in competitiveness of the accession countries by measure of productivity**

Author	Countries	Years	Sectors	Measures	Results
Landesmann (2002)	CEE-3 relative to Austria	1991-1998	5 sectors at the NACE 2-digit level (textile, leather, machinery, electrical equipment and transport)	Dynamics of productivity expressed at constant prices (with output levels compared at PPP)	a) Highest for electrical equipment and transport, the lowest for textile and leather products. b) Top position of Hungary in terms of dynamics of productivity growth except for leather and textile
Landesmann (2002)	CEE-3 relative to Austria	1991-1997	NACE 2-digit manufacturing industries divided into three subgroups (low-tech, medium-/high-tech and resource-intensive)	initial gap relative to Austria and rate of decline in the gap	a) The high-tech industries (which showed the highest initial gap) experienced the highest productivity growth rate. b) Low-tech industries which show an initial gap comparable to the hi-tech industries) experienced a very low growth rate in the closure the gap for the branches within the group c) The resource-intensive branches show the lowest initial gap on average and a relatively high growth rate in the closure of the gap
Landesmann (2000)	CEE-7 relative to Austria (Austria 1996= 100)	1991-1998	a) 5 sectors at the NACE 2-digit level b) NACE 2-digit manufacturing industries divided into 3 subgroups	initial gap relative to Austria and rate of decline in the gap	a) CEE-5 are catching in productivity levels relatively faster in the technologically more sophisticated industries than in the low-tech industries b) The rate of closure of a productivity gap would be higher in those industries in which the initial gaps were the greatest. c) The impact of FDI across branches
Havlik [2000]	CEE-3 and Slovenia	1990-1998	Manufacturing (2-digit NACE)	productivity	a) The productivity of manufacturing ranged between one third and one half of the Austrian level depending on the price level indicator used b) The good productivity performance of Hungary's manufacturing industry, better than in the Czech Rep. and relatively poor standing for Slovenia c) Manufacturing industry labour productivity levels for 4 CEECs are roughly the same d) Much larger productivity than wage differences across individual manufacturing branches e) Large dispersion of manufacturing labour productivity in the Czech Rep., Poland and Slovenia
Monnikhof, Ark [2000]	Czech Rep., Hungary, Poland Compared to Germany	1996	About 200 product matches within 12 branches of manufacturing	Price competitiveness and productivity competitiveness	a) On average, manufacturing process were about half of those in Germany for all three accession countries b) The price structure in Hungary was more alike that of Germany than in the other two East European countries c) Hungary was characterised by relatively low price levels in out of 12 branches while Czech in one branch and Poland – in 2 branches of manufacturing d) For total manufacturing Hungary shows a productivity advantage. It is strong in 6 out of 12 branches, while in Czech – in two branches and in Poland in one branch of manufacturing e) Price and productivity do not provide a full picture of competitiveness. This would also require measures of costs.
Marczewski [1998]	Poland	1994-1997	Industry	Relative domestic export prices (RDEP)	RDEP decreased in 1994-1997. It increased in 1997 but did not reach 1994 level
Hunya [2000]	CEE-3, Slovenia and Estonia	1993-1998	manufacturing	Productivity gap between foreign investment enterprises (FIEs) and domestic enterprises (DEs) in sales per employee and sales per assets	a) Labour productivity in FIEs is on average two times higher than in DEs b) Labour productivity gap between FIEs and DEs increased in Hungary and Poland and remained unchanged in the Czech Rep. Convergence of labour productivity between DEs and FIEs in Slovenia and Estonia indicate some spill-over effect coming from foreign firms c) Endowment with capital is higher in the FIEs than in the DEs. However capital productivity is higher in FIEs than in DEs in the Czech Rep., Poland and Slovenia. It is especially high in Hungary and significantly lower in Estonia..
Hitchen and others [1995]	Czech Rep. Hungary and Germany	1993	Sample of manufacturing plants	Productivity	The Czech productivity was 18% of the 1988 West Germany level, while Hungary – 20%

**Table A3a. Evaluation of changes in competitiveness of the accession countries by unit labour cost**

Author	Countries	Years	Sectors	Measures	Results
Landesmann (2002)	CEE-3 (Poland, Czech Rep. Hungary) relative to Austria	1991-1998	a) 5 sectors at the NACE 2-digit level b) NACE 2-digit manufacturing divided into 3 subgroups (low-tech, medium-/high-tech and resource-intensive)	Dynamics of ULC expressed at constant prices (with output levels compared at PPP)	a) The initial gap of wages is higher than that of productivity levels in three subgroups and much more similar across industries, almost the same in the medium/high-tech and resource-intensive industries, and a little lower in the low-tech industries b) In the low-tech and resource-intensive industries the wage growth rate is higher than the productivity growth. In the medium/high-tech industry the wage growth rate was lower than productivity growth
Landesmann (2000)	CEE-7 relative to Austria	1991-1999	a) 5 sectors at the NACE 2-digit level	ULC	a) Catching up of wages is much more similar across the branches within the CEE opposite to ULC
Wziątek-Kubiak, Lipowski [2000]	Poland	1994-1998	High- and low processed branches of industry at NACE Ref. 1, 3 digit level	ULC	a) ULC increased in most low processed industries
Wziątek-Kubiak [2003]	Poland	1994-2000	Industry at NACE Ref. 1, 3 digit level	ULC	a) ULC decrease in most branches on Polish industry while the unit intermediate cost increased in most cases
Havlik [2000]	CEE-3 and Slovenia	1990-1998	Manufacturing at NACE 2-digit	ULC	a) In most CEECs industrial ULC grew less strongly than in the economy as a whole, largely due to much more pronounced productivity improvements in this sector b) Rising ULC in the Czech rep. and Poland, moderate growth in Hungary and less in Slovenia c) The highest total ULC were registered in Slovenia (46% of the Austrian level), followed by Poland, Hungary (22-24%) and Czech Rep. (21 %).
Fassman [1996]	Czech Rep. Compared to West Germany and Austria	1993	Industry	Aggregate Czech ULC	Aggregate Czech ULC was 23% of the West Germany and Austrian level

**Table A4. Evaluation of changes in competitiveness of the accession countries by market share**

Author	Countries	Years	Sectors	Measures	Results
Sheehy (1995)	CEE-3 and CEE-2	1988-1992	Manufacturing	The shares of CEECs exports in EU extra- trade	The CEECs export increased its share in extra-EU manufacturing imports from 2,8% to 4,6%
Landesmann (1995)	CEE-3	1988-1991	Manufacturing	Share of CEEE-3 export in EC-6 market versus quality/price gaps	Results were ambiguous as far as levels and trends in quality gap and market share are concerns. Increasing quality gap in some branches of industry were accompanied by increasing market share
Havlik [2000]	CEE-3 and Slovenia	1989-1997	Manufacturing	Share of exports of CEE-4 in EC(12) extra-trade	a) Emerging of the new and distinct pattern of trade competitiveness and restructuring of CEEC-4 after 1993 as compared to the period before 1993. b) Selections of “competitive losers” and “winners”. Clear loser over the whole period were parts of the food processing industry in Hungary and Poland. Most recently – clothing, footwear, furniture – all industries which were view as highly competitive before 1993
Wziętek-Kubiak, Lipowski [2000]	Poland	1994-1999	High- and low-process branches of industry	Share in domestic market and in the extra-trade of the EU (15)	a) Stable share of low processed branches in domestic market while decreasing share of the most of high-processed branches. b) Share of high-processed branches in the extra-import of the EU increased
Wziętek-Kubiak [2003]	Poland	1994-1999	Profitable in at least 3 years branches of industry	Share in domestic market and in the extra-trade of the EU (15)	a) Among 81 profitable branches of industry 10% decreased share in both domestic and the EU market while 28% – increased this share. 58% branches decreased its share in domestic market while increased – in the EU market b) No correlation between changes in market share and changes in productivity

**Table A5. Evaluation of changes in competitiveness of the accession countries by constant market share and shift and share analysis**

Author	Countries	Years	Sectors	Measures	Results
Havlik (1995)	CEE-3	1989-1992	NACE 3-digit data on CEE trade with the EU-6	Shift and share analysis	Above 80% of export increment in the EU imports from the three CEECs was attributed to the improved competitiveness. The biggest competitiveness gains were recorded by Czech Rep (91%), Poland (82,1%), and Hungary (79,5%).
Havlik (2000)	CEE-3 and Slovenia	1993-1997	NACE 3-digit data on CEE trade with the extra EU (12) imports	a) Shift and share analysis b) x-factor intensities for most competitive industries in exports to the EU	a) About 70% of the CEECs 1993-1997 export increment can be attributed to “competitive gains” of market shares in the EU whereas the effect of “general demand growth” was much smaller and the “structural effect” was actually negative. b) The largest competitive gains were recorded in a heterogeneous mix of industries, but unlike the initial period till 1993 a larger number of more sophisticated branches of industry recorded competitive gains c) Correlation of x-factor intensities of successful export industries and market share was positive only for energy intensive industries in Poland while significant negative correlation of skill intensity and market share in Poland and the Czech Rep.
Hoer [1998]	CWW-3 and Slovakia	1985-1990, 1990-1993, 1993-1995	Exports of manufacture to the EU (SITC 01,1-8)	Constant market share	In 1990-1993 above 85% of CEECs exports increment to the EU-6 was result of competition effect. In 1993-1995 – over 58%. In 1993-1995 the biggest competition effect was in recorded in Slovakia (78%), the smallest – Hungary (58%).