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Determinants of Industrial Location Patterns in CEECs

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Determinants of Industrial Location Patterns in CEECs

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Abstract

We describe concentration tendencies in individual manufacturing industries in Central and Eastern European countries and identify relevant factors causing these patterns. Using output and employment data for 14 manufacturing industries over the years 1993-2002, we observe an increase in concentration of industrial activity (both in output and employment terms). This is opposed to the general trend prevailing in Western Europe over the same period. Using panel estimation techniques, we explain these developments by factors derived from traditional trade theory (differences in endowments or technologies), new trade theory (expenditure patterns, scale economies) and new economic geography (backward and forward linkages, transport costs). Concentration is driven by differences in human capital and the local concentration of demand. While output concentration is strongly influenced by productivity differentials, concentration of the labour force is strongly related to wage differences. Differences in productivity levels influence output concentration patterns in all industries, while the relevance of other factors varies across industries.

Keywords: location of industry, relative and absolute concentration, Central and Eastern Europe

JEL classification: C21, F14, F15, L60.

Antje Hildebrandt and Julia Wörz

Determinants of industrial location patterns in CEECs*

1 Introduction

The process of European integration certainly had a strong impact on the industrial landscape in Europe. The single market programme brought about an increased mobility of production factors within the EU-15. On the one hand this allowed for a more efficient allocation of resources, on the other hand it also permitted a more equal distribution of key resources across Europe by facilitating the exchange of knowledge and ideas, with a positive influence on the diffusion of new technologies. In the early 1990s, the Central and Eastern European countries (CEECs) rapidly re-oriented their external relations towards Western Europe. The Europe Agreements have substantially reduced trade barriers and transport costs between East and West. All this has shaped the distribution of industrial activity in Europe.

In this paper we analyse the changes in industrial specialization and concentration patterns among the CEECs that took place during the transition period. We will confine our attention to the industrial sector, and here to manufacturing in particular, as this sector experienced a radical opening-up to international competitors through trade and investment flows, experiencing a far greater extent of structural change than all other sectors of the economy.

There exists already a relatively large body of literature dealing with the location of industry. In general, this literature analyses regional specialization patterns, often at a rather detailed level of regional disaggregation. Numerous studies for the US (e.g. Ellison and Glaeser, 1997, Hanson, 2002) and the EU (e.g. Amiti, 1999; Brühlhart, 1998; Haaland et al., 1999) exist, whose results seem to depend crucially on the time period covered. Due to an obvious lack of data until very recently, Central and Eastern Europe has been left out of most European studies. We try to fill this gap by analysing a relatively new and comprehensive set of industry-specific time series at the national level. Thus, our breakdown is by industries rather than by regions. Existing studies for Western Europe at the industry level make clear that developments seem to have been quite diverse over the past few decades, with alternating periods of increasing specialization/concentration and diversification.

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Clearly, the history of industrial specialization patterns in Eastern Europe has been subject to very specific conditions, thus leading to a distinct industrial structure up until the start of the transition. The fall of the Iron Curtain implied the collapse of the Council for Mutual Economic Assistance (CMEA) which was formally dissolved in 1991. Under the CMEA system, industrial specialization patterns were more or less predetermined and sustained through the accordance of central plans of all involved countries under Soviet hegemony. The rapid re-orientation towards Western European trading partners that was observed immediately after 1991 resulted, on the one hand, from the strong interest to reduce economic dependence on the former Soviet Union and, on the other hand, from the desire to catch up with the economically far more advanced Western European countries (Richter, 1997 and 2001). Given these motivations, it does not seem surprising that the CEECs first engaged in contracts with partners in Western Europe and the European Union before concluding agreements between each other. Thus, the far-reaching bilateral Europe Agreements[1] between individual CEECs and each member of the European Union as well as the Union itself were signed in the first half of the 1990s and some of them predated the Central European Free Trade Agreement (CEFTA) from 1992, which is a pure free trade agreement, again on a bilateral basis. This explains why during the 1990s no integration process among the CEECs could be observed. Each country was pursuing a policy of integration with the Western world while being reluctant to intensify relations with former communist partners. For example, roughly 90% of industrial goods can be traded freely inside CEFTA since 1997. Also, since 1998, CEECs' industrial exports to the EU are free from tariffs.[2] Thus, when speaking of the impact of integration on industry location in the Eastern European context, this has to be seen as a bilateral East-West integration rather than a regional Eastern European integration process.

The paper is organized as follows: Section 2 describes the patterns of industrial specialization in EU-acceding countries and compares these developments to those in the EU-15. Section 3 explains industrial concentration within the region using a panel data set of 14 industries and ten years. Section 4 looks at the factors that drive specialization within individual industries using a panel data set of eight countries and ten years for each industry. Section 5 concludes.

[1] The Europe Agreements are not restricted to economic issues and include *inter alia* political, financial and cultural cooperation as well as general regulations, movement of workers, etc.

[2] The asymmetric nature of the Europe Agreements implied that EU exports to CEECs were subject to tariffs up to 2000.

2 The Evolution of geographic concentration in Central and Eastern European countries

2.1 Measuring geographic concentration

Our database contains data for ten CEECs (Bulgaria, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovak Republic and Slovenia) from 1993 to 2000. This period allows us to analyse the impact stemming from the transitional change and from the CEECs' stronger trade integration with the European Union. Our starting point – 1993 – has the clear advantage of the data not being blurred by the transformational recession, which was largely over in most transition countries by 1993. Data on output, employment, wages and inward FDI stocks for 14 manufacturing industries were taken from the wiiw Industrial Database.[3] Data on exports and imports (total and to/from the EU) were taken from UN COMTRADE. Industries are classified according to NACE, Rev. 1 subsections DA to DN. All values are in euro, converted at current exchange rates. The measures of the degree of geographic concentration are based on output data at current prices[4] as well as on employment data.

In the period under review, the structure of manufacturing changed broadly in CEECs. In 1993, the three largest countries in terms of output – Poland, the Czech Republic and Romania – accounted for as much as 67% of manufacturing production in the region. By the year 2000 Romania had fallen behind and Hungary had advanced to the third rank, with the share of the three largest countries having increased to 74%. In terms of employment, Poland, Romania and the Czech Republic also ranked first to third in 1993. At the time, 68% of all manufacturing employees of the region worked in these three countries; this share increased to 72% by 2002.

Before looking at the geographic concentration patterns in Central and Eastern Europe, let us explain our measure of concentration in more detail. To start with, the issue of specialization versus concentration should be set out clearly. While the two concepts are strongly linked – both describe convergence or divergence of industrial structure, in terms of output, employment, trade patterns and the like – they do not describe exactly the same developments. Specialization is measured across countries and relates to increasing differences in industrial structure between individual countries. Concentration is measured with respect to individual industries and refers to the question whether certain industries locate only in certain regions or countries as opposed to a pattern where output is homogeneously dispersed across all countries. The two often coincide such that increasing

[3] wiiw Industrial Database Eastern Europe, June 2004.

[4] There are various other ways to measure the size of an industry (for instance, employment or value-added data). Apart from the fact that value-added data are not available for all CEECs, production output data are less affected by structural shifts from outsourcing to other sectors than value-added data (Midelfart-Knarvik, 2002).

specialization is observed together with increasing concentration.[5] This leads us to our measure of concentration. In the literature on geographic concentration, a variety of approaches to measure the degree of concentration can be found. We decided to use a measure of relative concentration (i.e. adjusting for differences in country sizes) in accordance with Haaland et al. (1999) which is a modified form of the Hoover-Balassa-Index:

$$CIP_i^R = \sqrt{\frac{1}{c}\sum_j \left(\frac{X_{ij}}{\sum_j X_{ij}} - \frac{\sum_i X_{ij}}{\sum_i \sum_j X_{ij}} \right)^2}$$

The value of production is denoted by X_{ij},[6] the index i refers to industries and j to countries.

Total industry i production in the CEECs is depicted by $\sum_j X_{ij}$ and

the share of production in industry i carried out in country j is thus $\frac{X_{ij}}{\sum_j X_{ij}}$.

The term c indicates the number of countries in our sample.

Finally, $\frac{\sum_i X_{ij}}{\sum_i \sum_j X_{ij}}$ reflects country j's share in all ten countries' total manufacturing production.

Relative concentration measures the degree to which industries are more strongly represented in specific countries than is the case for the respective country's weight in overall production. Thus, an industry is relatively concentrated if its output is more concentrated than total manufacturing (or economy-wide) output in the area. Consequently, high relative concentration implies also a high degree of country specialization.

2.2 The evolution of relative concentration

Over the period 1993-2000, the regional concentration of production in Eastern Europe increased in relative terms, which – according to our measure of relative concentration –

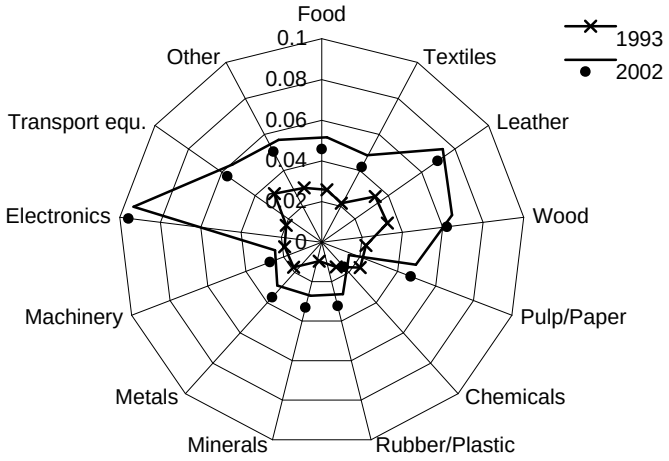
[5] If countries differ in size, e.g. one country is twice the economic size of its trading partner, one industry could be concentrated in this country, while the country itself would remain unspecialized. This example, however, refers to an absolute measure of concentration, which is not used in this paper.

[6] For the concentration indices based on employment data X_{ij} refers to the number of people employed in sector i in country j.

implies that the CEECs became at the same time more specialized.[7] There is one exception: concentration decreased in the chemical industry, causing the latter to rank last in 2002 (see Table A1 in the Appendix). This reflects a general decline of the chemical industry (and a stronger decline in those countries in which it was formerly more strongly represented), which led to a more dispersed production structure. The manufacturing of electrical and optical equipment experienced the largest increase in the degree of concentration, reflecting Hungary's strong specialization in this field (in 2002 the electrical and optical equipment industry accounted for almost 30% of Hungarian manufacturing). Further, the leather industry showed a pronounced increase in concentration, with Romania increasing its share in this industry from 15% to 25%. In addition, the concentration level of the wood and wood products industry increased significantly, given that the Baltic states, in particular Latvia, specialized more strongly in this industry. Also, the production of pulp and paper became more strongly concentrated in relative terms.

Figure 1

Relative concentration in CEE manufacturing output



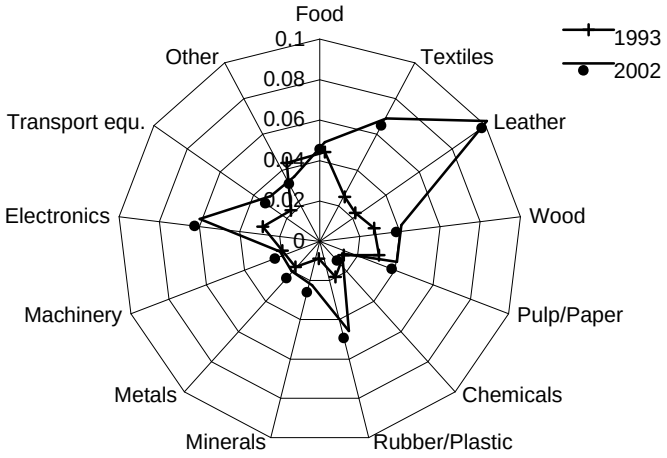
Employment data also show concentration of the labour force to have increased in general. Particularly employment in the leather and leather products industry became more concentrated (see also Table A2 in the Appendix). This may be traced to an increase of employment in this industry in Bulgaria and Romania, which are the two largest countries in terms of total employment and have traditionally been dominant employers in this industry. Some smaller countries, e.g. Bulgaria, have increased the share of employees in

[7] At first sight, this observation of increasing specialization stands in contrast to the observation of increasing intra-industry trade between the CEECs and the EU-15 during the same period (Fidrmuc and Djablik, forthcoming). Increasing intra-industry trade clearly implies decreasing specialization. This apparent discrepancy may be explained by the fact that we look at intra-CEEC patterns of specialization, while Fidrmuc and Djablik analyse trade between the EU-15 and CEECs. Furthermore, the level of disaggregation used in the two analyses is different. We use manufacturing data for only 13 industries whereas the mentioned study uses data at a much more disaggregated level.

this sector, while the leather industry lost in importance as a place of employment in all other sample countries. In 2002, this industry was by far the most concentrated industry in terms of employment. In addition, employment became more concentrated in textiles, electronics, and rubber and plastics. The degree of concentration dropped only in the chemical industry and in other manufacturing branches, not classified elsewhere.

Figure 2

Relative concentration in CEE manufacturing employment



2.3 Comparison CEECs–EU

An analysis of the afore-described structural changes raises the question whether the development in the CEECs corresponds to production and employment patterns in the EU member states. We calculated corresponding geographic concentration indices for the 15 EU countries for the years 1985, 1993 and 2002. The time period allows us to draw some conclusions on the extent to which stronger economic integration has influenced geographic concentration in the EU.

From 1985 to 1993, which can be considered the 'pre-Single Market period', geographic concentration with regard to employment data increased in 11 (out of 13) industries. In 1985 the three most concentrated industries were the manufacturing of leather and leather products, the machinery industry and the textile industry. The least concentrated industries were represented by chemicals, rubber and plastic products and basic and fabricated metals. The period from 1993 to 2002, which may be termed 'Single Market period' and which corresponds to our observation period for the Central and East European sample, was characterized by a general decrease of concentration. Based on employment data, concentration decreased within seven industries. The ranking of industries according to their degree of concentration changed as well. Most strikingly, the production of transport

equipment ranks among the most concentrated industries; this industry became located in Germany in particular. The manufacturing of leather and leather products has become the most concentrated industry, due to the fact that Italy is strongly specialized in this industry.

The evolution of concentration is less clear-cut with regard to indices based on production data. Over the period 1985 to 1993, concentration increased in nine industries. From 1993 to 2002 there was a decrease in nine industries. The ranking of the most and least concentrated industries is almost equal to the concentration ranking based on employment data.

What are the most striking similarities and differences between the evolution of geographic concentration in the CEECs and in the EU, and what conclusions may be drawn? Overall, Central and Eastern Europe has experienced a substantial amount of structural change since the start of the transition process, which has led to greater similarities both among the individual countries in the region and vis-à-vis the EU-15 (see Urban, 2000; Landesmann, 2003a; Landesmann 2003b). Convergence results from the relative decline of initially important labour-intensive and low value-added activities. As we have seen, from 1993 to 2002 the concentration of the manufacturing industries in the CEECs increased both to higher levels and by a higher percentage than in the EU during the 'pre-Single Market period'.

However, the ranking of industry types according to the degree of concentration in CEECs deviates to a large extent from the structure which can be found in the EU-15. Furthermore, in the EU the correlation between concentration indices based on employment and on production data is very high, whereas this correlation is very low in CEECs. This can possibly be ascribed to the time lag between the adjustment of output and employment and relates to the prevalent lower level of productivity in Central and Eastern Europe compared to the EU-15 countries.[8] Initially low levels of productivity allowed for rapid catching-up. This productivity boost could lead to changes in concentration in output levels that were not accompanied by changes in employment concentration in the same industries.

3 Explaining concentration inside CEECs

3.1 Theoretical determinants

In our attempt to explain the observed increase in industrial concentration in Central and Eastern Europe we use a broad set of explanatory variables motivated by different trade

[8] In 2001, labour productivity for the manufacturing industry (converted with 1996 purchasing power parities for gross fixed capital formation) ranged between 10% (Bulgaria) and 41% (Hungary) of the productivity level reached in Austria (wiiw, 2003).

theories. Differences in productivity levels among industries are intended to capture *technological differences* and thus comparative advantages, which are at the heart of traditional Ricardian trade theory. Large differences in relative productivity levels among industries, adjusted for the country's overall productivity level, are expected to have a positive influence on the concentration of an industry.

In a Heckscher-Ohlin model, stronger differences in endowment structures will induce a higher degree of concentration given that industries differ in their use of individual endowments as factors of production.[9] We include three types of production factors explicitly in the analysis: *Labour intensity* of an industry is measured as its employment to output ratio relative to the mean ratio in CEECs' manufacturing. *Human capital intensity* is measured by the deviation of industry-specific human capital in each country from the industry mean, correcting for the country's overall human capital intensity.[10] Further, we include a measure of *foreign capital intensity,* for the following reason: although FDI, because of its mobility by definition, is to a large part endogenous in the concentration process, it can be seen as an exogenous factor in the case of CEECs because of its strong correlation with the privatization programmes in these countries. Economic developments in all transition economies were naturally heavily influenced by privatization in those countries. Further, privatization has dominated FDI inflows to a large extent (Kalotay and Hunya, 2000). However, privatization policies have been very distinct in the individual CEECs. While Hungary pursued a policy of early privatization via the capital market, thus attracting large FDI inflows into all sectors, the voucher privatization in e.g. Romania and Bulgaria implied that foreign capital was kept out of the country for a relatively long period. Poland started to privatize state-owned firms at a later point in time; thus FDI inflows occurred at a later stage. Consequently, the timing and industrial spread of foreign capital inflows into the individual CEECs differed because of the different privatization policies. Thus, FDI inflows may be seen as exogenous in this analysis. In addition, FDI brings with it its own endowments (knowledge and technologies) and reinforces other factors (Ricardian factors, scale economies, and also demand patterns). Thus, it seems important to include FDI separately in the analysis. *FDI intensity* is calculated analogously to labour intensity, using the ratio of FDI to output.

New trade theory postulates that even in the absence of such differences, *scale economies* may induce specialization among countries and thus relative concentration. As we are unable to measure scale economies directly, we use estimates from Forslid et al.

[9] As we are only interested in whether or not industries are concentrated, all that matters is whether or not an industry is intensive in the use of a certain factor. Thus, we only look at deviations in factor use from the mean, regardless of whether the respective industry uses this factor more or less intensively than other industries. If deviations are large, the industry is expected to be highly concentrated, while industries with an average factor use are expected to be equally distributed across countries.

[10] Human capital itself is defined as the share of white-collar high- and medium-skilled workers in employment and collected from individual labour force surveys. It comprises ISCO groups 1 (legislators, senior officials and managers), 2 (professionals), 3 (technicians and associate professionals), and 4 (clerks).

(2002, Table 5, p. 104). According to these figures, the transport industry realizes the greatest economies of scale in production, followed by chemicals, machinery (including electronics) and metals. The smallest efficiency gains from a larger scale of production are found to prevail in the textiles, leather and food industry. Again according to new trade theory, a home market bias for a specific product will also induce a concentration of production in the home country. Thus we include a variable for *domestic absorption* (output plus imports minus exports) which is constructed analogously to the concentration measure.

Also new economic geography models state that larger demand for a certain product implies stronger backward linkages and thus induces an industry to concentrate absolutely. Besides backward linkages (i.e. with consumers), economic geography models also put a heavy emphasis on the role of *forward linkages* (i.e. with intermediate input producers). In contrast to the original economic geography literature we focus here on intra-industry linkages rather than inter-industry linkages since we are concerned with concentration patterns of individual industries and not with agglomeration of economic activity as such. The strength of intra-industry forward linkages is captured by the share of inputs in total costs that originate in the same industry. Again, we use estimates from Forslid et al. (2002), based on data from Central and Eastern European input-output matrices. From these data, textiles, chemicals, metals and the wood industry emerge as having strong intra-industry linkages. The expected sign of this variable is positive; stronger forward linkages within the same industry should *ceteris paribus* lead to more concentration in that industry. Thus, we would expect these industries to be more concentrated than, for instance, the food, transport or leather industries, which show weak intra-industry forward linkages. From new economic geography models we further use *trade costs* (expecting a negative relationship with concentration). Estimates are again taken from Forslid et al. (2002) and measured as the percentage of trade costs to Western Europe in producer prices, averaged by each industry over the region. Another cost argument relates to *wage costs* in an industry. Therefore we also include an industry's deviation from the average wage rate in the region as one determinant of industrial concentration. The effect of relative wage costs on concentration is conditional on other factors influencing location decisions. We expect a positive correlation between relative wage costs and concentration for the following reason: High-wage industries will respond in their location decision more strongly to other factors, such as endowment with human capital and the like. Consequently they will concentrate in those countries that offer appropriate conditions and thus justify paying high wages. Low-wage industries, on the other hand, will presumably be also labour-intensive and look for 'cheap' locations and concentrate there.

3.2 Empirical results

All the above measures are calculated as averages across eight countries for each industry, resulting in a panel of 14 industries over ten years.[11] We estimated a random effects model, using the instrumental variables estimator proposed by Hausman and Taylor (1981). We chose this estimator because it allows us to make best use of our knowledge of individual (i.e. industry-) specific fixed effects (such as scale economies, trade costs, forward linkages) that is lost in a fixed effects regression, as the fixed effects estimator removes all individual specific time-invariant effects. A random effects model however would lead to inconsistent estimates in the presence of those fixed effects. In contrast to traditional instrumental variables estimation procedures, the Hausman-Taylor estimator assumes that a subset of the explanatory variables in the model is correlated with the individual-level random effects μ_i (i.e. the error component that varies across individuals but not over time) but none of the explanatory variables is correlated with the idiosyncratic error component.

The estimator requires to discriminate between exogenous and endogenous (i.e. correlated with μ_i) in addition to time-varying and time-invariant (fixed effects) explanatory variables. We identified labour intensity, human capital intensity, wages and expenditure levels as endogenous, time-varying regressors and intra-industry forward linkages as a time-invariant endogenous variable. All endogenous variables are assumed to be correlated with the individual specific error component (thus violating the OLS assumption of independence between the regressors and the residual). The Hausman-Taylor estimator uses the purely exogenous variables (FDI, technological differences, scale economies, trade costs) as instruments for the endogenous fixed effects (in our case intra-industry forward linkages) and is thus able to give consistent estimates for the fixed effects in a two-step procedure.

Applying more or less the same model as Haaland et al. (1999) to Central and Eastern European data yields the following results, which are given in Table 1. We find that relative concentration patterns are primarily determined by industry characteristics, such as labour intensity, human capital intensity, and the local concentration of domestic demand. While industries that deviate strongly from the average level of human capital intensity show a high concentration, the labour intensity of an industry surprisingly shows a negative correlation with concentration. Thus, the labour-intensive industries as well as those industries with a relatively low employment to output ratio are dispersed equally across Central and Eastern Europe and industries with an average use of labour as a production factor are more concentrated.

[11] Bulgaria and Romania are not included here, since no industry-level FDI data are available for these countries.

Table 1

Determinants of relative concentration

	Output	Employment
FDI intensity	-0.0042	0.0183
	0.870	*0.186*
tech. differences	0.0379 ***	0.0060
	0.005	*0.394*
human capital intensity	0.0127 *	0.0176 ***
	0.092	*0.000*
labour intensity	-0.6829 ***	-0.2448 ***
	0.000	*0.003*
rel. wage costs	2.20E-06	2.06E-06 **
	0.216	*0.031*
expenditure concentration	0.5333 ***	0.2702 ***
	0.000	*0.000*
scale economies	-0.0472	-0.0214
	0.497	*0.813*
trade costs	-2.85E-05	-2.16E-05
	0.944	*0.968*
linkages	0.0806	-0.1585
	0.437	*0.228*
dummy[1)]		0.0301 ***
		0.000
constant	0.4161 **	0.0604 **
	0.049	*0.011*
year dummies	yes	yes
observations	140	104
groups (industries)	14	14
Wald-χ^2	166.04	297.68
Prob > χ^2	0.0000	0.0000

1) Dummy variable to control for outliers (leather and electronics in 2002). Inclusion of this dummy did not alter the remaining coefficients and their significance.

Dependent variable is the relative concentration index for output and employment, respectively. P-values are in italics. * (**) [***] stands for significance at the 1 (5) [10] % significance level.

In line with the observations in the descriptive part, differences between relative concentration in employment and output can be identified. These differences in concentration between output and employment data hint towards differences in productivity growth in individual industries in Central and Eastern Europe as mentioned previously. The result that productivity differentials do not play a role for employment patterns is in line with the frequently observed 'jobless growth' in Central and Eastern Europe (see e.g. Astrov, 2004). High growth rates in the region arise mostly from strong productivity improvements without creating new employment. As our analysis shows, productivity increases are not equal across different industries, which drives a wedge between structural developments in

output and employment. Comparative advantages as measured by differences in productivity levels influence output concentration but not employment patterns.

Compared to employment, output patterns are more strongly influenced by domestic absorption. The coefficient on the variable for domestic absorption is more than twice as high in the output equation as compared to the employment equation while the dependent variable has by construction the same range in both equations. The fact that domestic absorption (i.e. domestic demand patterns) matters implies also a role for backward linkages. On the other hand, relative wage costs influence concentration in employment, but not in output. In summary, explanatory factors derived from classical and new trade theory both turned out to be relevant in explaining industrial concentration in Central and Eastern Europe. With the exception of the expenditure variable, all variables designed to capture explicitly new economic geography explanations – scale economies, trade costs and input-output linkages – remain insignificant.

4 Developments in individual industries

Let us now turn to developments in individual industries. By calculating concentration indices, all country-specific information is lost through averaging. To avoid this it seems appropriate to take a closer look at specialization patterns of individual countries with respect to each industry. Thus, for each industry we now use a panel of the eight countries from 1993 to 2002.[12] The dependent variable we look at is each country's share of output in the respective industry's total output. We control for country size by including total manufacturing output on the right-hand side. Because of severe endogeneity problems we did not use a measure reflecting the relative labour abundance of each country.

Human capital is again measured by the share of high- and medium-high-skilled white-collar workers in employment by country and industry. We expect a positive coefficient on this variable for human capital-intensive industries (i.e. electronics, chemicals, etc.) as these industries would locate where human capital is abundant. Technological differences are measured as deviations in productivity levels from the industry average. FDI also enters in the same way. We further included the share of exports to the EU in total exports as well as the import share from the EU to account for the degree of EU trade orientation. As outlined before, the transition from centrally planned to market economies implied a rapid and substantial re-orientation of trade flows, away from Eastern European partners and CIS countries towards the EU-15. This is likely to have had an impact also on location decisions of firms, albeit a different one in different industries. Tables 2-4 present the

[12] Our interest here is not to describe which countries are specialized in which industries but to explain what drives specialization. For a description of individual country patterns see Wörz (2004).

results obtained from a two-way error component, fixed effects regression for individual industries.[13]

The results are in line with our descriptive results from section 2.2. The variable for country size is included as a control, since the dependent variable is simply a country's output share without correcting for differences in economic size. Consequently, country size does not matter for industries which are not very concentrated and those with a high degree of relative but not absolute concentration, such as electronics, wood, and leather. For instance the electronics industry is located primarily in Hungary, which in terms of total output comes only third after Poland and the Czech Republic. The transport industry shows both, strong absolute and relative concentration, being concentrated in Poland and the Czech Republic, the two largest countries in 2002 as measured by manufacturing output. Hence, the coefficient for country size is positive for this industry. The economic size of a country is further positively associated with output concentration in the food industry, the manufacture of pulp and paper and minerals products. These industries all concentrate mainly in Poland, with sometimes as much as 50% of total CEE output being produced in this country.[14]

Only one variable: differences in productivity levels, is always significantly and positively related to output concentration in all industries. The higher the productivity level in a country relative to the industry mean, the higher is its output share. Since a higher productivity level implies a more efficient use of inputs and therefore produces more output with the same quantity of inputs, this seems obvious. However, the highly significant positive coefficient on this variable indicates that differences in productivity levels, and thus Ricardian factors, are still relevant in explaining the industrial landscape in CEECs.

Let us now turn to the results for individual industries, keeping in mind the general positive influence of a positive productivity differential on concentration in all industries: Table 2 gives the results for mostly labour-intensive industries. Concentration in the food industry is influenced by differences in human capital (locating in countries with a relatively low level of human capital) and differences in wages. Surprisingly, above-average wage rates imply higher output shares for this industry. Further, output is highly concentrated in large countries; 50% is manufactured in Poland alone. In contrast, textiles are primarily produced in economically smaller countries with lower FDI shares, and again higher wages as compared to the industry average. Human capital levels do not play a role for this industry. The leather industry is characterized by high output shares in low-wage countries, with below-average FDI levels and surprisingly above-average human capital levels. Although

[13] The results for 'coke and refineries' as well as 'other manufacturing' are not reported here, since location in the former industry is mainly determined by natural endowments, while the latter is a remainder category for which an analysis of concentration patterns does not seem meaningful.

[14] Poland's share of total CEE manufacturing output amounts to roughly 40% for the total period.

the leather industry is concentrated primarily in Poland and Romania, the third largest leather producer in 2002 has been Hungary, a capital-rich country whose share in total CEE leather output remained constant at 10%. The production of wood and wood products has become concentrated in smaller countries. All endowment variables significantly relate to concentration in this industry, FDI with a negative and wages and human capital with a positive coefficient. Further, a high output concentration correlates with low import shares from the EU in this industry. The production of pulp and paper is again concentrated in large countries. Human capital and FDI relate negatively with high output shares, which is to be expected for this labour- and resource-intensive industry.

Table 2

Regression results for individual industries I

	DA **Food products**	**DB** **Textiles**	**DC** **Leather**	**DD** **Wood**	**DE** **Pulp and paper**
TECDIF	0.4129***	0.9435***	0.7600***	0.4023**	1.3403***
	0.001	*0.000*	*0.000*	*0.013*	*0.000*
HCAP	-0.2295***	-0.1029	0.2501***	1.4035***	-0.3572*
	0.003	*0.664*	*0.000*	*0.000*	*0.051*
FDI	0.6627	-1.5497**	-0.8884**	-2.9803*	-1.7797*
	0.626	*0.039*	*0.025*	*0.083*	*0.062*
Wage	0.1036**	0.1661*	-0.2888**	0.9146***	0.0802
	0.044	*0.090*	*0.032*	*0.000*	*0.166*
EUexp	0.0095	0.2129	-0.2537	-0.4243	-0.7878***
	0.944	*0.227*	*0.313*	*0.401*	*0.001*
EUimp	0.0388	-0.1266	0.3052	-0.5668**	0.3109
	0.788	*0.536*	*0.405*	*0.046*	*0.274*
Size	3.66E-09***	-4.57E-09***	-2.54E-10	-5.71E-09*	7.53E-09***
	0.005	*0.010*	*0.947*	*0.053*	*0.004*
Const.	-3.3673***	-3.8068***	-3.3931***	-4.4466***	-3.2930***
	0.000	*0.000*	*0.000*	*0.000*	*0.000*
R^2 (within)	55.58	87.2	62.6	87.75	76.87
no. of obs.	77	77	77	77	77
no. of groups	8	8	8	8	8

Dependent variable is the industry's output share in each country. P-values are in italics.
* (**) [***] stands for significance at the 1 (5) [10] % significance level. Year dummies are always included.

The four industries presented in Table 3 are in general more skill- and technology-intensive than the previous ones. The explanatory power of our variables seems to be far weaker for these industries. Concentration in the chemical industry is influenced mainly by differences in productivity levels and human capital. Locations with a higher level of human capital produce a greater share of chemicals, other things equal. This is to be expected, since the chemical industry includes the production of drugs and medicines, which is clearly a high-

skill activity. For the rubber and plastic industry, only the coefficient on the EU import share is significant besides relative productivity. Output concentrates in countries with a lower share of imports from the EU. The production of mineral products is concentrated in large countries with above-average productivity levels, while FDI shows again a negative impact. Finally, output shares in the metal industry are positively related to differences in productivity levels again and to higher wage rates, while country size and the share of EU exports show a negative impact.

Table 3

Regression results for individual industries II

	DG	**DH**	**DI**	**DJ**
	Chemicals	**Rubber and plastics**	**Mineral products**	**Metals**
TECDIF	0.5706***	1.4746***	0.7320***	0.9306***
	0.002	*0.000*	*0.000*	*0.000*
HCAP	0.2531**	0.0453	-0.1418	-0.1698
	0.020	*0.587*	*0.118*	*0.433*
FDI	1.9015	0.1263	-1.9571*	-0.8876
	0.289	*0.836*	*0.055*	*0.127*
Wage	0.0069	-0.1120	-0.0636	0.3221***
	0.975	*0.405*	*0.15*	*0.004*
EUexp	0.0638	0.2654	-0.1277	-0.3939*
	0.843	*0.295*	*0.457*	*0.078*
EUimp	-0.4989	-1.1052**	0.3293	-0.0035
	0.237	*0.015*	*0.133*	*0.988*
Size	-1.86E-09	-6.48E-10	6.00E-09***	-1.05E-08***
	0.682	*0.841*	*0.001*	*0.000*
Const.	-3.7424***	-3.6798***	-3.5304***	4.3161***
	0.000	*0.000*	*0.000*	*0.000*
R^2 (within)	42.40	89.71	69.53	84.17
no. of obs.	77	76	77	77
no. of groups	8	8	8	8

Dependent variable is the industry's output share in each country. P-values are in italics.
* (**) [***] stands for significance at the 1 (5) [10] % significance level. Year dummies are always included.

Table 4 presents the results for three rather high-skill-intensive industries. Again, differences in productivity levels determine output shares in all industries. Apart from the manufacture of transport equipment, country size does not matter for the concentration in output levels. Output shares of machinery and electrical equipment both show a negative correlation with FDI and wages. A positive coefficient is observed only in the transport industry, which has increasingly gained importance in Poland, the Czech Republic but also

Table 4

Regression results for individual industries III

	DK Machinery	DL Electronics	DM Transport equip.
TECDIF	0.7476***	0.9397***	0.9080***
	0.000	*0.000*	*0.000*
HCAP	0.0323	1.1423***	-0.6540***
	0.845	*0.000*	*0.000*
FDI	-1.8619**	-1.3917*	2.8958***
	0.012	*0.054*	*0.000*
Wage	-0.4041***	-0.2729***	-0.0197
	0.001	*0.000*	*0.797*
EUexp	-0.0636	0.6426***	0.1006
	0.78	*0.000*	*0.523*
EUimp	-0.3175	-1.7271***	0.1001
	0.516	*0.000*	*0.749*
Size	3.58E-09	1.29E-09	-4.71E-09*
	0.171	*0.583*	*0.095*
cons	-2.9874***	-3.5661***	-4.2551***
	0.000	*0.000*	*0.000*
R^2 (within)	45.36	90.54	86.66
no. of obs.	77	77	77
no. of groups	8	8	8

Dependent variable is the industry's output share in each country. P-values are in italics.
* (**) [***] stands for significance at the 1 (5) [10] % significance level. Year dummies are always included.

in Hungary. While one might accept the fact that FDI does not play a role for industries such as textiles, leather, wood, paper and minerals, the negative coefficient in the machinery and electronics industries is much harder to explain. A closer look at the data reveals that the production of electronics has become more concentrated in Hungary, increasing Hungary's share from 15% to 37%. On the other hand, although Hungary still holds the highest share of FDI in electronics, it has lost FDI shares to Poland and the Czech Republic. While the Czech Republic has increased its output share in electronics (however not as much as Hungary), Poland has lost output shares over the same period. Thus, those countries who gained FDI shares in this industry have not yet succeeded in translating this into equally higher output shares. In the machinery producing industry developments in both variables are not too clear. Concentration in output levels did not change as we can see from Figure 1 while FDI has become slightly more dispersed in relative terms. Despite this stable picture in the aggregate, there were some movements of individual countries in terms of their output and FDI shares. Similar to the development in the electronics industry, Hungary has increased its output share while losing FDI shares to

the Czech Republic. Further, Slovenia has lost FDI shares, while maintaining its share in output constant.

The electronics industry is the only industry where all explanatory variables show a significant impact on output shares. It is interesting to note that the share of EU exports relates positively to higher output shares, whereas EU imports are negatively correlated. This actually hints towards inter-industry trade in this industry between the EU and CEECs, where imported inputs are sourced from outside the EU while manufactured exports are primarily directed to the old EU member countries.

Finally, output of transport equipment is positively influenced by high FDI shares. Here, the Czech Republic and Hungary both gained in FDI and output shares, while Poland lost shares in both variables. Country size matters positively for output concentration, however, the coefficient is only weakly significant. The negative coefficient on the human capital variable hints towards the fact that this industry is not so much a high-skill industry as suggested by our grouping.

Even if the results from this simple model cannot be generalized beyond the sample and observation period, they do suggest that there are differences across industries with respect to the factors that determine industrial location patterns. Apart from the general importance of possessing comparative advantage expressed by an above-average productivity level, some industries are more influenced in their location patterns by certain endowments (labour, human capital, FDI) while others respond to differences in wage rates. The degree of EU trade orientation has been important only in the case of electronics. Nearly all other industries, with very few exceptions (wood, plastics, metals), did not show any significant correlation with this variable. It seems that the intra-CEE specialization patterns have developed endogenously according to factors inside these countries with the exception of the electronics industry. Here, the export orientation towards the EU has played a crucial role for the concentration of this industry in Hungary.

5 Conclusions

The Central and Eastern European countries experienced a massive reallocation of production and the labour force during transition; this has strongly affected the patterns of regional concentration of manufacturing firms. Industrial activity has become increasingly concentrated between 1993 and 2002, both in terms of production and employment. In contrast to this, the EU-15 exhibited a de-concentration of industrial activity over the same period. Still, that process was preceded by a rise in concentration in the pre-single market period from 1985 to 1992, albeit to a lesser degree than observed for CEECs. This suggests that economic integration initially induces a more efficient allocation of resources with an increase in concentration as predicted by traditional trade theories. However,

ongoing economic integration will bring about higher factor mobility (in particular of capital) and technology spillovers, thus eroding traditional Ricardian or Heckscher-Ohlin factors. This leads to a stronger role for intra-industry trade with a consequent decline in concentration patterns and less pronounced specialization of individual countries. The deepening of integration among the EU-15 and the CEECs (and consequently also among the individual CEECs) through the latter's accession to the common market thus leads us to expect a turning point in the concentration trends observed up to date. In the medium term, concentration of industrial activity within the CEECs is expected to decrease rather than increase further, along with an increased role for intra-industry trade. This view is based on the expectations that technology spillovers between Western and Eastern Europe are going to gain in scale and scope.

In order to identify the driving forces behind the patterns of concentration in CEECs, we referred to traditional and new trade theory as well as to the new economic geography models. Our data set comprises output and employment data for ten Central and Eastern European countries and 14 industries over the period from 1993 to 2002. We used panel estimation techniques to explain the location of manufacturing activities in the CEECs according to two measures of the size of an industry (production and employment).

Our results showed that relative concentration (i.e. adjusting for differences in country size) is strongly influenced by the local concentration of demand, human capital intensity and labour intensity. However, we identified some differences between the relative concentration of output and employment: while the former is strongly affected by comparative advantages (measured by differences in productivity levels), the latter is driven by relative wage rates. We found that variables reflecting new economic geography models had very little impact on the evolution of concentration patterns in CEECs.

In a further step we investigated the location of industries across CEECs by looking at specialization patterns within individual industries. In doing so, we try to explain the location of industries across countries. Our results suggest that differences in productivity levels – and thus traditional Ricardian factors – are a crucial factor in all industries. Endowment with human capital and FDI played a different role in individual industries. The same applied to wage differentials. Export orientation towards the EU had a significant impact only in the electronics industry.

Given the process of further and also deeper integration of CEECs with their Western European counterparts, it seems appropriate to shift attention towards the enlarged European Union. Thus, future research should analyse concentration and specialization patterns in the EU-25 rather than for the EU-15 and CEEC separately. Our study here may serve as a reference by giving a detailed picture of the developments in Eastern Europe prior to accession. However, in the future a more comprehensive perspective is called for.

References

Aiginger, K. (1999), 'Do Industrial Structures Converge? A Survey on the Empirical Literature on Specialization and Concentration of Industries', *WIFO Working Paper* 116, Austrian Institute of Economic Research (WIFO), Vienna.

Amiti, M. (1999), 'Specialization Patterns in Europe', *Weltwirtschaftliches Archiv* 135(4), pp. 573-593.

Astrov, V. (2004), 'Wirtschaftsentwicklung in den MOEL 2003 durch deutliche Konvergenz geprägt', *WIFO Monatsbericht* 5/2004, Austrian Institute of Economic Research (WIFO), Vienna, pp. 383-402.

Brühlhart, M. (1998), 'Trading Places: Industrial Specialization in the European Union, *Journal of Common Market Studies* 36(3), pp. 319-346.

Carlin, W. and M. A. Landesmann (1997), 'From Theory into Practice? Corporate Restructuring and Economic Dynamism in Transition Economies', *wiiw Research Reports*, No. 240, The Vienna Institute for International Economic Studies (wiiw), Vienna.

Combes, P.-P. and H. Overman (2003), 'The Spatial Distribution of Economic Activities in the EU', *CEPR Discussion Paper* 3999, Centre for Economic Policy Research, London.

Ethier, W. J. (1982), 'National and International Returns to Scale in the Modern Theory of International Trade', *American Economic Review* 72, pp. 389-405.

Ellison, G. and E. Glaeser (1997), 'Geographic Concentration in US Manufacturing Industries: A Dartboard Approach', *Journal of Political Economy*, 105, pp. 889-927.

Fidrmuc, J. and M. Djablik, 'Intra-industry trade between the EU and the acceding countries: the importance of foreign direct investment on trade structure', East-West-Conference Volume, forthcoming.

Forslid, R., J. I. Haaland, K. H. Midelfart-Knarvik and O. Mestad (2002), 'Integration and Transition: Scenarios for the Location of Production and Trade in Europe', *Economics of Transition* 10(1), pp. 93-117.

Fujita, M., P. Krugman and A. J. Venables (1999), *The Spatial Economy: Cities, Regions and International Trade*, MIT Press, Cambridge Massachusetts.

Gugler, K. and M. Pfaffermayr (2000), 'Convergence in Structure and Productivity in European Manufacturing', *WIFO Working Paper* 127, Austrian Institute of Economic Research (WIFO), Vienna.

Haaland, J. I., H. J. Kind, K. H. Midelfart-Knarvik and J. Torstensson (1999), 'What Determines the Economic Geography of Europe?', *CEPR Discussion Paper* 2072, Centre for Economic Policy Research, London.

Hanson, G. (2002), 'Market Potential, Increasing Returns, and Geographic Concentration', mimeo, University of Michigan, November; revised version of *NBER Working Paper* 6249, February 1998.

Hausman, J. A. and W. E. Taylor (1981), 'Panel Data and Unobservable Individual Effects', *Econometrica* 49(6), pp. 1377-1398.

Helpman, E. (1981), 'International Trade in the Presence of Product Differentiation, Economies of Scale and Monopolistic Competition: A Chamberlin-Heckscher-Ohlin approach', *Journal of International Economics* 11, pp. 305-340.

Kalotay, K. and G. Hunya (2000), 'Privatization and FDI in Central and Eastern Europe', *Transnational Corporations* 9(1), pp. 39-66.

Krugman, P. (1980), 'Scale Economies, Product Differentiation, and the Pattern of Trade', *American Economic Review* 70(5), pp. 950-959.

Landesmann, M. A. (2003a), 'The CEECs in an Enlarged Europe: Patterns of Structural Change and Catching-up', in H. Handler (ed.), *Structural Reforms in the Candidate Countries and the European Union*, Austrian Ministry for Economic Affairs and Labour, Economic Policy Center, Vienna, pp. 28-87.

Landesmann, M. A. (2003b), 'Structural Change, Convergence and Specialization in the EU Accession Countries', in M. A. Landesmann (ed.), *wiiw Structural Report 2003 on Central and Eastern Europe*, Vienna, pp. 1-26.

Midelfart-Knarvik, K., H. G. Overman, S. R. Redding and A. J. Venables (2002), 'The Location of European Industry', *European Economy*, 2, pp. 216-273.

Posner, M. V. (1961), 'International Trade and Technical Change', *Oxford Economic Papers*, 13, pp. 323-41.

Pratten, C. (1988), 'A Survey of the Economies of Scale', chapter 2 in: Commission of the European Communities, Research on the 'Cost of Non-Europe', Vol. 2, Studies on the Economies of Integration, European Commission, Brussels.

Puga, D. and A. J. Venables (1996), 'The Spread of Industry: Spatial Agglomeration and Economic Development', *Journal of the Japanese and International Economies* 10(4), pp. 440-64.

Richter, S. (1997), 'European Integration: The CEFTA and the Europe Agreements', *wiiw Research Reports*, No. 237, The Vienna Institute for International Economic Studies (wiiw), Vienna.

Richter, S. (2001), 'Transition and regional economic cooperation in Central Europe', wiiw mimeo, The Vienna Institute for International Economic Studies (wiiw), Vienna.

Urban, W. (2000), 'Patterns of Structural Change in CEEC Manufacturing', in: M. A. Landesmann (ed.), *wiiw Structural Report. Structural Developments in Central and Eastern Europe*, pp. 20-66.

wiiw (2003), *Competitiveness of Central and Eastern European Industries – now and in an Enlarged EU*, study commissioned by Bank Austria Creditanstalt, Economic Department, Vienna.

Wolfmayr-Schnitzer, Y. (1999), 'Economic Integration, Specialization and the Location of Industries: A Survey of the Theoretical Literature', *WIFO Working Paper* 120, Austrian Institute of Economic Research (WIFO), Vienna.

Wörz, J. (2004), 'Specialization patterns in CEEC manufacturing output', *wiiw Monthly Report* 2/04, The Vienna Institute for International Economic Studies (wiiw), Vienna, pp. 6-13.

Appendix

Table A1

Ranking of relative concentration indices in production, 1993 and 2002

Industry name	1993		2002	
	Rank	CIP_i^R	Rank	CIP_i^R
Transport equipment	1	0.0315	5	0.0566
Wood and wood products	2	0.0298	4	0.0620
Coke, refined petroleum products, nuclear fuel	3	0.0292	2	0.0822
Leather and leather products	4	0.0290	3	0.0695
Chemicals, chemical products, man-made fibres	5	0.0246	14	0.0162
Basic metal and fabricated metal products	6	0.0244	10	0.0364
Manufacturing n.e.c.	7	0.0237	6	0.0505
Machinery and equipment n.e.c.	8	0.0221	13	0.0274
Pulp, paper and paper products; publishing, printing	9	0.0206	7	0.0468
Electrical and optical equipment	10	0.0202	1	0.0957
Food products, beverages and tobacco	11	0.0199	8	0.0458
Rubber and plastic products	12	0.0185	12	0.0322
Other non-metallic mineral products	13	0.0156	11	0.0330
Textiles and textile products	14	0.0151	9	0.0418

Table A2

Ranking of relative concentration indices in employment, 1993 and 2002

Industry name	1993		2002	
	Rank	CIE_i^R	Rank	CIE_i^R
Coke, refined petroleum products, nuclear fuel	1	0.0502	4	0.0504
Food products, beverages and tobacco	2	0.0407	6	0.0455
Manufacturing n.e.c.	3	0.0400	10	0.0322
Electrical and optical equipment	4	0.0308	3	0.0624
Pulp, paper and paper products; publishing, printing	5	0.0287	7	0.0382
Wood and wood products	6	0.0246	8	0.0381
Machinery and equipment n.e.c.	7	0.0225	13	0.0237
Rubber and plastic products	8	0.0217	5	0.0492
Basic metal and fabricated metal products	9	0.0216	12	0.0245
Textiles and textile products	10	0.0211	2	0.0649
Transport equipment	11	0.0205	9	0.0328
Leather and leather products	12	0.0183	1	0.0978
Chemicals, chemical products, man-made fibres	13	0.0140	14	0.0128
Other non-metallic mineral products	14	0.0124	11	0.0260

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