

# SPECIALIZATION AND AGGLOMERATION PATTERNS IN EASTERN EUROPE

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## Abstract

The paper investigates specialization and agglomeration trends in EU-27 regions (NUTSII) over 1991-2011 by means of two versions of the relative Theil indicators using employment data. The paper's main focus is on Central and Eastern European Countries (CEECs) regions. As a legacy of central planning, these regions presented significantly above-average specialization and agglomeration levels. The paper shows that over 1991-2011 these features change very little; moreover, while disproportions fall in the other EU members, they rise in CEECs, implying growing divergence among the two groups in real terms, notwithstanding EU emphasis on real convergence. Indicators disaggregated by sectors show that for CEECs specialization/agglomeration change most in agriculture, in market services and in manufacturing. The paper focuses on the last two sectors. It argues that performance in the service sector is entirely due to capital regions catching up on previous underdevelopment in the sector, therefore getting closer to Western capitals' features. Non-capital regions instead lag behind, moving away from the EU sectoral average. As far as manufacturing is concerned, CEEC regions continue to specialize in the more traditional lines of production, in which also agglomeration remains extremely high. Consideration of the changes over time gives a partially different picture as it shows that the higher specialization in overall manufacturing results from the development of a small but dynamic medium-high technology sub-sector that is significantly disseminated across regions, thus appearing to be the result of successful industrial restructuring and reconversion.

JEL Classification: O18, O52, P25, R11, R12

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## 1. Introduction

Traditional text-book trade theory claims that a fall in transport costs – due for instance to tighter economic integration – unambiguously leads to higher specialization across countries<sup>1</sup>. The reduction of trade barriers exposes firms to growing competition from abroad; although this can make production drop in previously protected sectors, eventually it leads to higher specialization in the sectors in which a country has a comparative advantage. In addition, New Economic Geography (NEG) models show that lower transport costs following the reduction of trade barriers, associated with increasing returns to scale, determine a spatial agglomeration of production.

On the basis of these results, it seems reasonable to assume that over the last two decades the strengthening of economic integration among European Union (EU) members resulted in a rise in both specialization and agglomeration. Empirical evidence on the issue, however, remains unclear. Some authors (among the others, Krugman, 1993, Amiti, 1997, and Overman *et al.*, 2001) contend that production in EU countries has indeed become more specialised, even if rather slowly – slower, for instance, than in the United States (Krugman, 1993). Other authors, including Paci *et al.*, 2000, Aiginger *et*

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<sup>1</sup> Even if the prediction of specialisation patterns may differ, Heckscher-Ohlin-type models expecting specialisation to take place in the sectors that are relatively intensive in the factors of which a country is relatively more endowed, inter-industry trade theories in those in which higher returns to scale may be obtained.

*al.*, 2002 and Aiginger *et al.*, 2004, claim the opposite. Geographic concentration in Western EU members is found to have fallen in some sectors (manufacturing) but not in others (agriculture and services) (Brühlhart *et al.*, 2005). Further research considers a breakdown of manufacturing by industries in some Western countries and shows that agglomeration occurs in most branches even if it remains low and, as expected, is generally lower in European countries than in the United States<sup>2</sup>.

The issue of sectoral relocation in the EU becomes all the more relevant following the latest enlargements (in 2004 and in 2006) that extend membership to Central and East European Countries (CEECs). These enlargements took place after a long process dating back to the early 'Nineties that saw previously centrally planned countries adapt their economies to the rules and standards of the EU. In fact, some forty years of central planning had left CEECs over-specialized in some sectors (agriculture and traditional manufacturing) and under-specialized in others (services and R&D-intensive manufacturing). Production generally took place in huge conglomerates and often gave life to mono-industrial economies at the regional level. Material- and labour-intensive technology, resulting in low productivity and in obsolete, low quality, goods was the rule. In the early years of transition the removal of trade barriers led to sharp falls in output due to plant closures and domestic products giving way to imports from abroad<sup>3</sup>. However, as integration with the West tightened in view of EU membership, competition and globalisation gained momentum and CEECs started growing at positive, often high, rates<sup>4</sup>. According to NEG models the abolition of trade barriers across a number of countries initially leads to de-industrialization and dispersion in the less developed areas. However, as trade liberalization continues to deepen, a new phase is opened during which agglomeration prevails and production becomes more specialized<sup>5</sup>. Also, the sectoral composition of production appears to be important. Recently this issue has attracted much attention in the literature, as it is underlined that not all sectors present the same growth potential. In particular, when markets in a country are not fully integrated (i.e. factor returns are not equalized across sectors) and/or technology is not a public good, the sectoral mix of production can result in uneven growth across countries or regions<sup>6</sup>. Moreover, empirical findings generally agree that a strong specialization in agriculture determines low growth while specialization in the industrial and service sector may bring better results (see, for instance, Paci *et al.*, 1997). In this respect, it is further acknowledged that the technology content of sectors counts as well, growth and productivity being higher in high-tech industries and services (Mora *et al.*, 2005).

This paper aims at investigating the recent evolution of specialization and agglomeration patterns in the enlarged EU. It analyses relocation trends throughout EU-27 members and considers whether recent growth in CEECs has gone hand-in-hand with changes in specialization and agglomeration and, when these occur, in what direction they go. It compares CEECs' performance with that of the other EU members in order to verify the extent and the evolution in differences between the two groups.

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<sup>2</sup> See Ellison *et al.*, 1997, for the US; Deveraux *et al.*, 2004, and Duranton *et al.*, 2005 for the UK; Maurel *et al.*, 1999, for France; Guimaraes *et al.*, 2007, for Portugal.

<sup>3</sup> This phase is reminiscent of industrial restructuring problems faced by declining old industrialised regions in Western countries during the '80s. On the point see Rodriguez-Pose, 1998 and Chapman, 2008, and the literature quoted therein.

<sup>4</sup> In CEECs GDP in PPPs per inhabitant grew by a yearly average of 7.3% during 1994-99 and by 5.4% in 2000-04. In older members it grew respectively by 5.1% and by 2.5% (calculations based on Eurostat data).

<sup>5</sup> This is reminiscent of the so-called *inverted U hypothesis* (Kuznets, 1955), according to which the early stages of development are characterized by a positive relation between growth and inequality.

<sup>6</sup> See Paci *et al.*, 1997, for a survey of the literature on structural change and economic growth.

Finally, it considers whether it is possible to trace new emerging patterns of production in CEECs sharing any feature with those prevailing among the other EU members<sup>7</sup>.

To this end, this paper adopts two versions of the dissimilarity index first developed by Theil, 1967. It extends the approach defined by Aigigner *et al.*, 2001, Brühlhart *et al.*, 2005, and Cutrini, 2006. The first work shows that, when properly defined, the Theil indicator can measure both the specialization and the geographic concentration (agglomeration) of production. The second one defines a methodology to decompose the concentration index; the last one applies decomposition to specialization.

The paper is organized as follows: section 2 briefly describes the methodology and identifies the indicators and their decomposition into within- and between-country components. Section 3 reports and comments the results concerning all EU27 members. Country groups (CEECs and Other members) and main sectors (agriculture, manufacturing, construction, and market and non market services) are considered separately. Section 4 addresses the evolution of CEEC countries individually and considers a breakdown of manufacturing according to its technology content, distinguishing among traditional and more advanced lines of production. Section 5 contains some brief conclusions.

The selected point of view is sectoral for specialization and geographic for agglomeration. The basic unit of analysis are regions, generally taken at the NUTS2 level. For the sake of uniformity, both in terms of geographic extension and, more important still, of administrative powers and autonomy, for some countries (Belgium, Germany, Greece, the Netherlands and the United Kingdom) the NUTS1 level (macro-regions) is selected. The country level (NUTS0) is used for one-region countries (Estonia, Cyprus, Latvia, Lithuania, Luxemburg and Malta). This leads to consider in all 189 units, referred to in the paper as “regions”<sup>8</sup>. Macro-sectors (agriculture, construction, manufacturing, services) as well as low, medium-low and medium-high technology manufacturing and knowledge-intensive services are all based on NACE Rev 1.1. Data are from Cambridge Econometrics and from Eurostat REGIO database; they cover the period 1991-2011 or shorter sub-periods. As in much of the literature on the subject, employment is taken as a proxy for value added<sup>9</sup>. A list of groups and definitions is in Appendix 1.

## 2. Specialization and agglomeration indexes

Specialization and agglomeration capture two closely-related, yet distinct, aspects of production. Specialization arises from differences across territorial units (countries, regions) in terms of employment or value added; it is highest when one sector accounts for all the employment or value added in the unit (complete specialization) and lowest when all units present the same share in all sectors (no specialization). Geographic

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<sup>7</sup> The issue of sectoral specialization and relocation in CEECs has been addressed by several authors. By analyzing trade flows Zaghini, 2005, shows a rise in the specialization of production; signs of an overall reduction in specialization of CEEC regions over 1992-2005 are found by Marelli, 2007. Kallioras *et al.*, 2004, find that dissimilarities in specialization and concentration remain largely unchanged between 1991-1998 in some CEECs (notably Bulgaria, Romania and Slovenia) but change in others (Estonia and Hungary). The authors conclude that production patterns change only in intermediate income CEECs and remain stable in low and in high income ones.

<sup>8</sup> Owing to their geographical remoteness and peculiar features that set them apart from other EU economies, Ciudad Autonoma de Ceuta, Ciudad Autonoma de Melilla and Canarias (Spain); French Overseas Departments (France); Regiao Autonoma de Madeira (Portugal) are not included in the sample.

<sup>9</sup> In fact, “...employment data (are considered) as preferable to data based on production values, because the former are not subject to the problems associated with price conversions across countries and years”. See Brühlhart *et al.*, 2005, p.609.

concentration, or agglomeration, measures the differences among sectors in territorial units; it is at its maximum when only one sector provides all the jobs or the value added in a unit (complete agglomeration) and lowest when employment or value added is equally distributed among sectors (no agglomeration)<sup>10</sup>. In general, it may appear that both phenomena are bound to go hand-in-hand, higher specialization leading to a rise in geographic concentration and vice-versa. However, Aigigner *et al.*, 2001, show that, when correctly measured, these two aspects of production may indeed diverge.

Both specialization and agglomeration can be measured in different ways. Regional specialization is generally captured through some measure of a region's share (in value added, employment, exports or another variable) with respect to the universe. Indexes of this type are the ones by Balassa, by Finger-Krein, by Krugman, and so on. Also agglomeration may be studied through different measures, the most well-known being the Hoover and the so-called locational Gini ones<sup>11</sup>.

A class of indicators that has been recently explored is the Theil dissimilarity index, that derives from general entropy indicators. With respect to other measures, the Theil index has the advantage of satisfying a number of requirements (axioms) that appear to be desirable when identifying inequality; in particular it is easily decomposed into a *within* group and a *between* (or *across*) group effect (the so-called decomposability axiom), a property not shared by other indicators<sup>12</sup>. Moreover, independence from the number of observations allows comparison between different sub-sets of cases.

The Theil index captures inequality among independent basic units. It is a type of geometric mean that downgrades extreme observations inasmuch as each one is weighted by its relative intensity. Assume, for instance, a set of  $n$  individuals where each unit  $i$ , for  $i=1, \dots, n$ , has  $y_i$ , a nonnegative fraction of total income. The Theil index  $T$  is defined as follows<sup>13</sup>:

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<sup>10</sup> Although the two phenomena are likely to go hand-in hand (see Maurel *et al.*, 1999, p.593 and Devereaux *et al.*, 2004, pp. 536-7), agglomeration, or *geographic* concentration, should be kept distinct from *sectoral*, or industrial, concentration. The latter occurs when a small number of independent enterprises (at the extreme, only one) provides all the jobs or the value added in a sector (industry); it is generally measured by the Herfindahl index.

<sup>11</sup> A review of these measures is, among the others, in Bickenbach *et al.*, 2008. Recently a new class of indicators (so-called "second generation" measures) has been developed. Following the seminal work by Ellison *et al.*, 1997, these measures differ from inequality indicators inasmuch as they control for random localization that is inherent in production. Hence they capture only the agglomeration that is above the general tendency of firms to cluster. In this line, Ellison *et al.*, 1997, and Maurel *et al.*, 1999, measure concentration in excess of an ideal situation in which firms select location randomly over discrete spatial units (e.g. regions). Duranton *et al.*, 2005, overcome the arbitrariness of units defined *ex ante* by considering the distribution of distances between all pairs of enterprises in a given industry over a continuous space. Although providing considerable insight into agglomeration and its determinants, these indicators require large amounts of detailed information (at the 3- or 4-digit level); moreover, international comparisons are made difficult by differences in industry classifications. For these reasons, "second generation" measures of agglomeration will not be pursued in this paper.

<sup>12</sup> The other requirements are scale independence, or homogeneity of degree one (if all observations are scaled by the same number, the measure of inequality should not change) and independence from the number of observations (inequality measured for one group should remain unchanged when the group is merged with another identical group). Most inequality measures share these two properties, but only the Theil index satisfies them all. See Sala-i-Martin, 2002, and the literature quoted therein.

<sup>13</sup> The Theil index derives from information theory. Basically, it measures how much a message concerning an event changes its probability to occur. When the initial probability is high (the event is almost certain) a message stating that the event is likely to occur does not change its probability by much; it is said to have a low information content. Vice versa, when the probability of an event is low the same message changes its probability greatly and has a high information content. The expected average difference between the initial probabilities of a distribution of events ("prior probability") and the one that follows the message ("posterior probability") is called *entropy*, in resemblance with the notion in physics. See Theil, 1967.

$$T = \sum_{i=1}^n y_i \ln(n \cdot y_i) \quad (1)$$

The index reaches its maximum when all income is concentrated in one unit and the other ones have zero income (complete inequality). It is easily verified that in this case  $T$  equals  $\ln(n)$ . On the other side, when activity is distributed equally among units each one receives the same share  $1/n$  and (1) reduces to zero (complete equality).

This last point warrants some further consideration. As already mentioned, the present paper applies the Thiel index to NUTS2 regions in the EU. This implies assuming regions as the basic units, which however is mistaken, as regions have a spatial dimension and differ deeply from one another<sup>14</sup>. Returning to the complete equality case just discussed, its benchmark assumes that all regions in the sample have the same share in overall activity, which is evidently not the case, due to differences in size, population, economic activity, and so on - an issue referred to as the MAUP – the modifiable areal unit problem. A way for dealing with the MAUP consists in substituting *absolute* measures like (1) with *relative* ones, where the economic variable under consideration is weighted by region-specific weights. Possible weights suggested so far are a region's geographic extension (in square kilometres), its resident population or aggregate economic activity<sup>15</sup>. In what follows we choose the latter approach and weight sectoral employment by overall employment, respectively at the regional and at the aggregate level. This reduces but does not eliminate potential biases; the resulting index continues to underestimate dissimilarity inasmuch as the benchmark assumes homogeneous shares of regional activity with respect to total activity for all sectors and all regions<sup>16</sup>.

The indexes used in this study,  $T_{sp}$  and  $T_{con}$ , are two different versions of the relative Thiel index, modified in order to capture respectively sectoral specialization (or similarity) and/or regional geographic concentration (or agglomeration).

Starting from agglomeration, for region  $r$ , where  $r=1\dots R$ , and  $R$  is the total number of regions in the sample and for sector  $s$ , with  $s=1\dots S$ , employment is a nonnegative amount  $y_r^s$ . Agglomeration is defined as a sector's share in employment over all regions' employment in the sector. Both variables are weighted by the respective aggregate employment to yield:

$$T_{con} = \sum_{r=1}^R \sum_{s=1}^S \left[ \frac{y_r^s}{y_R^s} \ln \left( \frac{y_r^s / y_r^S}{y_R^s / y_R^S} \right) \right] \quad (2)$$

Defining specialization accordingly is straightforward, but poses the additional question of identifying the most appropriate territorial benchmark. For the purposes of this study regional specialization in a sector could be usefully set either against *country* specialization or against supra-national, *aggregate*, specialization in the sector. In what follows we choose the second possibility, for sake of homogeneity with  $T_{con}$  as in (2).  $T_{sp}$  is defined as follows:

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<sup>14</sup> See Theil, 1967, ch.4.

<sup>15</sup> See Brulhart *et al.*, 2005 and Bickenbach *et al.*, 2008.

<sup>16</sup> See Brulhart *et al.*, 2005. Relative indexes of dissimilarity are closely related to the Balassa index of comparative advantage. On this point, see Cutrini, 2006.

$$T_{sp} = \sum_{r=1}^R \sum_{s=1}^S \left[ \frac{y_r^s}{y_r^S} \ln \left( \frac{y_r^s / y_R^s}{y_r^S / y_R^S} \right) \right] \quad (3)$$

Like base index (1) both indicators measure dissimilarity, or disproportion, across basic units; hence (2) and (3) are directly related, respectively, to agglomeration or to specialization.

Equations (2) and (3) can be easily decomposed by partitioning regions into C sub-groups (countries). Each region  $r$  belongs to only one sub-group  $c$  and each sub-group contains  $r_c$  regions, such that for  $c=1, \dots, C$ ,  $\sum_{c=1}^C r_c = R$ . Decomposition allows to separate the *within*-country component from the *across*, or between-country, component of inequality. Following Theil, 1967, this may be done as follows for equation (3):

$$T_{sp} = \sum_{s=1}^S \sum_{c=1}^C \left[ \sum_{r=1}^{r_c} \frac{y_r^s}{y_r^S} \ln \left( \frac{y_c^s / y_c^S}{y_R^s / y_R^S} \right) + \sum_{r=1}^{r_c} \frac{y_r^s}{y_r^S} \ln \left( \frac{y_r^s / y_c^s}{y_r^S / y_c^S} \right) \right] \quad (4)$$

and for equation (2):

$$T_{con} = \sum_{s=1}^S \sum_{c=1}^C \left[ \sum_{r=1}^{r_c} \frac{y_r^s}{y_R^s} \ln \left( \frac{y_r^s / y_r^S}{y_R^s / y_R^S} \right) + \sum_{r=1}^{r_c} \frac{y_r^s}{y_R^s} \ln \left( \frac{y_r^s / y_r^S}{y_c^s / y_c^S} \right) \right] \quad (5)$$

In each formula the first addendum in the square brackets is the *between*-country element of the index ( $T_b$ ); the second one is the *within*-country component ( $T_w$ )<sup>17</sup>.

### 3. Specialization and agglomeration patterns in EU regions

A preliminary idea of the dynamics of differences among European regions can be gained from Fig.1, where the estimated density function of employment (in logs) in EU-27 regions is plotted respectively for 1991 and 2011<sup>18</sup>. The figure shows that the two distributions are practically identical, except for an almost imperceptible growth in dispersion. The Kolmogorov-Smirnov equality-of-distribution test rules out statistically significant difference between the two distributions.

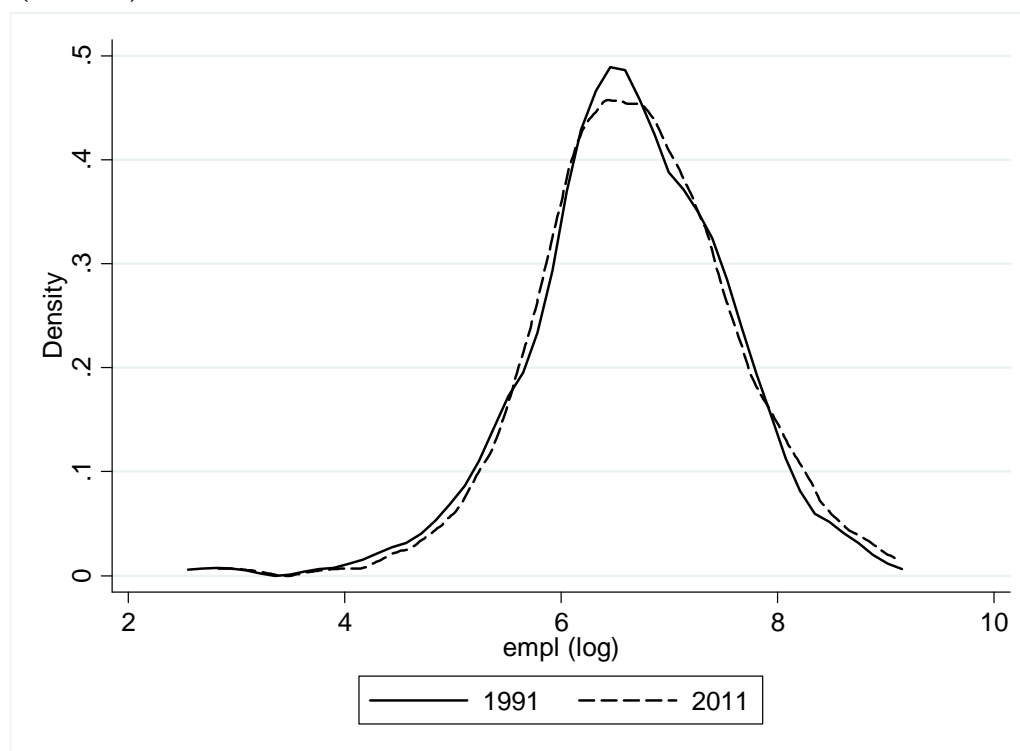
Tables 1-2 report the aggregate indexes  $T_{sp}$  and  $T_{con}$  along with their breakdown into the within and between countries components over 1991-2011 and over two sub-periods (1991-2000 and 2001-11). Over the whole period EU-27 regions become more similar in terms of specialization but less similar in terms of the geographic concentration of activity. However, considering the two sub-periods separately shows that both indicators grow in the first decade but drop in the second one, implying that in the Two Thousands EU regions become on average more homogeneous in terms of both indicators. The major source of inequality is the *between*-countries component; differences *within* countries are on average lower.

Separating the regions of CEECs from those of Western members ("Other" countries in the tables; see Appendix 1 for definitions) provides yet a different picture.

<sup>17</sup> Obviously,  $T = T_b + T_w$  for either index.  $T_w = y_c^s / y_c^S \cdot T_{sp}$  in the first formula and  $T_w = y_c^s / y_c^S \cdot T_{con}$  in the second one where both indexes  $T_{sp}$  and  $T_{con}$  refer to each sub-group.

<sup>18</sup> Probability density functions are based on the Epanechnikov kernel, using the "optimal" bandwidth (=0.2365), without weighting observations (189 observations). Results are consistent with other estimators.

Figure 1 – Probability Density Functions: Employment in EU regions (in logs) in 1995 (continuous line) and in 2007 (dotted line)



First, on average both specialization and agglomeration in CEEC regions is significantly different from the whole of the EU and significantly higher than in Other countries. Second, the evolution over time of the two indicators differs as well, at least in part: over 1991-2011 both rise for CEEC regions but drop for Other ones. Some similarity emerges only in the second sub-period (2001-11) when average indicators fall in both groups, signaling a general reduction in inequalities, even if somewhat weaker in CEECs (no variation is statistically significant). Third, the *within*- and *between*-country components show that CEECs regions are relatively equal country-wise and that the major source of inequality comes from differences *between* countries in the group. The opposite holds for Other countries: Western regions are relatively similar to one another (and become significantly more so) but present high divergences *within* each country. Fourth, albeit only a minor source of inequality, in CEECs *within*-country differences grow significantly in terms of agglomeration in the second sub-period (they remain practically unchanged in terms of specialization).

Additional information is provided by the breakdown of the two indexes into the economy's main sectors: agriculture, construction, manufacturing, market and non market services<sup>19</sup>. Tables 3 and 4 show the results for the entire sample, for CEEC regions and for Other ones. Consistently with the findings of similar studies covering different time periods (e.g. Aigigner *et al.*, 2001, Brühlhart *et al.*, 2005), for the whole of EU regions specialization and geographic concentration are highest in agriculture and in manufacturing. This, however, is entirely due to CEECs regions, that throughout 1991-2011 specialize significantly more than Other ones in these sectors. Western regions instead specialize in services (both market and non-market) and in construction. In CEECs agglomeration is highest in agriculture and in manufacturing; in Other ones this

<sup>19</sup> The same subdivision in five broad sectors is found (even if in a different context) among the others, in Paci *et al.*, 1997, and in Le Gallo *et al.*, 2006.

Table 1 – The T<sub>sp</sub> indicator: whole sample and country groups, within and between country components, mean values and yearly average growth rate (1991-2011, 1991-2000 and 2001-2011)

	EU			CEECs			Other countries		
	Tsp	Tspw	Tspb	Tsp	Tspw	Tspb	Tsp	Tspw	Tspb
1991	6.5339	3.1831	3.3507	3.0709	.8933	2.1776	3.4630	2.3104	1.1526
1992	6.7176	3.1271	3.5905	3.2693	.9013	2.3679	3.4483	2.2459	1.2025
1993	6.7345	3.0471	3.6873	3.3959	.8822	2.5136	3.3386	2.1848	1.1538
1994	6.8010	3.0011	3.7999	3.5311	.8693	2.6618	3.2699	2.1516	1.1183
1995	6.6661	2.9810	3.6852	3.4837	.8429	2.6409	3.1824	2.1601	1.0223
1996	6.7928	2.9437	3.8490	3.6495	.8364	2.8131	3.1433	2.1313	1.0120
1997	6.9304	2.9345	3.9960	3.8187	.8542	2.9646	3.1117	2.1027	1.0090
1998	7.2171	2.8705	4.3466	4.2199	.8586	3.3612	2.9973	2.0340	.9633
1999	7.1825	2.9060	4.2765	4.1883	.8980	3.2903	2.9942	2.0325	.9617
2000	7.2875	2.8214	4.4662	4.3235	.8525	3.4710	2.9640	1.9906	.9734
2001	6.7446	2.7812	3.9634	3.9019	.8418	3.0601	2.8427	1.9593	.8834
2002	6.2756	2.6931	3.5826	3.5785	.8221	2.7565	2.6971	1.8934	.8037
2003	6.2656	2.6282	3.6375	3.5987	.7933	2.8054	2.6669	1.8560	.8109
2004	6.0433	2.6058	3.4375	3.4887	.8026	2.6861	2.5546	1.8250	.7296
2005	5.9880	2.5591	3.4289	3.4694	.7878	2.6816	2.5186	1.7921	.7265
2006	5.7969	2.5325	3.2644	3.3388	.8053	2.5334	2.4582	1.7487	.7095
2007	5.7141	2.5324	3.1817	3.2858	.8012	2.4846	2.4283	1.7313	.6970
2008	5.5576	2.5122	3.0454	3.2085	.8019	2.4065	2.3492	1.7346	.6145
2009	5.5230	2.5208	3.0022	3.2567	.8215	2.4352	2.2664	1.7222	.5442
2010	5.3422	2.5050	2.8373	3.1238	.7973	2.3265	2.2184	1.7298	.4885
2011	5.2988	2.4843	2.8146	3.0739	.7836	2.2903	2.2250	1.7233	.5017
mean91-11	6.3530	2.7700	3.5830	3.5369 <sup>a,b</sup>	.8356 <sup>a,b</sup>	2.7013 <sup>a,b</sup>	2.8161 <sup>a</sup>	1.9552 <sup>a</sup>	.8609 <sup>a</sup>
avgr91-11	-.9990	-1.2259 <sup>c</sup>	-.7330	.1194	-.6263	.4421	-2.1767	-1.4487 <sup>c</sup>	-3.9454 <sup>c</sup>
mean91-00	6.8863	2.9815	3.9048	3.6951 <sup>a,b</sup>	.8689 <sup>a,b</sup>	2.8262 <sup>a,b</sup>	3.1913 <sup>a</sup>	2.1344 <sup>a</sup>	1.0569 <sup>a</sup>
avgr91-01	.3663	-1.3342 <sup>c</sup>	1.8490	2.5603	-.5585	3.6835	-1.9455 <sup>c</sup>	-1.6287 <sup>c</sup>	-2.5414
mean01-11	5.8682	2.5777	3.2905	3.3932 <sup>a,b</sup>	.8053 <sup>a,b</sup>	2.5879 <sup>a,b</sup>	2.4750 <sup>a</sup>	1.7923 <sup>a</sup>	.6827 <sup>a</sup>
avgr02-11	-2.3643 <sup>c</sup>	-1.1175 <sup>c</sup>	-3.3151 <sup>c</sup>	-2.3216	-.6941	-2.7992	-2.4079 <sup>c</sup>	-1.2686 <sup>c</sup>	-5.3495 <sup>c</sup>

Source: calculated from Cambridge Econometrics

<sup>a</sup> denotes rejection of H<sub>0</sub> (group mean = EU mean) based on Student's t, 95% confidence interval; <sup>b</sup> denotes rejection of H<sub>0</sub> (CEEC mean = Others mean) based on Student's t, 95% confidence interval; <sup>c</sup> denotes rejection of H<sub>0</sub> (yearly average growth rate = 0) based on bootstrap sampling, 95% confidence interval, 10,000 replications

occurs in services and in construction. Furthermore, on average in all sectors both phenomena differ significantly between the two groups, confirming deep dissimilarity between them. The evolution over time of the indicators shows general de-specialization and de-localization (i.e. rising homogeneity) in most sectors for Western regions, with disproportions growing only in agriculture in the second sub-period. For CEECs instead results are somewhat more mixed, often due to diverging behaviour in the two sub-periods. Considering only the second one gives a more clear-cut picture: disproportions grow in practically all sectors except agriculture and non market services, where they fall. While in the second sub-period in the West only de-localization in services is significant, pointing to relative stability, for CEECs all sectors except construction and non market services undergo significant changes. In particular, Eastern regions record significant de-specialization in agriculture and in market services, while agglomeration rises significantly in manufacturing and in market services.

In summary, so far the Theil indicators show significantly different specialization and agglomeration patterns prevailing in the two groups of regions. Notwithstanding tighter



Table 2 – The  $T_{con}$  indicator: whole sample and country groups, within and between country components, mean values and yearly average growth rate (1991-2011, 1991-2000 and 2001-2011)

	EU			CEECs			Other countries		
	$T_{con}$	$T_{conW}$	$T_{conb}$	$T_{con}$	$T_{conW}$	$T_{conb}$	$T_{con}$	$T_{conW}$	$T_{conb}$
1991	.2896	.1093	.1803	.2190	.0320	.1870	.0706	.0773	-.0067
1992	.3067	.1082	.1985	.2422	.0324	.2098	.0645	.0758	-.0113
1993	.3161	.1064	.2097	.2549	.0323	.2226	.0612	.0741	-.0129
1994	.3247	.1051	.2196	.2663	.0325	.2338	.0584	.0726	-.0142
1995	.3275	.1066	.2209	.2666	.0320	.2345	.0609	.0745	-.0136
1996	.3378	.1058	.2321	.2793	.0314	.2479	.0585	.0744	-.0158
1997	.3437	.1047	.2389	.2883	.0313	.2571	.0554	.0735	-.0181
1998	.3526	.1020	.2506	.3064	.0311	.2753	.0461	.0708	-.0247
1999	.3658	.1034	.2624	.3135	.0305	.2830	.0523	.0728	-.0205
2000	.3758	.1014	.2745	.3241	.0303	.2938	.0517	.0711	-.0194
2001	.3701	.1053	.2648	.3213	.0314	.2899	.0488	.0739	-.0251
2002	.3382	.1091	.2292	.2874	.0329	.2545	.0509	.0762	-.0253
2003	.3508	.1090	.2417	.3006	.0326	.2681	.0501	.0765	-.0263
2004	.3370	.1116	.2254	.2916	.0344	.2573	.0454	.0772	-.0318
2005	.3381	.1122	.2259	.2933	.0346	.2587	.0448	.0776	-.0328
2006	.3313	.1156	.2157	.2880	.0374	.2506	.0433	.0782	-.0349
2007	.3319	.1168	.2151	.2934	.0384	.2550	.0386	.0784	-.0397
2008	.3268	.1182	.2086	.2967	.0397	.2570	.0301	.0785	-.0484
2009	.3232	.1185	.2047	.3008	.0402	.2606	.0224	.0783	-.0559
2010	.3105	.1210	.1895	.2864	.0398	.2466	.0241	.0812	-.0571
2011	.3114	.1211	.1903	.2874	.0401	.2473	.0240	.0810	-.0570
mean91-11	.3338	.1101	.2237	.2861 <sup>a,b</sup>	.0342 <sup>a,b</sup>	.2519 <sup>a,b</sup>	.0477 <sup>a</sup>	.0759 <sup>a</sup>	-.0282 <sup>a</sup>
avgr91-11	.4189	.5309	.4258	1.4639	1.1758	1.5373	-5.5448 <sup>c</sup>	.2537	-12.5534 <sup>c</sup>
mean91-00	.3340	.1053	.2288	.2761 <sup>a,b</sup>	.0316 <sup>a,b</sup>	.2445 <sup>a,b</sup>	.0580 <sup>a</sup>	.0737 <sup>a</sup>	-.0157 <sup>a</sup>
avgr91-01	2.4973 <sup>c</sup>	-.3564	3.9705 <sup>c</sup>	3.9497 <sup>c</sup>	-.1710	4.5379 <sup>c</sup>	-3.3396	-.4228	-16.2658
mean01-11	.3336	.1144	.2192	.2952 <sup>a,b</sup>	.0365 <sup>a,b</sup>	.2587 <sup>a,b</sup>	.0384 <sup>a</sup>	.0779 <sup>a</sup>	-.0395 <sup>a</sup>
avgr02-11	-1.6596	1.4183 <sup>c</sup>	-3.1189	-1.0218	2.5225 <sup>c</sup>	-1.4632	-7.7500	.9303	-8.8410 <sup>c</sup>

Source: calculated from Cambridge Econometrics

<sup>a</sup> denotes rejection of  $H_0$  (group mean = EU mean) based on Student's  $t$ , 95% confidence interval; <sup>b</sup> denotes rejection of  $H_0$  (CEEC mean = Others mean) based on Student's  $t$ , 95% confidence interval; <sup>c</sup> denotes rejection of  $H_0$  (yearly average growth rate = 0) based on bootstrap sampling, 95% confidence interval, 10,000 replications

economic integration, in real terms they move in opposite directions: in the West inequalities (which are significantly lower in the first place) generally fall over time; in the East they generally grow. Finally, the breakdown by sectors shows that significant differences are present in most branches of activity and tend to grow over time, especially during the second sub-period. These conclusions are in line with some results that are emerging in the literature, according to which a new divide between Eastern and Western regions is taking place in the EU, complementing and possibly replacing the more traditional North-South one<sup>20</sup>. While falling specialization for CEECs in agriculture can be easily accounted for by high initial levels, the same phenomenon in market services, that becomes significant in the second sub-period, appears *prima facie* more difficult to explain and calls for closer examination. So does the - fairly unexpected - growth of both indicators in the manufacturing sector. It is to these problems that we now turn.

<sup>20</sup> See, among the others, Chapman *et al.*, 2012. On the other hand, another result that is generally acknowledged by the literature - i.e. that *within*-country differences grow strongly in post-communist CEECs (see Paas, 2007, and Chapman *et al.*, 2012) - is confirmed in this work only for agglomeration.

Table 3 – The T<sub>sp</sub> indicator: major sectors, whole sample and country groups (absolute values, means and yearly average growth rates, 1991-2011, 1991-2000, 2001-11)

	EU					CEECs					Other countries				
	agr	constr	man	mktser	nnmktser	agr	constr	man	mktser	nnmktser	agr	constr	man	mktser	nnmktser
1991	4.7341	.4937	.3956	-.4765	1.3870	4.0808	.0439	1.4979	-1.6062	-.9456	.6533	.4498	-1.1023	1.1296	2.3326
1992	4.8420	.5093	.4454	-.5460	1.4669	4.4100	.0420	1.4541	-1.6252	-1.0117	.4320	.4673	-1.0087	1.0792	2.4786
1993	4.8674	.4694	.5713	-.6311	1.4573	4.5963	-.0218	1.4850	-1.6159	-1.0478	.2711	.4912	-.9137	.9849	2.5051
1994	4.9385	.4200	.6838	-.6669	1.4255	4.7935	-.0482	1.4751	-1.6276	-1.0618	.1450	.4682	-.7913	.9607	2.4873
1995	4.9160	.4453	.8658	-.8521	1.2911	4.7075	-.0905	1.5479	-1.6307	-1.0505	.2085	.5358	-.6820	.7786	2.3416
1996	5.0898	.4515	.9015	-.8575	1.2074	4.8857	-.0741	1.6017	-1.6179	-1.1460	.2041	.5256	-.7002	.7604	2.3534
1997	5.1876	.5047	1.0077	-.9765	1.2070	5.0825	-.0728	1.6213	-1.6644	-1.1478	.1051	.5775	-.6136	.6879	2.3548
1998	5.5338	.5055	1.0617	-.9733	1.0894	5.5195	-.0621	1.6507	-1.6935	-1.1947	.0143	.5676	-.5889	.7202	2.2841
1999	5.5283	.5319	1.1508	-1.1449	1.1165	5.5471	-.1028	1.5336	-1.6292	-1.1604	-.0188	.6347	-.3828	.4842	2.2769
2000	5.7032	.6020	1.2018	-1.2012	.9817	5.7726	-.1384	1.4816	-1.6008	-1.1915	-.0694	.7404	-.2798	.3995	2.1732
2001	5.1399	.6164	1.3882	-1.3110	.9112	4.9680	-.0931	1.7460	-1.6002	-1.1188	.1718	.7095	-.3578	.2892	2.0300
2002	5.0245	.6153	1.4318	-1.5026	.7065	4.5896	-.1105	1.8477	-1.6032	-1.1450	.4349	.7259	-.4159	.1005	1.8516
2003	4.9442	.6462	1.4426	-1.5053	.7379	4.5768	-.0903	1.8178	-1.5914	-1.1142	.3674	.7365	-.3752	.0861	1.8522
2004	4.7284	.6398	1.5839	-1.5947	.6860	4.3466	-.0728	1.9899	-1.5973	-1.1777	.3819	.7126	-.4061	.0025	1.8637
2005	4.6620	.6946	1.6606	-1.6245	.5954	4.2976	-.0638	2.0294	-1.5719	-1.2218	.3645	.7583	-.3688	-.0526	1.8172
2006	4.4313	.7022	1.7091	-1.5806	.5349	4.0230	-.0253	2.1324	-1.5544	-1.2368	.4083	.7276	-.4233	-.0262	1.7717
2007	4.2713	.7398	1.7454	-1.5909	.5484	3.8805	.0605	2.1554	-1.5167	-1.2939	.3908	.6793	-.4100	-.0742	1.8424
2008	4.0916	.7409	1.7532	-1.5629	.5348	3.7045	.1742	2.1535	-1.4836	-1.3402	.3871	.5667	-.4004	-.0792	1.8750
2009	4.1256	.6899	1.6570	-1.5240	.5746	3.7197	.2613	2.0901	-1.4018	-1.4127	.4059	.4286	-.4331	-.1222	1.9873
2010	4.0375	.6307	1.6488	-1.5053	.5307	3.5426	.2424	2.0929	-1.3311	-1.4230	.4949	.3882	-.4442	-.1742	1.9536
2011	3.9690	.6483	1.6624	-1.5071	.5262	3.4588	.2511	2.0999	-1.3333	-1.4027	.5102	.3972	-.4375	-.1738	1.9289
mean	4.7984	.5856	1.2366	-1.1969	.9294	4.5002 <sup>a,b</sup>	.0004 <sup>a,b</sup>	1.7859 <sup>a,b</sup>	-1.5665 <sup>a,b</sup>	-1.1831 <sup>a,b</sup>	.2982 <sup>a</sup>	.5852	-.5493 <sup>a</sup>	.3696 <sup>a</sup>	2.1124 <sup>a</sup>
avgr	-.8127	1.5648	7.7817 <sup>c</sup>	-6.2334 <sup>c</sup>	-4.4482	-.6705	13.3165	1.8296	-.9047	-2.0552	-9.5061	-.1236	3.4433	-135.5895	-.8743
mean1	5.1341	.4933	.8286	-.8326	1.2630	4.9396 <sup>b</sup>	-.0525 <sup>a,b</sup>	1.5349 <sup>a,b</sup>	-1.6311 <sup>a,b</sup>	-1.0958 <sup>a,b</sup>	.1945 <sup>a</sup>	.5458	-.7063 <sup>a</sup>	.7985 <sup>a</sup>	2.3588 <sup>a</sup>
avgr1	.9126	2.4947	13.6764 <sup>c</sup>	-10.9476 <sup>c</sup>	-3.9533	2.1828	-39.8327	1.7344	-.0211	-1.7871	-36.3786	4.9328	9.2866	-11.9660 <sup>c</sup>	-1.3140
mean2	4.4932	.6695	1.6075	-1.5281	.6261	4.1007 <sup>a,b</sup>	.0485 <sup>a,b</sup>	2.0141 <sup>a,b</sup>	-1.5077 <sup>b</sup>	-1.2624 <sup>a,b</sup>	.3925 <sup>a</sup>	.6209	-.4066 <sup>a</sup>	-.0204 <sup>a</sup>	1.8885 <sup>a</sup>
avgr2	-2.5379 <sup>c</sup>	.6349	1.8869	-1.5193	-4.9430	-3.5237 <sup>c</sup>	66.4657	1.9248	-1.7884 <sup>c</sup>	-2.3232	17.3663	-5.1799	-2.4001	-259.2129	-4.345

Source: calculated from Cambridge Econometrics

mean and avgr (average growth): 1991-2011; mean 1 and avgr1: 1991-2001; mean2 and avgr2: 2002-2011

<sup>a</sup> denotes rejection of H<sub>0</sub> (group mean = EU mean) based on Student's t, 95% confidence interval; <sup>b</sup> denotes rejection of H<sub>0</sub> (CEEC mean = Others mean) based on Student's t, 95% confidence interval; <sup>c</sup> denotes rejection of H<sub>0</sub> (yearly average growth rate = 0) based on bootstrap sampling, 95% confidence interval, 10,000 replications

Table 4 – The  $T_{con}$  indicator: major sectors, whole sample and country groups (absolute values, means and yearly average growth rates, 1991-2011, 1991-2000, 2001-11)

EU						CEECs					Other countries				
	agr	constr	man	mktser	nnmktser	agr	constr	man	mktser	nnmktser	agr	constr	man	mktser	nnmktser
1991	.2151	.0186	.0224	.0174	.0161	.2354	-.0011	.0282	-.0223	-.0212	-.0203	.0197	-.0059	.0398	.0374
1992	.2339	.0169	.0216	.0168	.0175	.2612	-.0005	.0255	-.0219	-.0221	-.0273	.0174	-.0040	.0387	.0396
1993	.2445	.0172	.0214	.0159	.0171	.2775	-.0049	.0253	-.0212	-.0217	-.0330	.0222	-.0038	.0371	.0388
1994	.2534	.0179	.0213	.0154	.0166	.2907	-.0064	.0247	-.0211	-.0215	-.0372	.0243	-.0033	.0366	.0382
1995	.2566	.0197	.0213	.0145	.0153	.2902	-.0083	.0260	-.0204	-.0209	-.0337	.0280	-.0047	.0349	.0362
1996	.2656	.0206	.0216	.0149	.0152	.3013	-.0074	.0271	-.0202	-.0215	-.0357	.0280	-.0054	.0351	.0367
1997	.2715	.0205	.0220	.0148	.0149	.3107	-.0069	.0260	-.0202	-.0212	-.0393	.0275	-.0040	.0350	.0362
1998	.2802	.0193	.0228	.0166	.0137	.3266	-.0060	.0262	-.0196	-.0207	-.0464	.0253	-.0033	.0362	.0344
1999	.2946	.0199	.0229	.0144	.0140	.3379	-.0084	.0223	-.0184	-.0199	-.0434	.0283	.0006	.0328	.0340
2000	.3047	.0205	.0230	.0146	.0130	.3505	-.0103	.0208	-.0175	-.0194	-.0458	.0308	.0022	.0321	.0324
2001	.3009	.0188	.0246	.0143	.0115	.3368	-.0071	.0256	-.0169	-.0172	-.0359	.0259	-.0011	.0312	.0287
2002	.2724	.0181	.0260	.0122	.0095	.2968	-.0073	.0298	-.0159	-.0160	-.0244	.0255	-.0038	.0281	.0255
2003	.2834	.0188	.0269	.0121	.0097	.3084	-.0068	.0303	-.0157	-.0156	-.0250	.0256	-.0034	.0278	.0253
2004	.2685	.0194	.0288	.0109	.0094	.2941	-.0055	.0341	-.0149	-.0161	-.0256	.0249	-.0053	.0259	.0255
2005	.2676	.0207	.0301	.0105	.0092	.2934	-.0047	.0354	-.0146	-.0162	-.0258	.0253	-.0053	.0252	.0254
2006	.2610	.0205	.0311	.0100	.0088	.2820	-.0021	.0384	-.0142	-.0162	-.0210	.0226	-.0073	.0241	.0249
2007	.2607	.0208	.0318	.0094	.0092	.2820	.0031	.0390	-.0136	-.0172	-.0212	.0177	-.0072	.0230	.0263
2008	.2584	.0173	.0326	.0090	.0094	.2793	.0087	.0397	-.0133	-.0178	-.0209	.0086	-.0071	.0223	.0272
2009	.2580	.0127	.0342	.0086	.0098	.2785	.0121	.0412	-.0126	-.0184	-.0206	.0006	-.0071	.0212	.0282
2010	.2478	.0110	.0344	.0079	.0094	.2621	.0120	.0421	-.0117	-.0181	-.0143	-.0011	-.0076	.0196	.0275
2011	.2484	.0111	.0347	.0079	.0093	.2620	.0125	.0425	-.0117	-.0179	-.0136	-.0014	-.0077	.0195	.0272
mean	.2641	.0181	.0265	.0128	.0123	.2932 <sup>a,b</sup>	-.0021 <sup>a,b</sup>	.0310 <sup>a,b</sup>	-.0170 <sup>a,b</sup>	-.0189 <sup>a,b</sup>	-.0291 <sup>a</sup>	.0203	-.0045 <sup>a</sup>	.0298 <sup>a</sup>	.0312 <sup>a</sup>
avgr	.8036	-2.1186	2.2587 <sup>c</sup>	-3.7402 <sup>c</sup>	-2.5447	.6605	-17.1275	2.3959	3.1697 <sup>c</sup>	0.7658	.6264	-22.8856	-4.5026	-3.4353 <sup>c</sup>	-1.4724
mean1	.2620	.0191	.0220	.0155	.0154	.2982 <sup>a,b</sup>	-.0060 <sup>a,b</sup>	.0252 <sup>b</sup>	-.0203 <sup>a,b</sup>	-.0210 <sup>a,b</sup>	-.0362 <sup>a</sup>	.0251 <sup>a</sup>	-.0032 <sup>a</sup>	.0358 <sup>a</sup>	.0364 <sup>a</sup>
avgr1	3.4419 <sup>c</sup>	0.2760	0.9804	-1.7352	-3.1907	3.7122 <sup>c</sup>	-90.3513	-0.4984	2.7316 <sup>c</sup>	1.9939	-7.0324	3.5568	25.7527	-2.3269	-2.5107
mean2	.2661	.0172	.0305	.0103	.0095	.2887 <sup>a,b</sup>	.0014 <sup>a,b</sup>	.0362 <sup>b</sup>	-.0141 <sup>a,b</sup>	-.0170 <sup>a,b</sup>	-.0226 <sup>a</sup>	.0158	-.0057 <sup>a</sup>	.0244 <sup>a</sup>	.0265 <sup>a</sup>
avgr2	-1.8347	-4.5132	3.5370 <sup>c</sup>	-5.7453 <sup>c</sup>	-1.8986	-2.3912	56.0963	5.2903	3.6078 <sup>c</sup>	-0.4622	8.2852	-49.3279	-34.7579	-4.5436 <sup>c</sup>	-0.4341

Source: calculated from Cambridge Econometrics

mean and avgr (average growth): 1991-2011; mean 1 and avgr1: 1991-2001; mean2 and avgr2: 2002-2011

<sup>a</sup> denotes rejection of  $H_0$  (group mean = EU mean) based on Student's  $t$ , 95% confidence interval; <sup>b</sup> denotes rejection of  $H_0$  (CEEC mean = Others mean) based on Student's  $t$ , 95% confidence interval; <sup>c</sup> denotes rejection of  $H_0$  (yearly average growth rate = 0) based on bootstrap sampling, 95% confidence interval, 10,000 replications

#### 4. Patterns of specialization and agglomeration in CEECs

In order to consider the features and the evolution of production patterns in CEECs more closely, these countries are now considered individually. The focus is on manufacturing and market services, i.e. on the sectors that most of all register significant changes, especially in the second sub-period (2002-11).

We start from market services. As already seen from Tables 3-4, during 1991-2011 the group as a whole shows below-average specialization and agglomeration in the sector, growing as far as geographic concentration is concerned, but falling for specialization. The sectoral indicators in Table 5 confirm these results for individual CEECs: over 1991-2011 regions in Eastern countries all present significantly below-average sectoral specialization (part a) and agglomeration (part b). Not counting one-region countries (i.e. the three Baltic - more on this point *infra*) specialization grows in only three cases (Bulgaria, Slovenia and Slovakia) while agglomeration grows for all. Specializations generally picks up in the second sub-period even if average growth rates are never significant and leave indicators significantly below-average<sup>21</sup>. In some countries (Bulgaria, Slovenia and Slovakia) growth occurs in both sub-periods and is higher in the second one; in others (Poland and Romania) specialization first falls and starts growing only in the Two Thousands, showing initial adjustment and later catching up. In two cases (the Czech Republic and Hungary) it falls throughout the entire

Table 5 -  $T_{sp}$  and  $T_{con}$  indicators in market services for individual CEECs (absolute values, means and yearly average growth rates, 1991-2011, 1991-2000, 2001-11)

	(part a: $T_{sp}$ )									
	bg	cz	ee	lv	lt	hu	pl	ro	si	sk
1991	-.2488	-.0634	-.0392	-.0382	-.0361	-.1587	-.4929	-.3726	-.0501	-.1061
1992	-.2512	-.0648	-.0375	-.0367	-.0390	-.1609	-.5098	-.3692	-.0520	-.1041
1993	-.2533	-.0690	-.0307	-.0322	-.0361	-.1725	-.5027	-.3725	-.0440	-.1029
1994	-.2524	-.0664	-.0244	-.0290	-.0312	-.1792	-.5268	-.3750	-.0444	-.0987
1995	-.2518	-.0667	-.0191	-.0289	-.0346	-.1886	-.5335	-.3672	-.0453	-.0950
1996	-.2572	-.0787	-.0170	-.0292	-.0361	-.1718	-.5396	-.3873	-.0405	-.0604
1997	-.2646	-.0910	-.0185	-.0327	-.0324	-.1641	-.5541	-.3909	-.0449	-.0714
1998	-.2638	-.0846	-.0146	-.0244	-.0368	-.1937	-.5635	-.4166	-.0426	-.0528
1999	-.2425	-.0696	-.0120	-.0207	-.0403	-.1818	-.5624	-.4025	-.0480	-.0492
2000	-.2499	-.0597	-.0088	-.0170	-.0395	-.1660	-.5757	-.3912	-.0451	-.0478
2001	-.2423	-.0632	-.0148	-.0204	-.0395	-.1741	-.5634	-.4002	-.0457	-.0367
2002	-.2456	-.0648	-.0105	-.0212	-.0387	-.1871	-.5599	-.4167	-.0358	-.0229
2003	-.2456	-.0683	-.0163	-.0178	-.0387	-.1804	-.5659	-.4090	-.0350	-.0143
2004	-.2334	-.0759	-.0244	-.0161	-.0360	-.1868	-.5791	-.3915	-.0365	-.0176
2005	-.2284	-.0791	-.0187	-.0168	-.0363	-.1719	-.5896	-.3930	-.0389	.0008
2006	-.2317	-.0854	-.0167	-.0100	-.0283	-.1789	-.5867	-.3913	-.0355	.0100
2007	-.2267	-.0846	-.0199	-.0080	-.0286	-.1808	-.5499	-.3940	-.0325	.0082
2008	-.1957	-.0980	-.0173	-.0074	-.0205	-.1762	-.5663	-.3870	-.0308	.0155
2009	-.1893	-.0793	-.0134	-.0050	-.0187	-.1811	-.5535	-.3774	-.0246	.0405
2010	-.1744	-.0690	-.0134	-.0045	-.0115	-.1880	-.5289	-.3675	-.0204	.0465
2011	-.1803	-.0652	-.0134	-.0047	-.0116	-.1941	-.5179	-.3706	-.0210	.0455
mean	-.2347 <sup>a,b</sup>	-.0737 <sup>a,b</sup>	-.0191 <sup>a,b</sup>	-.0200 <sup>a,b</sup>	-.0319 <sup>a,b</sup>	-.1779 <sup>a,b</sup>	-.5487 <sup>a,b</sup>	-.3878 <sup>a,b</sup>	-.0387 <sup>a,b</sup>	-.0339 <sup>a,b</sup>
avgr	1.5015	-.7217	1.9442	8.7575	4.5385	-1.2151	-.2846	-.0130	3.7633	81.9809
mean1	-.2536 <sup>a,b</sup>	-.0714 <sup>a,b</sup>	-.0222 <sup>a,b</sup>	-.0289 <sup>a,b</sup>	-.0362 <sup>a,b</sup>	-.1737 <sup>a,b</sup>	-.5361 <sup>a,b</sup>	-.3845 <sup>a,b</sup>	-.0457 <sup>a,b</sup>	-.0788 <sup>a,b</sup>
avgr1	.2137	-.5868	6.4258	5.1867	-1.3113	-1.2419	-1.3662	-.7659	.5546	8.8013
mean2	-.2176 <sup>a,b</sup>	-.0757 <sup>a,b</sup>	-.0163 <sup>a,b</sup>	-.0120 <sup>a,b</sup>	-.0280 <sup>a,b</sup>	-.1818 <sup>a,b</sup>	-.5601 <sup>a,b</sup>	-.3907 <sup>a,b</sup>	-.0324 <sup>a,b</sup>	.0069 <sup>a,b</sup>
avgr2	2.7894	-.8566	-2.5374	12.3283	10.3882	-1.1883	.7970	.7400	6.9720	155.1604

<sup>21</sup> In only one case (Slovakia) regional specialization in the sector grows to the extent of reaching, from 2005 on, positive (i.e. above EU-average) values.

(part b:  $T_{con}$ )

	bg	cz	ee	lv	lt	hu	pl	ro	si	sk
1991	-.00223	-.00036	-.00044	-.00077	-.00088	-.00109	-.00602	-.00921	-.00040	-.00094
1992	-.00206	-.00037	-.00040	-.00068	-.00093	-.00098	-.00627	-.00893	-.00039	-.00092
1993	-.00205	-.00042	-.00031	-.00056	-.00083	-.00102	-.00604	-.00875	-.00032	-.00092
1994	-.00203	-.00040	-.00023	-.00045	-.00067	-.00104	-.00639	-.00873	-.00031	-.00088
1995	-.00201	-.00040	-.00017	-.00040	-.00072	-.00097	-.00652	-.00805	-.00031	-.00085
1996	-.00200	-.00050	-.00015	-.00038	-.00074	-.00079	-.00659	-.00816	-.00026	-.00061
1997	-.00196	-.00061	-.00016	-.00044	-.00066	-.00073	-.00688	-.00781	-.00028	-.00067
1998	-.00192	-.00050	-.00012	-.00032	-.00074	-.00096	-.00691	-.00736	-.00026	-.00053
1999	-.00155	-.00031	-.00009	-.00026	-.00076	-.00081	-.00655	-.00728	-.00029	-.00047
2000	-.00152	-.00022	-.00007	-.00020	-.00070	-.00067	-.00634	-.00711	-.00027	-.00043
2001	-.00137	-.00026	-.00011	-.00025	-.00066	-.00064	-.00595	-.00702	-.00027	-.00036
2002	-.00140	-.00028	-.00008	-.00026	-.00067	-.00070	-.00566	-.00637	-.00021	-.00029
2003	-.00143	-.00026	-.00012	-.00022	-.00068	-.00072	-.00560	-.00622	-.00020	-.00023
2004	-.00134	-.00033	-.00018	-.00020	-.00062	-.00069	-.00541	-.00574	-.00020	-.00024
2005	-.00127	-.00033	-.00014	-.00020	-.00063	-.00053	-.00558	-.00558	-.00021	-.00013
2006	-.00128	-.00031	-.00013	-.00012	-.00049	-.00053	-.00563	-.00540	-.00019	-.00008
2007	-.00123	-.00030	-.00015	-.00010	-.00049	-.00053	-.00522	-.00528	-.00017	-.00008
2008	-.00110	-.00039	-.00013	-.00009	-.00034	-.00042	-.00553	-.00508	-.00016	-.00004
2009	-.00108	-.00023	-.00009	-.00006	-.00030	-.00043	-.00551	-.00492	-.00013	.00013
2010	-.00094	-.00014	-.00009	-.00005	-.00017	-.00047	-.00525	-.00466	-.00010	.00016
2011	-.00095	-.00011	-.00009	-.00005	-.00017	-.00051	-.00515	-.00470	-.00011	.00016
mean	-.00156 <sup>a,b</sup>	-.00033 <sup>a,b</sup>	-.00016 <sup>a,b</sup>	-.00029 <sup>a,b</sup>	-.00061 <sup>a,b</sup>	-.00073 <sup>a,b</sup>	-.00595 <sup>a,b</sup>	-.00678 <sup>a,b</sup>	-.00024 <sup>a,b</sup>	-.00039 <sup>a,b</sup>
avgr	4.0149 <sup>c</sup>	3.1935	4.2873	11.3494 <sup>c</sup>	6.7321	2.9533	.6944	3.2713 <sup>c</sup>	6.0272 <sup>c</sup>	32.4400
mean1	-.00193 <sup>a,b</sup>	-.00041 <sup>a,b</sup>	-.00021 <sup>a,b</sup>	-.00045 <sup>a,b</sup>	-.00076 <sup>a,b</sup>	-.00091 <sup>a,b</sup>	-.00645 <sup>a,b</sup>	-.00814 <sup>a,b</sup>	-.00031 <sup>a,b</sup>	-.00072 <sup>a,b</sup>
avgr1	4.5349	.7364	9.8897	9.6275	2.2814	4.2452	.0297	2.6412 <sup>c</sup>	3.6465	8.5426
mean2	-.00122 <sup>a,b</sup>	-.00027 <sup>a,b</sup>	-.00012 <sup>a,b</sup>	-.00015 <sup>a,b</sup>	-.00047 <sup>a,b</sup>	-.00056 <sup>a,b</sup>	-.00550 <sup>a,b</sup>	-.00554 <sup>a,b</sup>	-.00018 <sup>a,b</sup>	-.00009 <sup>a,b</sup>
avgr2	3.4948	5.6506	-1.3152	13.0712 <sup>c</sup>	11.1828	1.6614	1.3591	3.9013 <sup>c</sup>	8.4079 <sup>c</sup>	56.3374

Source: calculated from Cambridge Econometrics

mean and avgr (average growth): 1991-2011; mean 1 and avgr1: 1991-2001; mean2 and avgr2: 2002-2011;

<sup>a</sup> denotes rejection of  $H_0$  (each mean = corresponding EU mean) based on Student's  $t$ , 95% confidence interval;<sup>b</sup> denotes rejection of  $H_0$  (each mean = corresponding Others mean) based on Student's  $t$ , 95% confidence interval;<sup>c</sup> denotes rejection of  $H_0$  (yearly average growth rate = 0) based on bootstrap sampling, 95% confidence interval, 10,000 replications

period. In general, the indicators point to surprisingly low growth in sectoral specialization throughout the period, notwithstanding initial underdevelopment. As far as agglomeration is concerned, the dynamics is more clear-cut: average indicators grow for all cases (significantly for Bulgaria, Romania and Slovenia) even if the sector remains significantly more dispersed than for Western regions.

Consistent growth in agglomeration coupled with moderate (or negative) growth in specialization points to a sector that is largely dominated by diverging behaviour between capitals and non-capital regions. Sectoral indexes for CEECs capitals (excluding the three Baltic ones) show above-average specialization and agglomeration for most cases, the only exceptions being Polish and Bulgarian capital regions Mazowieckie and Yugozapaden<sup>22</sup>. The role of capital regions was investigated further by calculating the indicators for a sub-sample of CEECs regions obtained by excluding all capitals; the null hypothesis was then tested that average indicators of the original sample and the ones of the sub-sample were statistically

<sup>22</sup> However, while for Poland both indicators remain negative throughout the whole period, for Yugozapaden they turn positive in the second sub-period. Indicators by individual regions are not shown in the paper but are available on request.

different<sup>23</sup>. The results show significant differences between the two groups for all cases except for Bulgaria and Slovenia, confirming the leading role of capitals in the sector<sup>24</sup>.

The need to separate capital regions from the other ones makes the analysis of the three one-region Baltic countries difficult, inasmuch as country performance could reflect a dominant capital effect that cannot be disentangled from other elements. In fact in 1991 the three countries presented the highest group specialization in the sector together with relatively high geographic concentration. However, over time only Latvia and Lithuania achieved further specialization and agglomeration (significant in the case of Latvia) while both indicators fell for Estonia after initial growth in the first sub-period.

A further breakdown of sectoral specialization and agglomeration patterns in CEECs addresses the role, if any, of the most advanced activities in the sector i.e. of so-called knowledge-intensive markets services, including financial intermediation. This is done with reference to the Eurostat REGIO database. Eurostat follows OECD standards and classifies economic activities on the basis of their technology intensity. For services the share of tertiary educated personnel in the sector (at NACE 1.1 level) is calculated. Activities presenting shares above a selected threshold are then classified as knowledge-intensive (sectoral approach). In principle the database covers 1999-2007 but for many CEECs the period is shorter and can start as late as 2004 (Poland) or 2003 (Bulgaria) (details on the time coverage are in Appendix 1). Given the additive nature of the Theil indicators, missing data represents a serious drawback inasmuch as it limits analysis to the period during which data is complete (in the case in object to 2004-07). In what follows an attempt is made to overcome this limit by calculating indicators prior to 2004. This is done by substituting in equations (2) and (3) total employment with the total employment available for the year. The values obtained are strictly not comparable with the ones based on the whole sample and should therefore be interpreted with caution; nevertheless they do provide some information on sectoral evolution at least from a qualitative point of view<sup>25</sup>. Indicators for market knowledge-intensive services and financial intermediation (kis for short) are in Table 6. Over 2004-07 they show significantly below-average specialization and agglomeration for all CEECs, growing somewhat (never significantly) in the three Baltic countries, in Bulgaria, the Czech Republic and Slovenia but falling in all the rest. Again, separating capitals from non-capital regions shows that, where it occurs, specialization in the more advanced market services is achieved almost entirely by capitals; the same can be said for the growing dissemination of these activities.

All-in-all, the analysis of the market service sector of CEECs during 1991-2011 shows a deep divide building between capital and non-capital regions. While agglomeration in the sector grows for all capitals it falls for most other regions. The development of market services and of its most advanced sub-sectors, which very often represent a driving force for growth, is entirely limited to capitals. As these slowly catch up on their Western counterparts, the other regions lag behind, moving away from the EU average.

The indicators relating to the manufacturing sector are in Table 7. As already seen, during 1991-2011 CEECs as a group present above-average and rising sectoral disproportions both in the field of specialization and of agglomeration. Table 7 largely confirms these results and shows significantly higher average sectoral indicators in each CEEC both with respect to EU and to Other countries, rising over time in most cases<sup>26</sup>. A breakdown of the indicators by

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<sup>23</sup> Test performed through Student's *t*, at 95% confidence interval. Results are available on request.

<sup>24</sup> For both cases, this points to low sectoral disproportions between capital and non-capital regions; for Bulgaria, however, this is largely due to the underdevelopment of services in the capital (see note 22 above).

<sup>25</sup> Before 2004 the indicators naturally underestimate the phenomenon to which they relate. However, the hypothesis that the yearly differences between total and available employment are equal to zero was tested by means of bootstrap inference with 10,000 replications and turned out to be acceptable for all years from 1997 to 2004 with a 95% confidence interval. Due to the purely indicative character of the indicators thus obtained, none of the usual tests is performed prior to 2004.

<sup>26</sup> Except in Bulgaria, Slovenia and Slovakia for specialization, in Latvia and Slovenia for agglomeration.

**Table 6 -  $T_{sp}$  and  $T_{con}$  indicators in knowledge-intensive market services and in financial intermediation for individual CEECs (absolute values, means and yearly average growth rates, 1991-2011, 1991-2000, 2001-11)**

$T_{sp}$	Bg	Cz	Ee	Lv	Lt	Hu	Pl	Ro	Si	Sk
1999		-.0470	-.0017	-.0108	-.0133	-.0630				-.0234
2000		-.0287	-.0029	-.0078	-.0127	-.0517		-.0875		-.0174
2001		-.0481	-.0004	-.0141	-.0151	-.0598		-.0898	-.0138	-.0093
2002		-.0774	.0009	-.0131	-.0149	-.0757		-.1024	-.0191	-.0283
2003	-.0784	-.0597	-.0052	-.0105	-.0138	-.0699		-.1041	-.0153	-.0211
2004	-.0893	-.0790	-.0098	-.0154	-.0167	-.0793	-.1972	-.1078	-.0212	-.0157
2005	-.0896	-.0860	-.0084	-.0140	-.0167	-.0817	-.1990	-.1138	-.0196	-.0252
2006	-.0895	-.0749	-.0103	-.0118	-.0159	-.0872	-.2132	-.1178	-.0193	-.0294
2007	-.0905	-.0708	-.0104	-.0115	-.0162	-.0904	-.2090	-.1207	-.0198	-.0267
mean	-.0875 <sup>a,b</sup>	-.0741 <sup>a,b</sup>	-.0088 <sup>a,b</sup>	-.0126 <sup>a,b</sup>	-.0159 <sup>a,b</sup>	-.0817 <sup>a,b</sup>	-.2046 <sup>a,b</sup>	-.1128 <sup>a,b</sup>	-.0191 <sup>a,b</sup>	-.0236 <sup>a,b</sup>
avgr	.5065	1.2184	1.4732	4.3768	1.3082	-.9523	-.9889	-1.2575	2.6075	-13.9907
$T_{con}$	Bg	Cz	Ee	Lv	Lt	Hu	Pl	Ro	Si	Sk
1999		-.00215	-.00008	-.00084	-.00158	-.00159				-.00154
2000		-.00120	-.00012	-.00054	-.00133	-.00087		-.00851		-.00120
2001		-.00184	-.00020	-.00067	-.00126	-.00126		-.00767	-.00044	-.00093
2002		-.00233	-.00001	-.00072	-.00110	-.00132		-.00625	-.00047	-.00115
2003	-.00176	-.00173	.00003	-.00066	-.00110	-.00112		-.00605	-.00036	-.00103
2004	-.00189	-.00211	-.00027	-.00072	-.00111	-.00129	-.00656	-.00592	-.00047	-.00090
2005	-.00183	-.00225	-.00023	-.00064	-.00110	-.00117	-.00684	-.00585	-.00043	-.00102
2006	-.00183	-.00190	-.00029	-.00055	-.00102	-.00128	-.00748	-.00595	-.00041	-.00110
2007	-.00183	-.00176	-.00028	-.00053	-.00102	-.00131	-.00696	-.00587	-.00041	-.00109
mean	-.00183 <sup>a,b</sup>	-.00195 <sup>a,b</sup>	-.00021 <sup>a,b</sup>	-.00062 <sup>a,b</sup>	-.00107 <sup>a,b</sup>	-.00123 <sup>a,b</sup>	-.00696 <sup>a,b</sup>	-.00593 <sup>a,b</sup>	-.00042 <sup>a,b</sup>	-.00103 <sup>a,b</sup>
avgr	.85170	1.3227	4.4726	2.9572	.8179	.8895	-1.6722	-.0605	2.9719	-3.5621

Source: calculated from Eurostat

mean and avgr (average growth) calculated over 2004-07;

<sup>a</sup> denotes rejection of  $H_0$  (country mean = corresponding EU mean) based on Student's  $t$ , 95% confidence interval;

<sup>b</sup> denotes rejection of  $H_0$  (country mean = corresponding Others mean) based on Student's  $t$ , 95% confidence interval

sub-periods is interesting inasmuch as it provides *prima facie* insight on industrial reconversion and restructuring processes in former centrally planned economies. Focusing on specialization, it would appear reasonable to expect indicators to fall in 1991-2001 on account of decline and heavy restructuring in traditional branches, and to fall much less – or growth – in 2002-11, due to restructuring getting close to completion and/or to successful completion leading to higher comparative advantage in the sector. Inspection of Table 6, part a, shows that this scheme applies only to a minority of CEECs, notably Bulgaria, Romania, Slovenia and Slovakia. Apart from Slovenia, where the indexes fall significantly in both sub-periods and the fall deepens in the second one, signaling what appears as structural de-specialization in the sector, the hypothesis of initial decline and restructuring followed by later consolidation appears to fit fairly well for the other three countries. For the remaining ones instead positive and high growth rates in the first sub-period (significant in two cases - the Czech Republic and Hungary) followed by further growth, albeit lower, in the second one apparently points to delayed restructuring. This is particularly evident for the Czech Republic and Poland where sectoral specialization continues to grow well into the Two Thousands.

Table 6, part b, also shows that in CEECs deeper sectoral specialization is coupled with higher agglomeration. This occurs in eight countries out of ten, and in some cases results in significant rates of growth. Industry's geographic concentration falls only in Slovenia and in Latvia. Again, this runs counter the general intuition according to which successful restructuring would require the dissemination of firms across regions, in line with what

happens in Other members' regions; in some sense, it recalls instead the production patterns that used to prevail under central planning<sup>27</sup>.

In summary, the analysis of average industrial specialization and agglomeration indicators in CEEC regions shows an unexpected persistence of initial patterns. Only one country (Slovenia) shows signs of structural reconversion away from the sector, in line with what generally occurs in Other countries. Early and successful restructuring appears to have taken place only in Bulgaria and in Romania<sup>28</sup>, even if in both cases, unlike what occurs in the West, it goes hand-in-hand with stronger geographic concentration. In the other CEECs slow and delayed industrial restructuring is associated with deeper localization, as regions apparently move away from the patterns prevailing among Western regions.

A further point worth investigating is whether CEECs regions' growing specialization in manufacturing shown in Tables 3 and 7 is related to the development of more modern, up-to-date lines of production – and in this sense may be interpreted as a sign of successful industrial restructuring – or instead it originates from more traditional areas, pointing to an extension over time of the production schemes typical of former centrally planned economies. This is done by considering the intra-sectoral differentiation of regional manufacturing on the basis of

**Table 7 -  $T_{sp}$  and  $T_{con}$  indicators in manufacturing for CEECs (absolute, mean values and yearly average growth rates, 1991-2011, 1991-2000, 2001-11)**

(part a: $T_{sp}$ )										
$T_{sp}$	Bg	Cz	Ee	Lv	Lt	Hu	Pl	Ro	Si	Sk
1991	.2099	.3984	.0253	.0184	.0278	.0875	.0032	.4317	.1303	.1654
1992	.1980	.4149	.0246	.0138	.0319	.1189	.0466	.3038	.1355	.1661
1993	.1976	.4392	.0173	.0062	.0173	.1724	.0926	.2429	.1293	.1701
1994	.1863	.4489	.0170	-.0023	.0013	.2161	.0993	.2154	.1262	.1668
1995	.1677	.4421	.0359	.0041	.0057	.2470	.1368	.2277	.1225	.1584
1996	.1440	.4849	.0319	-.0004	.0010	.2526	.1464	.2656	.1138	.1620
1997	.1451	.5264	.0223	-.0035	.0016	.2862	.1647	.1927	.1107	.1752
1998	.1296	.5254	.0219	-.0042	.0039	.3274	.1691	.2186	.1081	.1509
1999	.1122	.5189	.0235	-.0037	.0024	.3464	.1516	.1139	.1101	.1582
2000	.1193	.5362	.0315	.0003	.0038	.3440	.1019	.0769	.1101	.1576
2001	.1071	.5567	.0312	-.0031	.0040	.3738	.3246	.0841	.1102	.1575
2002	.1153	.5478	.0243	-.0051	.0056	.3784	.2488	.2783	.1026	.1518
2003	.1017	.5476	.0308	-.0021	.0069	.3257	.2781	.2629	.1027	.1635
2004	.1143	.5620	.0428	-.0027	.0057	.3222	.3515	.3275	.1032	.1635
2005	.1224	.5924	.0384	-.0052	.0077	.3143	.3911	.3027	.1033	.1622
2006	.1315	.6082	.0292	-.0034	.0073	.3250	.4422	.3358	.0971	.1596
2007	.1384	.6048	.0255	-.0041	.0073	.3480	.4813	.2949	.0927	.1667
2008	.1223	.6170	.0292	-.0012	.0082	.3586	.4932	.2782	.0851	.1629
2009	.1244	.5815	.0301	-.0032	.0055	.3196	.5556	.2851	.0723	.1193
2010	.1359	.5792	.0340	.0031	.0043	.3213	.5254	.3071	.0665	.1163
2011	.1433	.5717	.0347	.0043	.0049	.3286	.5175	.3109	.0669	.1171
mean	.1413 a,b	.5288 a,b	.0286 a,b	.0003 a,b	.0078 a,b	.2911 a,b	.2725 a,b	.2551 a,b	.1047 a,b	.1558 a,b
avgr	-1.5091	1.8872	5.1857	25.2733	20.0999	7.6742	88.1176	6.1583	-3.1739 c	-1.3958
mean1	.1610 a,b	.4735 a,b	.0251 a,b	.0029 a,b	.0097 a,b	.2399 a,b	.1112 a,b	.2289 a,b	.1197 a,b	.1631 a,b
avgr1	-6.2940 c	3.4659 c	7.4420	47.1628	35.4500	16.4244 c	170.6159	-12.3634	-1.6101	-.3195
mean2	.1233 a,b	.5790 a,b	.0318 a,b	-.0021 a,b	.0061 a,b	.3378 a,b	.4190 a,b	.2789 a,b	.0911 a,b	.1491 a,b
avgr2	3.2758	.3086	2.9295	3.3838	4.7498	-1.0759	5.6193	24.6799	-4.7378 c	-2.4721

<sup>27</sup> As with services, a new sample was built without capital regions. It was then compared with the original one by testing for statistical differences between the two. Results rule out statistical significance in the sector for all CEECs, except for Hungary for specialization, Bulgaria for agglomeration and Slovenia for both.

<sup>28</sup> In the case of Romania restructuring processes appear to have been largely related to investments from abroad.



(part b: T<sub>con</sub>)

T <sub>con</sub>	Bg	Cz	Ee	Lv	Lt	Hu	Pl	Ro	Si	Sk
1991	.00229	.00494	.00041	.00053	.00097	.00126	.00094	.01341	.00147	.00200
1992	.00208	.00531	.00040	.00039	.00114	.00156	.00187	.00919	.00148	.00211
1993	.00220	.00596	.00027	.00017	.00063	.00209	.00294	.00727	.00143	.00230
1994	.00216	.00633	.00027	-.00006	.00005	.00251	.00321	.00649	.00139	.00233
1995	.00199	.00632	.00053	.00009	.00020	.00243	.00413	.00670	.00134	.00229
1996	.00175	.00692	.00046	-.00001	.00003	.00242	.00437	.00759	.00120	.00237
1997	.00167	.00759	.00033	-.00008	.00006	.00275	.00495	.00500	.00115	.00254
1998	.00168	.00733	.00032	-.00010	.00013	.00320	.00502	.00529	.00112	.00218
1999	.00110	.00713	.00033	-.00008	.00008	.00353	.00430	.00245	.00118	.00225
2000	.00137	.00743	.00044	.00001	.00013	.00354	.00290	.00158	.00121	.00219
2001	.00121	.00776	.00044	-.00007	.00013	.00384	.00723	.00170	.00121	.00217
2002	.00142	.00782	.00035	-.00012	.00019	.00395	.00550	.00733	.00116	.00219
2003	.00138	.00780	.00046	-.00005	.00024	.00350	.00667	.00671	.00117	.00242
2004	.00151	.00813	.00065	-.00007	.00020	.00333	.00822	.00842	.00119	.00248
2005	.00169	.00876	.00061	-.00013	.00028	.00327	.00951	.00771	.00120	.00249
2006	.00184	.00907	.00048	-.00009	.00027	.00338	.01096	.00880	.00114	.00255
2007	.00198	.00921	.00042	-.00012	.00028	.00361	.01220	.00763	.00112	.00270
2008	.00182	.00950	.00049	-.00003	.00031	.00364	.01315	.00706	.00105	.00272
2009	.00209	.00927	.00048	-.00009	.00021	.00322	.01559	.00743	.00091	.00210
2010	.00214	.00944	.00053	.00008	.00016	.00333	.01523	.00823	.00084	.00207
2011	.00220	.00936	.00055	.00012	.00018	.00345	.01520	.00843	.00085	.00212
mean	.0018 a,b	.0077 a,b	.0004 a,b	.0000 a,b	.0003 a,b	.0030 a,b	.0073 a,b	.0069 a,b	.0012 a,b	.0023 a,b
avgr	.6808	3.3378 c	4.7134	-93.3045	20.3580	5.7264	20.1700	9.7328	-2.5641	.5773
mean1	.0018 a,b	.0065 a,b	.0004 a,b	.0001 a,b	.0003 a,b	.0025 a,b	.0035 a,b	.0065 a,b	.0013 a,b	.0023 a,b
avgr1	-5.0617	4.7512 c	5.4717	-188.046	34.0975	12.3183 c	31.6713	-15.6148	-1.7876	1.0379
mean2	.0018 a,b	.0087 a,b	.0005 a,b	-.0001 a,b	.0002 a,b	.0035 a,b	.0109 a,b	.0072 a,b	.0011 a,b	.0024 a,b
avgr2	6.4232	1.9243	3.9551	1.4373	6.6186	-0.8656	8.6688	35.0805	-3.3405	.1167

Source: calculated from Cambridge Econometrics

mean and avgr (average growth): 1991-2011; mean 1 and avgr1: 1991-2001; mean2 and avgr2: 2002-2011;

a denotes rejection of H<sub>0</sub> (each mean = corresponding EU mean) based on Student's t, 95% confidence interval;b denotes rejection of H<sub>0</sub> (each mean = corresponding Others mean) based on Student's t, 95% confidence interval;c denotes rejection of H<sub>0</sub> (yearly average growth rate = 0) based on bootstrap sampling, 95% confidence interval, 10,000 replications

its technology level. Again, data is taken from the Eurostat REGIO database and reflects NACE Rev.1.1 classification. Eurostat follows OECD standards and classifies industries on the basis of the technology content of the goods they produce or export; the technology content is measured by R&D expenditure as a percentage of value added (the sector approach)<sup>29</sup>. This classification allows to distinguish between low and medium technology manufacturing (respectively, light and heavy industry), the latter divided into medium-low and medium-high technology sectors (see Appendix 1 for definitions)<sup>30</sup>. Also in this case the dataset is complete only from 2004 on; indicators for previous years are built according to the method described above and should be considered as purely indicative.

Table 8 reports indicators T<sub>sp</sub> and T<sub>con</sub> relative to low, medium-low and medium-high technology manufacturing respectively for the whole and/or available sample, for CEECs and Western countries over 1999-07. Coherently with previous findings, Table 8 shows that in general during the whole period, but especially from 2004 on, in CEECs regions specialization and agglomeration in the three branches is above-average and higher than in the West (with

<sup>29</sup> See OECD, 2001 and 2002. The proposed indicator accounts for the impact of R&D outlays. Other technology indicators are the product approach, that evaluates directly whether a product is high, medium or low-tech, and the patent approach, that considers whether a patent is high, medium or low-tech. These indicators complement the first one.

<sup>30</sup> Consideration of the most advanced sub-sector (high technology manufacturing) is not possible due to incomplete data.

some exception for agglomeration, to which we shall return in a moment). CEECs regions specialize mostly in low technology manufacturing; medium-low and medium-high activities follow at a distance. Agglomeration reflects the same pattern: it is highest in low technology sectors, followed by the other two. Western regions instead specialize mostly in medium-low technology sectors, in medium-high and finally in low technology ones. As expected, CEEC regions' specialization is significantly above-average and higher than in the Others' group for low technology manufacturing even if it falls significantly. Also agglomeration in the sub-sector falls over 2004-07, but remains above average and far higher than in Western regions. Somewhat unexpectedly, Table 8 shows significant above-average specialization also in the relatively most advanced sector (i.e. the medium-high technology one), together with significantly below-average agglomeration. Both indicators are also significantly different from those of Other regions. The same holds for the medium-low technology sector, where specialization is significantly higher than in the West and agglomeration significantly lower. In both sub-sectors indicators grow, even if not significantly.

Consideration of the indicators for individual CEECs gives an idea on specialization and localization patterns also prior to 2004; it shows consolidation and growing, or unchanged, agglomeration taking place in the medium-low and in the medium-high technology sectors but falling for all countries in the low technology one except in Romania (see the Tables in

**Table 8 -  $T_{sp}$  and  $T_{con}$  indicators in low, medium-low and medium-high technology manufacturing: whole sample and country groups, 1997-2007 (absolute, mean values and yearly average growth rate)**

	EU			CEEC			Other		
$T_{sp}$	Low	Low-med	Med-hi	Low	Low-med	Med-hi	Low	Low-med	Med-hi
1997	.5929	.2902	.0381	.2287	-.0019	-.0018	.3642	.2921	.0399
1998	1.3491	.7427	.3839	.6736	.2767	.1272	.6756	.4660	.2567
1999	1.3415	.7625	.3886	.6376	.2791	.1211	.7039	.4834	.2675
2000	1.3662	.8256	.4148	.6806	.2785	.0871	.6856	.5472	.3277
2001	1.2090	.8768	.4266	.7701	.3495	.1199	.4389	.5273	.3067
2002	1.3726	.8959	.4189	.8858	.3580	.1476	.4868	.5379	.2712
2003	1.5334	.8559	.3980	1.0999	.3538	.1367	.4335	.5021	.2612
2004	1.2780	.6559	.1699	1.3063	.3200	.0443	-.0283	.3359	.1256
2005	1.2615	.6851	.2000	1.2478	.3700	.1179	.0136	.3151	.0821
2006	1.2244	.6962	.2251	1.2337	.4031	.1670	-.0093	.2931	.0582
2007	1.1220	.6171	.2909	1.1564	.4057	.2407	-.0344	.2113	.0502
mean04-07	1.2215	.6636	.2215	1.2360 <sup>a</sup>	.3747 <sup>b</sup>	.1425 <sup>a b</sup>	-.0146	.2888	.0790 <sup>a</sup>
avgr04-07	-4.1968	-1.7636	19.8443 <sup>c</sup>	-3.9579 <sup>c</sup>	8.4068	84.0572	-7.6292	-1.1369	-.2581 <sup>c</sup>
$T_{con}$									
1997	.0217	.0300	.0281	.0043	-.0004	-.0001	.0157	.0295	.0279
1998	.0430	.0477	.0471	.0163	.0105	.0039	.0252	.0362	.0428
1999	.0383	.0448	.0450	.0114	.0077	.0021	.0256	.0361	.0426
2000	.0424	.0470	.0486	.0170	.0091	.0014	.0240	.0372	.0468
2001	.0324	.0452	.0478	.0189	.0099	.0021	.0135	.0354	.0457
2002	.0419	.0437	.0468	.0230	.0113	.0034	.0189	.0324	.0434
2003	.0414	.0450	.0461	.0262	.0109	.0030	.0153	.0341	.0431
2004	.0261	.0275	.0317	.0304	.0089	-.0002	-.0043	.0186	.0319
2005	.0262	.0299	.0291	.0298	.0116	.0011	-.0036	.0183	.0280
2006	.0262	.0289	.0320	.0305	.0130	.0028	-.0043	.0159	.0292
2007	.0257	.0297	.0308	.0293	.0125	.0046	-.0035	.0172	.0262
mean04-07	.0291	.0322	.0340	.0292 <sup>a b</sup>	.0114 <sup>a</sup>	.0022 <sup>a b</sup>	-.0001 <sup>a</sup>	.0208 <sup>a</sup>	.0317
avgr04-07	-.5286	2.6908	-.6853	-1.2617	12.7350	-127.7979	-4.7946	-2.2175	-6.0582

Source: calculated from Eurostat

<sup>a</sup> denotes rejection of  $H_0$  (mean2 = EU mean) based on Student's t, 95% confidence interval; <sup>b</sup> denotes rejection of  $H_0$  (mean2 = Others mean) based on Student's t, 95% confidence interval; <sup>c</sup> denotes rejection of  $H_0$  (yearly average growth rate = 0) based on bootstrap sampling, 95% confidence interval, 10,000 replications

Appendix 2). Average specialization in the two more advanced sectors is highest in the Czech Republic and in Slovakia. Albeit growing, it remains negative (i.e. below-average) in the three Baltic countries and in Bulgaria; in the relatively most advanced sector it is negative also in Poland and in Romania. On the contrary, these two countries present the highest group specialization and agglomeration in low technology manufacturing; however, while specialization falls somewhat for Poland, it grows considerably in Romania, possibly in relation to foreign investments. In the medium-low technology manufacturing (traditional heavy industry) Romanian regions represent the only case among CEECs for which specialization and agglomeration fall to the extent that they become negative, implying considerable sectoral de-specialization and de-localization. Polish regions instead present negative values in the medium-high technology sector – a feature they share with some other cases for which restructuring processes seem more backwards, namely Bulgaria and the Baltic countries. Furthermore, in Poland agglomeration grows in all three sub-sectors.

In summary, the breakdown of manufacturing according to its technology content shows persisting above-average specialization in the more traditional lines of production, i.e. in low and medium-low technology manufacturing. Although present, restructuring processes appear extremely slow, given the high levels of geographic concentration that continue to prevail especially in light industry. Some interesting change appears instead to be under way in medium-high technology manufacturing for which average specialization does not differ significantly from that of Western regions. Furthermore, agglomeration is significantly lower, albeit on the increase during 2004-07, implying relevant dissemination of activity across regions. The breakdown by individual CEEC (coupled with the consideration, when possible, of more extended time-periods) shows the Czech Republic, Slovakia and possibly Hungary at the forefront in the more advanced lines of manufacturing, even if agglomeration remains extremely high in the Czech Republic. At the other extreme, more traditional lines of production continue to prevail in Poland, Bulgaria and in the three Baltic countries.

## 5. Conclusion

The paper analyses specialization and concentration patterns of production in CEECs by means of the Thiel index. It shows that over 1991-2011 both specialization and agglomeration grow implying that regional economies become more diversified. This contrast with parallel developments in the West, according to which dissimilarities on average fall. Rising disproportions in the East could be interpreted as an effect of plant closures and reconversion processes following the end of central planning. In this respect, an interesting finding is that, while growing overall, in second decade of transition (2001-11) disproportions fall also in Eastern regions, *prima facie* conforming to Western behaviour. However, unlike what occurs in the West, in CEECs this is associated with a significant jump in the *within*-countries component of agglomeration, due to the building up of considerable location effects. In this sense the Theil indicators confirm for CEECs the direct relationship between growth and inequality identified by Kuznets.

A breakdown by main sectors shows that CEECs are still significantly specialized in agriculture and in manufacturing and that these sectors are significantly more concentrated than in the rest of EU regions. At the same time, under-specialization in services remains evident. As far as manufacturing is concerned, CEEC regions continue to specialize in the more traditional lines of production, for which agglomeration remains extremely high, hardly indicating successful restructuring. In addition, comparing the evolution over time of CEEC regions with that of the Other countries shows that, notwithstanding EU emphasis on real convergence, sectoral patterns in the two groups are largely different.

Consideration of the changes over 2001-11 gives a partially different picture. In the first place, agglomeration grows significantly in both market and non-market services (while overall

specialization in the sector falls). This can be interpreted as a growing “capital region effect” that, however, does not spread to other areas. As CEECs capital regions start to catch up on Western standards, non-capital regions lag behind. Second, both specialization and agglomeration grow in manufacturing in CEECs (they fall in the rest of the sample). Over 2003-07 growth gains momentum from a small but dynamic medium-high technology sub-sector that is also significantly disseminated across regions, which could point to successful restructuring. As far as individual Eastern countries are concerned, the diversification and dissemination of the more advanced lines of production appears to be strongest in the Czech Republic, Hungary and Slovakia. Instead it is largely missing in Poland, Bulgaria and in the three Baltic countries. Finally, manufacturing in Romania presents peculiar features that set these regions apart from group performance and appear to be largely determined by foreign investments.

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## APPENDIX 1

List of the (NUTSII) regions included in the sample, classified as “Others” or CEECs (initial year of REGIO dataset in brackets)

	“Others” (older members)		CEECs (new members)
NUTS Code	Countries and regions	NUTS Code	Countries and regions
	<b>Belgium</b> (1995)		<b>Bulgaria</b> (2003)
be1	Région de Bruxelles	bg31	Severozapaden
be2	Vlaams Gewest	bg32	Severen tsentralen
be3	Région Wallonne	bg33	Severoiztochen
dk	<b>Denmark</b> (1995)	bg34	Yugoiztochen
	<b>Germany</b> (1996)	bg41	Yugozapaden
de1	Baden-Württemberg	bg42	Yuzhen tsentralen
de2	Bayern		<b>Czech Republic</b> (1998)
de3	Berlin	cz01	Praha
de4	Brandenburg	cz02	Strední Cechy
de5	Bremen	cz03	Jihozápad
de6	Hamburg	cz04	Severozápad
de7	Hessen	cz05	Severovýchod
	Mecklenburg-		
de8	Vorpommern	cz06	Jihovýchod
de9	Niedersachsen	cz07	Strední Morava
dea	Nordrhein-Westfalen	cz08	Moravskoslezsko
deb	Rheinland-Pfalz	ee	<b>Estonia</b> (1997)
dec	Saarland	lv	<b>Latvia</b> (1998)
ded	Sachsen	lt	<b>Lithuania</b> (1998)
dee	Sachsen-Anhalt		<b>Hungary</b> (1999)
def	Schleswig-Holstein	hu10	Közép-Magyarország
deg	Thüringen	hu21	Közép-Dunántúl
	<b>Ireland</b> (1998)	hu22	Nyugat-Dunántúl
ie01	Border, Midlands and	hu23	Dél-Dunántúl
	Western		
ie02	Southern and Eastern	hu31	Észak-Magyarország
	<b>Greece</b> (2000)	hu32	Észak-Alföld
gr1	Voreia Ellada -	hu33	Dél-Alföld
gr2	Kentriki Ellada		<b>Poland</b> (1999 or 2004)
gr3	Attiki	pl11	Lódzkie
gr4	Nisia Aigaiou, Kriti	pl12	Mazowieckie
	<b>Spain</b> (1995)	pl21	Malopolskie
es11	Galicia	pl22	Slaskie
es12	Principado de Asturias	pl31	Lubelskie
es13	Cantabria	pl32	Podkarpackie
es21	Pais Vasco	pl33	Swietokrzyskie
	Comunidad Foral de	pl34	Podlaskie
es22	Navarra		
es23	La Rioja	pl41	Wielkopolskie
es24	Aragón	pl42	Zachodniopomorskie
es30	Comunidad de Madrid	pl43	Lubuskie
es41	Castilla y León	pl51	Dolnoslaskie
es42	Castilla-la Mancha	pl52	Opolskie
es43	Extremadura	pl61	Kujawsko-Pomorskie
es51	Cataluña	pl62	Warminsko-Mazurskie
es52	Comunidad Valenciana	pl63	Pomorskie
es53	Illes Balears		<b>Romania</b> (2000)
es61	Andalucia	ro11	Nord-Vest
es62	Región de Murcia	ro12	Centru
	<b>France</b> (1995)	ro21	Nord-Est
fr10	Île de France	ro22	Sud-Est
fr21	Champagne-Ardenne	ro31	Sud - Muntenia
fr22	Picardie	ro32	Bucuresti - Ilfov
fr23	Haute-Normandie	ro41	Sud-Vest Oltenia
fr24	Centre	ro42	Vest
fr25	Basse-Normandie	si	<b>Slovenia</b> (1996 or 1997)

fr26	Bourgogne		<b>Slovak Republic</b> (1998)
fr30	Nord - Pas-de-Calais	sk01	Bratislavský kraj
fr41	Lorraine	sk02	Západné Slovensko
fr42	Alsace	sk03	Stredné Slovensko
fr43	Franche-Comté	sk04	Východné Slovensko
fr51	Pays de la Loire		
fr52	Bretagne		
fr53	Poitou-Charentes		
fr61	Aquitaine		
fr62	Midi-Pyrénées		
fr63	Limousin		
fr71	Rhône-Alpes		
fr72	Auvergne		
fr81	Languedoc-Roussillon		
fr82	Provence-Alpes-Côte d'Azur		
fr83	Corse		
	<b>Italy</b> (1995)		
itc1	Piemonte		
itc2	Valle d'Aosta/Vallée d'Aoste		
itc3	Liguria		
itc4	Lombardia		
itd3	Veneto		
itd4	Friuli-Venezia Giulia		
itd5	Emilia-Romagna		
ite1	Toscana		
ite2	Umbria		
ite3	Marche		
ite4	Lazio		
itf1	Abruzzo		
itf2	Molise		
itf3	Campania		
itf4	Puglia		
itf5	Basilicata		
itf6	Calabria		
itg1	Sicilia		
itg2	Sardegna		
cy	<b>Cyprus</b> (1999)		
lu	<b>Luxemburg</b> (1995)		
mt	<b>Malta</b> (2000)		
	<b>Netherlands</b> (2001)		
nl1	Noord-Nederland		
nl2	Oost-Nederland		
nl3	West-Nederland		
nl4	Zuid-Nederland		
	<b>Austria</b> (1995)		
at11	Burgenland		
at12	Niederösterreich		
at13	Wien		
at21	Kärnten		
at22	Steiermark		
at31	Oberösterreich		
at32	Salzburg		
at33	Tirol		
at34	Vorarlberg		
	<b>Portugal</b> (1995)		
pt11	Norte		
pt15	Algarve		
pt16	Centro (PT)		
pt17	Lisboa		
pt18	Alentejo		
	<b>Finland</b> (1999)		

fi13	Itä-Suomi		
fi18	Etelä-Suomi		
fi19	Pohjois-Suomi		
fi1a	Länsi-Suomi		
fi20	Åland		
	<b>Sweden (1995)</b>		
se11	Stockholm		
se12	Östra Mellansverige		
se21	Småland med öarna		
se22	Sydsverige		
se23	Västsverige		
se31	Norra Mellansverige		
se32	Mellersta Norrland		
se33	Övre Norrland		
	<b>Great Britain (2002)</b>		
ukc	North East		
ukd	North West		
uke	Yorkshire and The Humber		
ukf	East Midlands		
ukg	West Midlands		
ukh	Eastern		
uki	London		
ukj	South East		
ukk	South West		
ukl	Wales		
ukm	Scotland		
ukn	Northern Ireland		

- *Low technology manufacturing* (light industry) includes:

food products, beverages and tobacco; textiles and textiles products; leather and leather products; wood and wood products; pulp, paper and paper products; publishing and printing; manufacturing n.e.c.

- *Medium-low technology manufacturing* (heavy industry) includes:

manufacture of coke, refined petroleum products and nuclear fuel; manufacture of rubber and plastic products; basic metals and fabricated metal products; other non-metallic mineral products; building and repairing of ships and boats.

- *Medium-high technology manufacturing* includes:

manufacture of chemicals and chemical products (excl. pharmaceuticals, medicinal chemicals and botanical products); manufacture of machinery and equipment n.e.c.; manufacture of electrical machinery and apparatus n.e.c.; manufacture of motor vehicles, trailers and semi-trailers; manufacture of other transport equipment (excl. building and repairing of ships and boats and manufacture of aircraft and spacecraft).



## APPENDIX 2

Table A.1.  $T_{sp}$  and  $T_{con}$  indicators in low technology manufacturing for individual CEECs (absolute values, 1997-2007 and mean, 2004-07)

$T_{sp}$	Bg	Cz	Ee	Lv	Lt	Hu	Pl	Ro	Si	Sk
1997			.0509			.1778			.0460	
1998		.1557	.0483	.0598	.0296	.2266		.0871	.0461	.0665
1999		.1467	.0389	.0487	.0228	.2043		.0969	.0444	.0793
2000		.1284	.0488	.0588	.0309	.1980		.1254	.0444	.0905
2001		.1470	.0440	.0386	.0313	.1997		.1488	.0812	.0795
2002		.1580	.0453	.0321	.0318	.2158		.2393	.0779	.0855
2003	.2931	.1478	.0496	.0284	.0346	.1762		.2268	.0667	.0768
2004	.2747	.0924	.0485	.0245	.0273	.1195	.3310	.2674	.0525	.0686
2005	.3105	.0824	.0443	.0193	.0276	.1075	.2988	.2628	.0478	.0468
2006	.2997	.0915	.0340	.0170	.0287	.1017	.3112	.2577	.0438	.0483
2007	.2758	.0858	.0278	.0141	.0308	.0860	.3178	.2374	.0361	.0449
mean04-07	.2902	.0880	.0387	.0187	.0286	.1037	.3147	.2563	.0451	.0521
$T_{con}$	Bg	Cz	Ee	Lv	Lt	Hu	Pl	Ro	Si	Sk
1997					.0000	.0031			.0017	
1998		.0033	.0020	.0015	.0001	.0033		.0037	.0014	.0014
1999		.0031	.0016	.0012	.0001	.0031		.0040	.0013	.0017
2000		.0027	.0019	.0015	.0001	.0031		.0049	.0014	.0019
2001		.0031	.0013	.0015	.0001	.0032		.0060	.0013	.0017
2002		.0034	.0011	.0016	.0000	.0034		.0096	.0013	.0018
2003	.0049	.0032	.0010	.0018	-.0001	.0028		.0086	.0011	.0017
2004	.0044	.0018	.0008	.0013	-.0002	.0017	.0081	.0092	.0008	.0014
2005	.0050	.0017	.0007	.0013	-.0002	.0015	.0079	.0092	.0008	.0010
2006	.0050	.0019	.0006	.0014	-.0002	.0014	.0083	.0093	.0007	.0011
2007	.0047	.0018	.0005	.0015	-.0002	.0012	.0088	.0084	.0006	.0010
mean04-07	.0048	.0021	.0007	.0015	-.0002	.0017	.0083	.0090	.0008	.0013

Source: calculated from Eurostat

Table A.2.  $T_{sp}$  and  $T_{con}$  indicators in medium-low technology manufacturing for individual CEECs (absolute values, 1997-2007, and mean 2004-07)

$T_{sp}$	Bg	Cz	Ee	Lv	Lt	Hu	Pl	Ro	Si	Sk
1997			-.0056			.0037			.0139	
1998		.1761	-.0067	-.0067	-.0070	.0099		.0428	.0187	.0682
1999		.1972	-.0059	-.0064	-.0069	.0187		.0225	.0184	.0598
2000		.2045	-.0040	-.0066	-.0066	.0239		.0129	.0123	.0544
2001		.2311	.0004	-.0070	-.0066	.0324		-.0067	.0346	.0713
2002		.2217	-.0020	-.0068	-.0063	.0430		.0059	.0432	.0594
2003	-.0063	.2412	-.0027	-.0061	-.0066	.0319		.0055	.0392	.0578
2004	-.0093	.2155	-.0041	-.0062	-.0066	.0306	.0202	-.0035	.0368	.0466
2005	-.0070	.2272	-.0016	-.0063	-.0050	.0334	.0341	-.0058	.0401	.0610
2006	-.0041	.2359	-.0004	-.0059	-.0052	.0335	.0616	-.0105	.0435	.0547
2007	-.0044	.2321	.0006	-.0052	-.0062	.0352	.0613	-.0081	.0393	.0613
mean04-07	-.0062	.2277	-.0014	-.0059	-.0058	.0332	.0443	-.0070	.0399	.0559
$T_{con}$	Bg	Cz	Ee	Lv	Lt	Hu	Pl	Ro	Si	Sk
1997					-.0005	-.0002			.0009	
1998		.0060	-.0004	-.0006	-.0004	.0000		.0033	.0010	.0024
1999		.0065	-.0004	-.0006	-.0003	.0003		.0016	.0010	.0021
2000		.0069	-.0004	-.0006	-.0002	.0005		.0009	.0007	.0019
2001		.0075	-.0004	-.0005	-.0003	.0007		-.0005	.0009	.0022
2002		.0076	-.0004	-.0005	-.0002	.0010		.0005	.0012	.0020
2003	-.0003	.0080	-.0004	-.0006	-.0002	.0007		.0004	.0010	.0020
2004	-.0003	.0068	-.0004	-.0005	-.0003	.0005	.0007	-.0004	.0010	.0017
2005	-.0002	.0073	-.0004	-.0004	-.0004	.0006	.0021	-.0005	.0011	.0021
2006	-.0002	.0076	-.0004	-.0004	-.0004	.0006	.0034	-.0007	.0012	.0019
2007	-.0002	.0074	-.0003	-.0005	-.0004	.0006	.0029	-.0006	.0011	.0022
mean04-07	-.0002	.0073	-.0003	-.0005	-.0004	.0006	.0023	-.0006	.0011	.0020

Source: calculated from Eurostat

Table A.3.  $T_{sp}$  and  $T_{con}$  indicators in medium-high technology manufacturing for individual CEECs (absolute values, 1997-2007, and mean 2004-07)

$T_{sp}$	Bg	Cz	Ee	Lv	Lt	Hu	Pl	Ro	Si	Sk
1997			-.0082			.0064			.0073	
1998		.0780	-.0081	-.0061	-.0082	.0392		.0311	.0093	.0014
1999		.0854	-.0087	-.0069	-.0082	.0400		.0236	.0082	-.0039
2000		.0910	-.0086	-.0053	-.0089	.0263		-.0056	.0105	-.0017
2001		.0870	-.0063	-.0088	-.0089	.0391		-.0047	.0226	-.0001
2002		.0866	-.0083	-.0089	-.0090	.0307		.0133	.0290	.0142
2003	-.0160	.0928	-.0086	-.0085	-.0085	.0267		.0091	.0279	.0218
2004	-.0223	.0904	-.0077	-.0084	-.0091	.0199	-.0652	.0131	.0160	.0175
2005	-.0143	.1206	-.0080	-.0086	-.0088	.0312	-.0583	.0002	.0292	.0348
2006	-.0155	.1495	-.0085	-.0086	-.0088	.0401	-.0490	.0106	.0203	.0369
2007	-.0064	.1648	-.0084	-.0087	-.0090	.0507	-.0280	.0194	.0235	.0427
mean04-07	-.0146	.1313	-.0082	-.0086	-.0089	.0355	-.0501	.0108	.0223	.0330
$T_{con}$	Bg	Cz	Ee	Lv	Lt	Hu	Pl	Ro	Si	Sk
1997					.0000	.0001			.0003	
1998		.0022	-.0003	-.0006	.0003	.0009		.0016	.0004	.0002
1999		.0023	-.0003	-.0006	.0001	.0008		.0012	.0003	.0001
2000		.0024	-.0002	-.0006	-.0002	.0004		-.0005	.0004	.0001
2001		.0023	-.0004	-.0005	-.0002	.0007		-.0005	.0005	.0002
2002		.0024	-.0004	-.0006	-.0002	.0005		.0005	.0006	.0006
2003	-.0005	.0026	-.0004	-.0006	-.0001	.0005		.0002	.0006	.0008
2004	-.0006	.0023	-.0004	-.0006	-.0002	.0003	-.0025	.0003	.0003	.0007
2005	-.0005	.0032	-.0004	-.0006	-.0003	.0004	-.0022	-.0004	.0006	.0011
2006	-.0005	.0039	-.0004	-.0006	-.0003	.0006	-.0018	.0001	.0004	.0012
2007	-.0004	.0043	-.0004	-.0006	-.0003	.0008	-.0012	.0004	.0005	.0014
mean04-07	-.0005	.0034	-.0004	-.0006	-.0003	.0005	-.0019	.0001	.0005	.0011

Source: calculated from Eurostat