

XVIIth AISSEC CONFERENCE
Perugia, 25-27 June 2009

SPECIALISATION AND CONCENTRATION PATTERNS IN EASTERN EUROPE

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First draft – Comments welcome

1. Introduction

A well-known finding of trade theory is that a fall in transport costs – due for instance to tighter economic integration – unambiguously leads to increased specialisation of production across countries¹. The new economic geography models show also that lower trade costs in the presence of increasing returns to scale determine a spatial concentration of production.

On the basis of these predicaments, over the last decades specialisation and concentration among European Union (EU) members should have risen significantly. Empirical evidence on the issue, however, is unclear. Some authors contend that production in EU countries is indeed becoming more specialised, even if rather slowly²; others instead claim the opposite³. More puzzling still, further studies reach the conclusion that specialisation in production grows while the specialisation in trade flows falls.

The issue of sectoral relocation concerns also the Eastern and Central European Countries (CEECs) that have integrated in the EU. In all these countries the legacy of Communism amounted to over-sized agriculture and manufacturing and under-sized service sectors. In manufacturing production generally took place in huge conglomerates; it often concerned heavy industry goods and was obtained through obsolete, material- and labour-intensive technology, leading to low productivity and severe environmental problems. In the early years of transition the removal of trade barriers could well have helped CEECs reduce specialisation and concentration. Later on, as integration into the West tightened in view of EU membership, competition and globalisation forces gained momentum, and could have determined a move towards specialisation and, possibly, also concentration. These forces could still be going on. In any case, it appears reasonable to expect changes in these countries to have been intense.

Strikingly enough, however, not much work has yet been done to record the extent and the effects of relocation in Eastern Europe, the main exception being an unpublished paper by Kallioras *et al.*, 2004, that considers the evolution of specialisation and concentration patterns in CEECs from 1991 to 1999⁴. Contrary to what would be expected, the paper's main finding turns out to be that during the period under consideration industrial patterns changed very little, if at all, in practically all CEECs, except in Estonia and in Hungary. This leads the authors to claim that specialisation and concentration remained stable in low and in high income countries and changed only in intermediate income ones.

¹ 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 more endowed, inter-industry trade theories in those in which higher returns to scale may be obtained.

² Slower, for instance, than in the United States. See Krugman, 1993 (quoted in Marelli, 2007), and, among the others, Amiti, 1997 and Brulhart *et al.*, 2005.

³ For instance, Paci *et al.*, 2000, Aigigner *et al.*, 2002, Aigigner *et al.*, 2004.

⁴ The issue has been investigated, albeit not directly, also by are Marelli, 2007, who evaluates the role of industrial specialisation in new members in the context of the convergence debate and by Zaghini, 2005, who addresses the specialisation of trade flows.

Even if these results seemingly call for further investigation, the paper's interest lies in the fact that it employs entropy indexes to evaluate both specialisation and concentration patterns, in this extending the approach first formulated in Aigigner *et al.*, 2001, and later refined in Brulhart *et al.*, 2005. Of these two papers, the first one shows that, when correctly identified, entropy indexes can be used to evaluate both the specialisation and the concentration of production. The second one (that considers only concentration) addresses the decomposition of inequality indexes and tests the significance of their changes.

The aim of this paper is to extend the investigation of Kallioras *et al.* and to evaluate sectoral relocation patterns in CEECs over 1994-2007⁵ by means of entropy indexes. The selected point of view is geographical as far as specialisation is concerned, the basic unit of analysis being regions at the NUTSII level and sectoral for concentration. In this respect, rather than resorting to the traditional NACE Rev 1.1 branch classification for manufacturing (as in Kallioras *et al.*), at this stage only the three macro sectors – agriculture, manufacturing and services – are considered. All data is from EUROSTAT. As in much of the literature, employment is taken as a proxy for value added, given that more up-dated data sets are available.

2. Specialisation and concentration indexes

Specialisation and concentration capture two closely-related, yet distinct, aspects of production. Specialisation arises from differences across territorial units (countries, regions) in terms of employment or value added; it is lowest when all units present the same share in all sectors (no specialisation) and highest when one sector accounts for all the employment or value added (complete specialisation). Economic concentration instead occurs when a small number of enterprises controls large shares of sectoral production; it is highest when only one independent enterprise provides all the jobs or the value added in a sector (complete concentration), lowest when sectoral employment or value added is equally distributed among many enterprises (no concentration). In general, it may appear likely that both phenomena are bound to go hand-in-hand, higher specialisation leading to more concentration and vice-versa. However, Aigigner *et al.*, 2001, show that, when correctly measured, these two aspects of production may indeed present diverging paths.

Both specialisation and concentration may be measured in many different ways. For instance, specialisation 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, or the Finger-Kreinin's dissimilarity coefficient, and so on. Also concentration may be studied by means of different measures, the most well-known being the Gini and the Herfindal indexes⁶.

In general, indexes identifying and measuring inequality should satisfy a number of requirements (axioms)⁷. They should present scale independence, or homogeneity of degree one (if all observations are scaled by the same number, the measure of inequality should not change); they should be independent from the number of observations (inequality measured for one group should remain unchanged when the group is merged with another identical group). Finally, it should be possible to decompose the index into a *within* group and a *between (or across)* group component (the so-called decomposability axiom). While most inequality measures share the first two properties, satisfaction of the decomposition property is more difficult to find. Only general entropy indexes have the advantage of satisfying simultaneously all the axioms quoted above⁸.

⁵ Even if, excluding only four former-DDR *Länder*, the data actually available covers shorter time-periods. It starts from 1997 for the Czech Republic, Estonia, Hungary and Slovenia; from 1998 for Romania, from 1999 for Latvia, Lithuania and Slovakia and from 2000 and 2004 respectively for Bulgaria and Poland. In what follows, in order to have a (relatively) homogeneous set of data, the focus is mainly on the 1998-2007 period.

⁶ A review of these measures, as well as a discussion of their relative merits (and demerits) is, among the others, in Amiti, 1997.

⁷ See Sala-i-Martin, 2002.

⁸ See Sala-i-Martin, 2002, and the literature quoted therein.

The indexes that will be used in this study are two different versions of the General Entropy index first identified by Thiel, modified in order to capture regional specialisation and/or sectoral concentration. Entropy, or Thiel, indexes are a type of geometric mean that measure inequality. They downgrade extreme observations inasmuch as each observation is weighted by its relative intensity.

Adapting from Brulhart *et al.*, 2005, the two indexes, T_s , measuring respectively specialisation (or similarity) and T_c , measuring concentration (or dispersion) are defined as follows:

$$T_s = -[\sum_{r=1}^R \sum_{s=1}^S \frac{Y_{sr}}{Y_{EU}} \cdot \ln(\frac{Y_{sr}}{Y_{EU}/S})] \quad (1)$$

and

$$T_c = -[\sum_{s=1}^S \sum_{r=1}^R \frac{Y_{sr}}{Y_{sEU}} \cdot \ln(\frac{Y_{sr}}{Y_{sEU}/R})] \quad (2)$$

where Y is employment, S and R refer respectively to the number of sectors and that of the regions in the whole sample (the EU, in our case, $Y_{sEU} = \sum_{r=1}^R Y_{sr}$). In expressions (1) and (2) the denominator of the second fraction represents, respectively, average sectoral employment and average regional employment of the whole sample. The first index measures regions' shares across sectors; it is inversely related to regional dissimilarity, or diversification. Thus the higher is T_s the less diversified are regions (low specialisation). The second index (T_c) instead accounts for a sector's share between regions. It is the inverse of sectoral dispersion and is higher when sectors are less dispersed (high concentration).

Both indexes range from zero to a given value. When sectoral employment absorbs the same share of total employment in the sector, specialisation is null, and T_s equals zero. On the opposite, when regional employment in one sector equals overall employment, specialisation reaches its maximum and T_s equals $|\ln(S)|$. Similar considerations apply to the concentration index⁹. Summarising:

$$0 \leq T_s \leq |\ln(S)|$$

and

$$0 \leq T_c \leq |\ln(R)|$$

In order to separate the *within*-country component from the *across*, or between-country, component these indexes may be decomposed in regional sub-groups according to the following expressions:

$$T_s = -[\sum_{r=1}^R \sum_{s=1}^S \frac{Y_{sr}}{Y_{EU}} \cdot \ln(\frac{Y_{sr}}{Y_c}) + \sum_{r=1}^R \sum_{s=1}^S \frac{Y_{sr}}{Y_{EU}} \cdot \ln(\frac{Y_c}{Y_{EU}/S})] \quad (3)$$

and

$$T_c = -[\sum_{s=1}^S \sum_{r=1}^R \frac{Y_{sr}}{Y_{sEU}} \cdot \ln(\frac{Y_{sr}}{Y_c}) + \sum_{s=1}^S \sum_{r=1}^R \frac{Y_{sr}}{Y_{sEU}} \cdot \ln(\frac{Y_c}{Y_{sEU}/R})] \quad (4)$$

⁹ T_s and T_c are absolute indexes in the sense that they consider observed units as basic units. Put differently, the benchmark cases imply that with no specialisation/concentration all regions have the same sectoral employment, irrespective of the region's observed size. This is an evident shortcoming of indexes (1) and (2). However at this stage the issue will not be addressed. On this point, see Brulhart *et al.*, 2005.

where $Y_c = \sum_{r=1}^{R_c} Y_{sr}$ and R_c is the number of regions in the country under consideration. The first addendum in each formula represents the *within*-country element of the index (T_w) while the second one is the *between*-country component (T_b)¹⁰.

3. Specialisation patterns in CEEC regions

The calculation of index T_s and its breakdown into components is shown in Table 3.1; Table 3.2 instead gives an account of specialisation on a regional basis.

Table 3.1 needs some care to be interpreted correctly, as the incompleteness of the underlying data determines some discontinuity in the index. During 1999-2007¹¹, the (numerical value of the) index grows, marking an apparent big rise in specialisation in CEECs. The actual picture, however, is completely different, given that between 2003 and 2004 the data of two countries (Bulgaria and Poland) are added, making the index jump upwards. Calculation of the aggregate index netting out Bulgarian and Polish regions (the last line in the first part of Table 3.1) actually shows a move towards more diversification (i.e. de-specialisation), possibly as a result of plant outstripping and restructuring. Dividing the entire time-period into two sub-periods, one going from 1999 to 2003, and the other from 2004 on, when most CEECs joined the EU¹², provides further insight. Even if, strictly speaking, the two sub-periods are not comparable inasmuch as they cover different groups of regions, it appears evident that de-specialisation occurred mainly in the first sub-period, and slowed down considerably in the second one. Thus, in CEECs specialisation appears to have declined essentially between 1999 and 2003, and much less from 2004 to 2007.

The decomposition of the index shows the predominance of the *between*-country effect during the whole period. This means that de-specialisation occurred essentially among countries, and much less within regions in a country; in other terms, regions of a country tended to move together, making country effects dominate. However, again the year 2004 marks a change, as after then the *between*-country component declined somewhat, while the *within*-country component grew slightly.

As far as the regional breakdown of T_s is concerned¹³, Table 3.2 shows that in 1998 specialisation was still high (among the highest values in the sample), in East German *Länder*¹⁴ (especially in Sachsen, Berlin, Brandenburg and Sachsen-Anhalt), in Romanian regions (specialisation being highest in predominantly agricultural Nord-Est and Sud as well as in industrial Nord-Vest and Centru) and in one-region countries Lithuania, Latvia and Slovenia¹⁵. On the contrary, possibly as a result of previous restructuring, specialisation was relatively low already in the starting year and in most Czech, Hungarian and Slovakian regions, as well as in one-region country Estonia.

By 2007 specialisation had fallen almost everywhere, the extent of the reduction varying greatly among regions in different countries and, sometimes, also among different regions in the same country. The fall was big for Hungarian and Romanian regions (but not for the two capital areas, Kozep-Magyarország and Bucarest) and in the Czech Republic. Elsewhere – i.e. in the former DDR *Länder*, in Slovakia as well as in Estonia, Latvia, Lithuania and Slovenia - the fall was much

¹⁰ Obviously, $T = T_w + T_b$ holds for both indexes.

¹¹ In what follows we choose 1998 as a common base-year for all countries, in order to have a homogeneous time-span. This leaves out only Bulgaria and Poland (see footnote 5).

¹² Bulgaria and Romania joined the EU in 2006.

¹³ The indexes in Table 3.2 are calculated from equation (1) summing only by sector (and not by region as in Table 3.1).

¹⁴ The only case among CEECs, East German regions present data starting from 1994. It is interesting to note that in the earlier phase of transition regional specialisation was still very high. Consideration of the index in 1994-98 reveals high diversification taking place, probably the result of strong industrial restructuring.

¹⁵ Starting from January 2008 Slovenia created two administrative NUTSII regions, Vzhodna and Zahodna Slovenija. The regional breakdown of data is available starting from 2001 and shows rather modest specialisation levels. However, for the sake of homogeneity with the whole sample, in what follows reference is made to the national data that are available from 1998.

lower. By and large, the trend was generally rather homogeneous across regions in the same country, confirming the predominance of a country effect.

The sample's time-period is then divided into two sub-periods, taking 2004 as the dividing year. The breakdown confirms that most of the overall de-specialisation actually took place during the first time-period (1999-2003). By contrast, during the second one (2004-2007) the fall was much lower, in some cases almost coming to a halt. This occurred for Czech and Slovakian regions. Not only: for most regions in Hungary and in Romania, as well as in the three Baltic countries and in Slovenia specialisation actually rose, even if only by little, entailing a move towards reducing the diversification of production. De-specialisation, instead, carried on in East German regions.

Bulgaria and Poland represent special cases, inasmuch as data for these regions cover only the second time-period. Behaviour between the two groups of regions is completely different. While in 2004 specialisation was relatively low for Bulgarian regions (apart from the capital area, Yugozapaden), it was high for many Polish ones (particularly for the capital area, Mazowieckie, and some of the old industrial regions, such as Slaskie, Wielkopolskie, Malopolskie, Lodskie and Dolnoslaskie). By 2007, the de-specialisation of Bulgarian regions had practically come to a halt while some cases (notably Severoiztochen, Yuzhen tsentralen and the capital, Yugozapaden) actually moved towards stronger specialisation. In Polish regions, instead, during 2004-2007 de-specialisation was high practically everywhere, but highest in Podslaskie, Opolskie, Zachodniopomorskie, which were not particularly strongly specialised areas in relative terms in 2004. De-specialisation occurred also in specialised Wielkopolskie, Malopolskie, Dolnoslaskie and Lodskie but was practically absent in Slaskie). In the capital area specialisation rose.

Looking at the data in more detail, the behaviour of capital regions appears peculiar inasmuch as de-specialisation is generally lower than in the rest of the respective country. Over the second sub-period, moreover, the level of specialisation often remains constant (as for Praha, Berlin and Bucarest), or else grows very little (in Yugozapaden, Mazowieckie and Bratislavsky kraj), possibly as a result of inter-sectoral changes of equal weight but opposite sign or else of catching up in the previously under-represented service sector¹⁶.

As far as the other regions are concerned, the indexes reported in Table 3.2 are relevant with respect to the production structure prevailing initially. In heavily industrialised regions where the manufacturing sector was built according to the Socialist-type model a fall in specialisation marked the outstripping of the big conglomerates coupled with the diffusion of more differentiated activities. This occurred (during 2004-07) in industrial Lodskie, Wielkopolskie, Malopolskie, Dolnoslaskie, Kujawsko-Pomorskie and Pomorskie in Poland (but not in Slaskie), in Romanian regions Nord-Vest and Centru as well as in industrial Czech Moravskoslezsko and in Slovakian Stredne Slovensko, although to a smaller extent. In regions with strong agricultural sectors the fall in specialisation was sometimes high (as in Polish regions Podslaskie, Opolskie, Swietokrzyskie and in Romanian Nord-Est, Sud-Vest, Sud-Est and Sud) but for the other agricultural regions of the sample it was generally

lower. Thus, by and large, restructuring in CEECs concerned agriculture somewhat less than it did manufacturing.

4. Concentration patterns in CEEC sectors

The Thiel index of concentration is shown in Table 4.1. As expected, between 1999 and 2007 the index grows – concentration falls – as large, Soviet-type plants are increasingly substituted by smaller, more modern and flexible units. In this sense, indeed sectoral diversification and regional dispersion went hand-in hand, even if they followed different –and occasionally diverging– patterns. While for specialisation the year 2004 marked a discontinuity that was only apparent, for concentration the big jump of the index that occurred precisely in 2004 marks a decisive move towards stronger dispersion. This carried on until 2006 but stopped in 2007, showing a small rise

¹⁶Instead, during 2004-07 specialisation rose in the Slovenian capital area, Zahodna Slovenija.

in concentration. However, differently from what occurred for specialisation, the index had already started growing before 2004, and precisely in 2002. Thus EU membership appears to have contributed to reducing strongly concentration in CEEC regions, possibly in response to higher competition arising from integrated markets even though this effect was somewhat anticipated by markets.

The *within*-country component of concentration is always high and above the *between*-country one¹⁷; throughout the period it falls. Hence, the geographical dispersion of economic activity fell within countries, while that between countries remained grossly constant. Again, as for specialisation, dispersion occurs essentially on a national basis.

As far as the sectoral breakdown of the index is concerned, this is shown in Part b of Table 4.1. In 1999 agriculture was by far the most concentrated sector, followed by services and by manufacturing. Over 1999-2007 the index grew (concentration fell) in all sectors, leaving the relative position of each unaltered. Consideration of the two sub-periods, i.e. roughly speaking 1999-2003 (2000-2003 for agriculture, when Polish regions were added to the data set) and 2004-2007, shows that initially concentration falls in agriculture but grows in the other two sectors. In the second sub-period it falls everywhere. Thus while the earlier phases of transition amounted to considerable plant restructuring and reconversion and were conducive to generally more dispersed models of production, integration into the Single Market led to growing concentration¹⁸.

5. Conclusion

The paper analyses specialisation and concentration patterns of production in CEECs by means of the Thiel index. Over 1999-2007 it shows that specialisation falls – regional economies become more diversified – and so does sectoral concentration – production units become more dispersed geographically. Great part of this change, however, occurs during 1999-2003 (1999-2004 for specialisation) and appears to be linked to the restructuring processes that were determined by the end of central planning. Starting from 2004, with membership in the EU, for both indexes the fall slowed down considerably, and occasionally showed a tendency to move in the opposite direction – i.e. towards stronger specialisation and more concentration. Thus indeed membership in the EU appears to have influenced the structure of production in the new members.

BIBLIOGRAPHY

- Aigigner K. and Leitner W., 2002, “Regional Concentration in the United States and Europe: Who Follows Whom? ”, in *Weltwirtschaftliches Archiv*, 138, pp.652-79
- Aigigner K. and Davies S. W., 2004, “Industrial Specialisation and Geographic Concentration: Two Side of the Same Coin? Not for the European Union”, in *Journal of Applied Economics*, Vol.VII, no.2 November, pp.231-48
- Amiti M., 1997, “Specialisation Patterns in Europe”, in *Weltwirtschaftliches Archiv*, 138, pp.573-93
- Brulhart M. and Traeger R., 2005, “An account of geographic concentration patterns in Europe”, in *Regional Science and Urban Economics*, 35, pp. 597-624
- Kallioras D., Fotopoulos G. and Petrakos G., 2004, *Patterns of Regional Specialization and Sectoral Concentration of Industrial Activity in Bulgaria, Romania, Slovenia, Hungary and Estonia*, Paper presented at the 44th European Congress of the European Regional Science Association, Porto, 25-9 August

¹⁷ However, the decomposition of the index may actually under-estimate the *between*-country component as it leaves out one-region countries.

¹⁸ These results are consistent with the view held by Brulhart *et al.*, 2005, who reach the same conclusions considering the 15 pre-2004 EU members (plus Norway and Switzerland) during 1975-2000.

- Marelli E., 2007, "Specialisation and convergence of European Regions", in *The European Journal of Comparative Economics*, Vol.4, no.2, pp.149-78
- Paci R. and Usai S., 2000, "The role of specialisation and Diversity Externalities in the Agglomeration of Innovative activities", in *Rivista Italiana degli Economisti*, 5, pp.237-68
- Sala-i-Martin X., 2002, "The Disturbing 'Rise' of Global Income Inequality", *Working Paper*
Departement of economics and Business, Universitat Pompeu Fabra
- Zaghini A., 2005, "Evolution of trade patterns in the new EU member states", *Temi di discussione*, no.568, Banca d'Italia

Table 3.1 Thiel index of specialisation

sum of 3 sectors/all regions in country

$Y_{sr}/Y_{eu} * \ln(Y_{sr}/Y_{euav})$

<>	1999a00	2000a00	2001a00	2002a00	2003a00	2004a00	2005a00	2006a00	2007a00
bg Bulgaria					0,075956	0,077402	0,075672	0,076474	0,076838
cz Czech Republic		0,117237	0,116241	0,117352	0,115637	0,114939	0,113889	0,114172	0,114124
de Germany (for.GDR)	0,151702	0,148181	0,147276	0,146554	0,144643	0,142793	0,144498	0,14524	0,145868
ee Estonia		0,014571	0,014698	0,014827	0,014879	0,014876	0,014703	0,014958	0,014585
lv Latvia		0,022573	0,02256	0,023102	0,022965	0,022945	0,022583	0,022989	0,022762
lt Lithuania		0,031579	0,030441	0,031114	0,031948	0,030718	0,030555	0,030088	0,029672
hu Hungary		0,096681	0,096652	0,097087	0,09667	0,095293	0,093513	0,092461	0,090739
pl Poland						0,324241	0,325912	0,32494	0,332673
ro Romania		0,245107	0,240388	0,22331	0,217834	0,214729	0,207353	0,206772	0,202547
si Slovenia		0,02185	0,021838	0,022075	0,021431	0,022285	0,022042	0,021944	0,021856
sk Slovakia		0,053709	0,053633	0,053732	0,053937	0,052769	0,05337	0,054094	0,054248
Total Ts		0,751488	0,743727	0,729153	0,795901	1,112991	1,104092	1,104133	1,105911
Ts - bg					0,719944				
Ts - (bg+pl)						0,711348	0,702508	0,702719	0,6964

Thiel index of regional specialisation

within country component &

across country component

	1999a00	2000a00	2001a00	2002a00	2003a00	2004a00	2005a00	2006a00	2007a00
bg Bulgaria Tw					0,021355	0,021917	0,02182	0,022227	0,022529
bg BulgariaTb					0,052127	0,053167	0,05276	0,053165	0,053405
cz Czech Rep Tw		0,041054	0,040862	0,041422	0,041077	0,04068	0,040744	0,041052	0,041274
cz Czech RepTb		0,073381	0,07279	0,073536	0,072716	0,071895	0,071516	0,071553	0,071533
de Germany (ex-GDR)Tw	0,045413	0,053821	0,053453	0,053077	0,052454	0,051652	0,052769	0,053041	0,053004
de GermanyTb	0,083256	0,093201	0,092464	0,09226	0,09104	0,089971	0,090905	0,091354	0,091068
hu Hungary Tw		0,031125	0,031185	0,031279	0,031395	0,03078	0,030172	0,029772	0,029081
hu HungaryTb		0,064617	0,064652	0,064827	0,064399	0,063552	0,062434	0,061767	0,06072
pl Poland Tw						0,158889	0,158982	0,1588	0,163286
pl PolandTb						0,162295	0,161828	0,16142	0,16336
ro Romania Tw		0,097159	0,094893	0,085905	0,080643	0,079534	0,077809	0,077683	0,075651
ro RomaniaTb		0,144959	0,142888	0,134865	0,129263	0,128589	0,126366	0,125857	0,123808
sk Slovakia Tw		0,003126	0,002927	0,012242	0,012155	0,012167	0,012233	0,012055	0,012214
sk SlovakiaTb		0,040754	0,040362	0,040677	0,040745	0,040347	0,040493	0,040958	0,041063
Tw component		0,226285	0,223321	0,223925	0,239079	0,395619	0,394528	0,39463	0,397039
Tb component		0,416912	0,413157	0,406165	0,450291	0,609816	0,606303	0,606074	0,604957

Source: calculations from EUROSTAT

Table 3.2 - Thiel index of specialisation (sum of 3 sectors)

<>	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
bg31 Severozapaden										0,00901	0,00899	0,00869	0,00886	0,00907
bg32 Severen tsentralen										0,00991	0,01003	0,00963	0,00956	0,00973
bg33 Severoiztochen										0,00982	0,01008	0,01028	0,01039	0,01014
bg34 Yugoiztochen										0,0115	0,0115	0,01125	0,01137	0,01107
bg41 Yugozapaden										0,02039	0,02077	0,02075	0,02115	0,02136
bg42 Yuzhen tsentralen										0,01532	0,01603	0,01507	0,01514	0,01547
cz01 Praha					0,0147	0,01444	0,01401	0,01381	0,01383	0,01362	0,01362	0,01348	0,01372	0,01362
cz02 Strední Cechy					0,014	0,01363	0,01317	0,01319	0,01367	0,01368	0,01347	0,01344	0,01349	0,0136
cz03 Jihozápad					0,0148	0,01458	0,01432	0,01423	0,01426	0,01402	0,01383	0,01396	0,01385	0,01386
cz04 Severozápad					0,0135	0,01291	0,01241	0,01275	0,01263	0,0123	0,01268	0,01239	0,0124	0,01224
cz05 Severovýchod					0,018	0,01747	0,0172	0,01695	0,01705	0,0169	0,01662	0,01636	0,01639	0,01633
cz06 Jihovýchod					0,0192	0,01878	0,01846	0,01801	0,01811	0,01769	0,01751	0,01744	0,01734	0,01748
cz07 Strední Morava					0,015	0,01452	0,01385	0,01378	0,01401	0,01404	0,01384	0,01351	0,01372	0,01367
cz08 Moravskoslezsko					0,0153	0,01435	0,01383	0,01352	0,0138	0,01338	0,01337	0,01331	0,01326	0,01333
de3 Berlin			0,03723	0,0314	0,0297	0,02919	0,02875	0,02871	0,02835	0,02778	0,02765	0,02757	0,02783	0,0277
de4 Brandenburg			0,02678	0,02351	0,023	0,02349	0,02289	0,02297	0,02291	0,02282	0,02251	0,02295	0,02314	0,02339
de8 Mecklenburg-Vorpommern	0,0189	0,0267	0,02137	0,01764	0,0168	0,01692	0,01649	0,01608	0,01628	0,01616	0,01546	0,01627	0,01642	0,01623
ded Sachsen	0,0343	0,05257	0,04345	0,03698	0,0358	0,03604	0,03498	0,03496	0,03431	0,03422	0,03379	0,03425	0,03474	0,0345
dee Sachsen-Anhalt	0,0258	0,03544	0,02868	0,02369	0,0231	0,0227	0,02191	0,02208	0,02224	0,0217	0,02125	0,02156	0,02126	0,02219
deg Thüringen	0,0237	0,03412	0,02763	0,02385	0,0232	0,02336	0,02316	0,02247	0,02247	0,02196	0,02214	0,0219	0,02186	0,02186
ee Estonia				0,01698	0,0161	0,01523	0,01457	0,0147	0,01483	0,01488	0,01488	0,0147	0,01496	0,01459
lv Latvia					0,0246	0,02372	0,02257	0,02256	0,0231	0,02297	0,02294	0,02258	0,02299	0,02276
lt Lithuania					0,0337	0,03337	0,03158	0,03044	0,03111	0,03195	0,03072	0,03056	0,03009	0,02967
hu10 Közép-Magyarország				0,02628	0,0255	0,02568	0,02519	0,02488	0,02527	0,02514	0,02527	0,02509	0,02458	0,02424
hu21 Közép-Dunántúl				0,01211	0,0121	0,01238	0,01205	0,01206	0,01218	0,01234	0,01185	0,01177	0,01172	0,01153
hu22 Nyugat-Dunántúl				0,0119	0,0117	0,01179	0,01154	0,01152	0,01172	0,01133	0,01132	0,01109	0,01098	0,01091
hu23 Dél-Dunántúl				0,01018	0,01	0,00997	0,00981	0,00976	0,00965	0,00984	0,00949	0,00936	0,0091	0,00861
hu31 Észak-Magyarország				0,01156	0,0111	0,01137	0,01126	0,01127	0,0114	0,01139	0,01122	0,01069	0,01057	0,01041
hu32 Észak-Alföld				0,01363	0,0132	0,0137	0,01326	0,01355	0,01344	0,01385	0,01338	0,01295	0,01307	0,0127
hu33 Dél-Alföld				0,01438	0,0139	0,01378	0,01356	0,01362	0,01343	0,01278	0,01277	0,01257	0,01244	0,01234
pl11 Łódzkie											0,02533	0,02586	0,02562	0,02705
pl12 Mazowieckie											0,03899	0,03916	0,03974	0,04119
pl21 Malopolskie											0,02697	0,02732	0,02811	0,02732
pl22 Slaskie											0,03455	0,03422	0,03378	0,03454
pl31 Lubelskie											0,02176	0,02235	0,02155	0,02216
pl32 Podkarpackie											0,01824	0,01854	0,0189	0,01952
pl33 Swietokrzyskie											0,01291	0,01347	0,01411	0,01444
pl34 Podlaskie											0,01214	0,01186	0,01127	0,01184
pl41 Wielkopolskie											0,02992	0,02862	0,02818	0,02823
pl42 Zachodniopomorskie											0,01412	0,0139	0,01332	0,01303
pl43 Lubuskie											0,01062	0,01079	0,01083	0,01125
pl51 Dolnoslaskie											0,02179	0,02266	0,02341	0,02405
pl52 Opolskie											0,00904	0,00963	0,00925	0,00951
pl61 Kujawsko-Pomorskie											0,01949	0,01827	0,01753	0,01766
pl62 Warminsko-Mazurskie											0,0117	0,01252	0,01294	0,01321
pl63 Pomorskie											0,01669	0,01674	0,01638	0,01768

ro11 Nord-Vest	0,035	0,03244	0,03099	0,03079	0,02868	0,02743	0,02694	0,02625	0,02629	0,02583
ro12 Centru	0,0299	0,02927	0,02836	0,02863	0,02677	0,02518	0,02374	0,02329	0,02333	0,0225
ro21 Nord-Est	0,0424	0,04194	0,04104	0,04081	0,0378	0,03751	0,03766	0,03623	0,03489	0,03476
ro22 Sud-Est	0,0318	0,03153	0,03133	0,02957	0,02784	0,02816	0,02774	0,0263	0,02672	0,02539
ro31 Sud - Muntenia	0,0398	0,04005	0,03886	0,03783	0,03406	0,03397	0,03268	0,03108	0,0309	0,0309
ro32 Bucuresti - Ilfov	0,0237	0,02356	0,02233	0,02076	0,02073	0,02011	0,02092	0,02067	0,02145	0,02036
ro41 Sud-Vest Oltenia	0,0312	0,03048	0,02918	0,02928	0,02644	0,02527	0,02513	0,0242	0,02382	0,02329
ro42 Vest	0,0258	0,02415	0,02301	0,02272	0,021	0,0202	0,01992	0,01934	0,01937	0,0195
si01 Vzhodna Slovenija				0,01324	0,01336	0,01282	0,01341	0,01322	0,01317	0,01322
si02 Zahodna Slovenija				0,01136	0,01151	0,01132	0,01172	0,01164	0,01157	0,01141
sk01 Bratislavský kraj	0,0088	0,00872	0,00854	0,00847	0,00815	0,00822	0,00792	0,00825	0,00823	0,00822
sk02 Západné Slovensko	0,0197	0,01872	0,01816	0,01804	0,01827	0,01842	0,01846	0,01856	0,01892	0,01902
sk03 Stredné Slovensko	0,0149	0,01369	0,0133	0,01321	0,01324	0,01319	0,01291	0,01311	0,01328	0,01305
sk04 Východné Slovensko	0,0146	0,0143	0,01371	0,01391	0,01407	0,01411	0,01347	0,01345	0,01366	0,01396

Source: calculations from EUROSTAT

Table 4.1 - Thiel index of sectoral concentration

Part a

	1999a00	2000a00	2001a00	2002a00	2003a00	2004a00	2005a00	2006a00	2007a00
Sum - Agriculture	-0,85997	-1,05094	-1,06316	-0,94605	-0,93267	-0,61461	-0,5888	-0,55579	-0,57157
Sum - Manufacturing sector	0,009822	0,016539	0,02154	0,013878	0,026293	0,041706	0,042007	0,036129	0,035818
Sum - Services	0,037678	0,057466	0,064014	0,065691	0,078986	0,084652	0,084075	0,082408	0,080075
Total	-0,81247	-0,97694	-0,97761	-0,86648	-0,82739	-0,48825	-0,46272	-0,43725	-0,45568

Part b

Within-country - Agriculture	0,913009	1,422004	1,433071	1,38366	1,396238	1,131152	1,113962	1,08266	1,091538
Within-country - Manufact	0,305803	0,293137	0,297886	0,310279	0,337129	0,50914	0,503969	0,516436	0,523755
Within-country - Services	0,22675	0,382003	0,375049	0,368845	0,385243	0,363884	0,350522	0,353522	0,358787
Within-country	1,445563	2,097144	2,106006	2,062784	2,11861	2,004176	1,968454	1,952618	1,97408
Across-country - Agriculture	-1,94194	-2,52049	-2,54848	-2,35799	-2,36582	-1,83134	-1,79922	-1,73976	-1,76529
Across-country - Manufact	-0,2974	-0,27814	-0,27828	-0,29822	-0,31189	-0,46943	-0,46524	-0,48344	-0,49142
Across-country - Services	-0,19051	-0,17378	-0,16223	-0,15419	-0,15948	-0,14113	-0,12655	-0,12839	-0,13
Across-country	-2,42985	-2,9724	-2,98899	-2,81041	-2,83719	-2,44189	-2,39101	-2,3516	-2,38671

Source: calculations from EUROSTAT

Note: $T_c > T_w + T_b$ inasmuch as T_c includes one-region countries for which decomposition is not possible