UNIVERSITY OF WUPPERTAL
BERGISCHE UNIVERSITÄT WUPPERTAL

EUROPÄISCHE WIRTSCHAFT
UND
INTERNATIONALE MAKROÖKONOMIK

Balázs Lengyel

Regional clustering tendencies of the Hungarian automotive and ICT industries in the first half of the 2000's

Diskussionsbeitrag 184
Discussion Paper 184

Europäische Wirtschaft und Internationale Wirtschaftsbeziehungen
European Economy and International Economic Relations
ISSN 1430-5445

Balázs Lengyel

Regional clustering tendencies of the Hungarian automotive and ICT industries in the first half of the 2000's

December 2010

Herausgeber/Editor: Prof. Dr. Paul J.J. Welfens, Jean Monnet Chair in European Economic Integration

EUROPÄISCHES INSTITUT FÜR INTERNATIONALE WIRTSCHAFTSBEZIEHUNGEN (EIIW)/
EUROPEAN INSTITUTE FOR INTERNATIONAL ECONOMIC RELATIONS
Bergische Universität Wuppertal, Campus Freudenberg, Rainer-Gruenter-Straße 21,
D-42119 Wuppertal, Germany
Tel.: (0)202 – 439 13 71
Fax: (0)202 – 439 13 77
E-mail: welfens@eiiw.uni-wuppertal.de
www.eiiw.eu

JEL classification: L62, L63, C38, 011
Key words: Regional Clustering, Hungary, Automotive, ICT

Summary: This paper gives an introduction to regional clustering tendencies of Hungarian automotive and ICT sectors. Regional concentration patterns of these two sectors are shown using various measures (number of firms, number of employees, value added, and export). Regional location quotient is also calculated (LQ) in order to select those regions where clustering might happen and analyse these locations over the first half of the decade. The ownership structure is also outlined for every region in the beginning and end of the period. The findings suggest that there is no archetype of clustering tendency in Hungary, a wide variety of regional dynamics is present in both sectors. One might find that agglomeration economies are strongly affected by the location of foreign owned companies.

Zusammenfassung: Dieser Beitrag gibt eine Einführung in die regionalen Clusterbildungstendenzen der ungarischen Automobil-und IKT-Sektoren. Regionale Konzentrationsmuster dieser beiden Sektoren werden unter Zuhilfenahme verschiedener Maßnahmen dargestellt (Anzahl der Unternehmen, Zahl der Beschäftigten, Wertschöpfung, Export). Der Regionale Lokationsquotient (LQ) wird ebenfalls berechnet, um Regionen zu identifizieren, in denen eine Clusterung entstehen könnte. Weiterhin soll die Entwicklung dieser Standorte in der ersten Hälfte des Jahrzehnts analysiert werden. Die Eigentümerstruktur für jede Region wird ebenfalls zum Beginn und Ende der Periode aufgezeigt. Die Ergebnisse legen nahe, dass es keine Archetyp der Clusterungstendenz in Ungarn gibt, jedoch eine Vielzahl von regionalen Dynamiken in beiden Sektoren. Man könnte meinen, dass konzentrierte Ökonomien stark von der Lage der im ausländischen Besitz befindlichen Unternehmen abhängen.

Balázs Lengyel, Research Assistant at European Institute for International Economic Relations (EIIW) at the University of Wuppertal, Rainer-Gruenter-Str. 21, D-42119 Wuppertal, Phone: +49-202-4391371, Fax: +49-202-4391377
welfens@eiiw.uni-wuppertal.de , www.eiiw.eu

Regional clustering tendencies of the Hungarian automotive and ICT industries in the first half of the 2000's

Discussion Paper 184

Table of Contents

List of Figures

List of Tables

1. Introduction and overview

In Porters' definition, a regional cluster is a territorial concentration of competing and co-operating companies in certain industrial sectors. In this sense a cluster is more than the value chain of producing activities; supporting financial institutions, business-, infrastructural-, and university services, enterprise associations also belong to them (Porter, 1990). The measurement and mapping of regional clusters draws first of all on indicators of regional specialization and concentration of industries (Brenner, 2004). In this paper we intend to draw up the regional clustering tendencies in Hungary in the field of automotive and ICT sectors. Though qualitative methods are also essential to map regional clusters (Carter, 2007), we focus solely on regional concentration and analyse concentration patterns of these industries over the first half of the decade.

Greenfield investments by large multinational companies were realized after the change of the regime both in the automotive and in telecommunication and computer industries. On the one hand, Audi, Suzuki and Opel etc, as well as, on the other hand, Ericsson, Nokia, Siemens, IBM and the like decided to relocate their production sites to Hungary due to the relatively cheap and well-educated labour force. After a climatisation period, these companies started to relocate their R&D functions to these Hungarian sites (Lengyel and Cadil, 2009). In the period 1995-2003, the growth of shares in business R&D spending by foreign affiliates was among the highest in Hungary (UNCTAD, 2005, p. 127), with the share of foreign affiliates in business R&D being around 80% (EC, 2005).

As a consequence, foreign-owned companies play a crucial role in cluster formation; however, their regional networks are bound by the dictates of their corresponding headquarters. One can hardly find Hungarian firms in their suppliers (Grosz, 2006). Still, we expect an effect on the local economy through the mobility of labour. For example, although IBM relocated its site from Fejér county to China, according to the leader of the Association for ICT Companies, the ICT industry still seems to be strong in that region. This might be because software engineers could establish SMEs and find the market niche after the big company had left. Audi has also likely had this effect on the local automotive industry, as during its long presence plenty of experts left the company and now work for other firms in the same industry and region.

Theoretically speaking, regional clusters emerge in agglomeration economies where positive externalities occur between companies. As Marshall (1920) recognized, these externalities consist of thick markets for specialized labour, the occurrence of knowledge and technology spill-over among companies, and the emergence of subsidiary trades. In this view, externalities occur among companies from the same industry, because specialized labour and knowledge flow needs similar technological and cultural backgrounds. On the other hand, urban agglomerations provide the possibility for inter-industrial knowledge spill-over effects as well through the dense social networks and the diverse economy in big cities (Jacobs, 1969). Thus, the externality effects of localization agglomeration economies and urbanization agglomeration economies are distinguished in the literature. Localization externalities originate in local specialization of industries, as was reported many times in Third Italy (Antonelli, 1994), in Silicon Valley and Route 128 (Saxenian, 1994), and in the UK (Oxford and Cambridge, particularly) (Miller, 2001).

Meanwhile, urbanization externalities originate much more in the diversity of economic activity and labour division in spatial concentrations as seen in metropolitan areas (Florida, 2002).

Clustering tendencies are often viewed from a life-cycle perspective, in which the emergence and decline of regional clusters generally last for decades. The archetype of clusterization process (EC, 2002) follows six phases: (1) pioneer enterprises, (2) evolution of cluster specific environment and attraction of special suppliers and service providers, (3) new organization for cluster services, (4) attraction of new entrants and specially educated labour, (5) non-market relations with local institutions and NGO's facilitating knowledge flow in the local society, and (6) stagnation or decline of key enterprises. The cluster life cycle mainly depends on the life cycle of the key products and technologies; thus external market conditions are decisive for them.

Previous research on regional clusters showed that North-Western Hungary stands out as a leading area in automotive industry concentration (Grosz, 2006). However, the clustering of automotive industry is still in its initial phase, because the headquarters of the key German, Japanese and US companies make it very difficult for domestic firms to enter their global supplier and R&D networks. It was also pointed out that telecommunication and computer equipment manufacturing spread on a larger scale over the country with the exception of Budapest agglomeration (Szanyi, 2008). Another analysis on Hungarian regional innovation systems showed that high-tech and medium-tech industries are led by foreign-owned companies in Hungary and that location matters in those manufacturing sectors (Lengyel and Leydesdorff, 2009). On the other hand, knowledge-intensive services do not need physical proximity, as these services can be provided from a bigger distance as well. Clustering, in the first case, builds on supply chains, while the ICT services counteract on the concentration trends of the ICT manufacturing. Consequently, the automotive industry is more likely to form regional clusters in areas with localization externalities than in the ICT industry. Urbanization externalities might lead to the concentration of ICT in big city regions; clustering thus happens faster than in other regions and other industries in Hungary. As such, large multinational companies (Nokia-Siemens Networks, Ericsson) have located their R&D sites to Budapest.

In this paper we give an introduction to the regional clustering tendencies within the Hungarian automotive and ICT sectors. We show the regional concentration patterns of these two sectors using various measures (number of firms, number of employees, value added, export) and also calculate the regional location quotient (LQ) in order to select those regions within which clustering might happen. Furthermore, we analyse these locations over the first half of the decade and show the ownership structure for every region in the beginning and end of the given period.

2. Data and method

We have access to a unique database based on the dataset of the Hungarian Tax Office. Company level data are available for the 2000-2005 period in terms of company balance. In our set, companies are categorized into industrial sectors by four-digit NACE codes and into LAN 1 regions. Thus, our data enables us to show the regional concentration patterns of the automotive and ICT industries and to analyse them over the first half of the decade.

Table 1: Industrial sectors in automotive- and ICT clusters

Cluster	NACE Code	Industrial sectors
Auto-	2511	Manufacture of rubber tyres and tubes
motive	2512	Retreading and rebuilding of rubber tyres
	3161	Manufacture of electrical equipment for engines and vehicles n.e.c.
	3410	Manufacture of motor vehicles
	3420	Manufacture of bodies for motor vehicles; manufacture of trailers and semi-trailers
	3430	Manufacture of parts and accessories for motor vehicles and their engines
	3541	Manufacture of motorcycles
	3550	Manufacture of other transport equipment n.e.c.
ICT	3001	Manufacture of office machinery
	3002	Manufacture of computers and other information processing equipment
	3130	Manufacture of insulated wire and cable
	3162	Manufacture of other electrical equipment n.e.c.
	3210	Manufacture of electronic valves and tubes and other electronic components
	3220	Manufacture of television/radio transmitters, apparatus for line telephony/telegraphy
	3230	Manufacture of television/radio receivers, sound/video recording/reproducing apparatus and associated goods
	6411	National post activities
	6412	Courier activities other than national post activities
	6420	Telecommunications
	7133	Renting of office machinery and equipment, including computers
	7221	Publishing of software

Source: Self-edited

Regional industrial clusters contain interconnected industries, supporting institutions, local demand and supply, and competitors (Porter, 1990). Thus, NACE codes and sectors defined by statistical data collections need to be revised. We follow – while slightly altering, however – a widely accepted perspective to define the industrial clusters (Ketels and Sölvell, 2005, Szanyi, 2008). Our automotive cluster contains manufacturing activities of all the equipment and components for all kinds of transport vehicles. The ICT cluster includes the manufacturing and service sides of all communication fields (table 1).

The first step in mapping regional clusters of a given industry is to count the regional concentration and agglomeration patterns of it. Regional concentration arises if the industry has a high share in the region. Agglomeration is something more, as it informs us about inter-regional patterns and comes into being when certain industries are ‘concentrated’ in neighbouring statistical regions. In this paper we only focus on concentration patterns and trends of the above outlined clusters in the Hungarian LAN 1 regions and do not operationalize agglomeration patterns.

Hungary as a whole is considered a NUTS 1 unit according to the Eurostat classification. There are seven regions (NUTS 2), 19 counties (NUTS 3) and 174 subregions (LAN 1) in Hungary. However, the number of sub-regions are changing due to the reforms in

territorial development, and in the time-frame of our analysis, there were only 168 sub-regions. As such, our data reflect the 168 sub-regions. Budapest is the only metropolitan district in Hungary and must therefore be considered a special category in regional surveys; data from the Budapest is generally collected at the NUTS 3 level.

One the most accepted indicators of regional concentration, and surely the most simple, is the Location Quotient (LQ) measure. It compares the share of the industry in the region to the share of the industry in the country with the following formula:

$$LQ_{ij} = \frac{e_{ij} / E_i}{e_j / E} \quad \text{, where}$$

e_{ij} *is the number of employees in industry i of region j,*

e_j *is the number of employees in all industries of region j,*

E_i *is the number of employees in industry i in the country,*

E *is the number of employees in all industries in the country.*

The value of LQ informs us about the relationship between the share of industry in the region and the share of industry in the country. If the regional LQ value is higher than 1, the share of industry is higher in the region than in the country average. Thus, the first step one has to take in mapping regional clusters is to count the LQ values and exclude all the regions where LQ is lower than 1.

In the following sections we will show country-level data for the automotive and ICT industries for the period 2000-2005. The general overview will be followed by the regional analyses. These sections will present regional data (number of firms, number of employees, added value, net export income) with the help of maps. After that, we select the sub-regions where the LQ of automotive or ICT industries is higher than 1 and show how the major measures of companies changed over the first half of the decade. The analysis will summarize by showing the regional features of stock structure and long terms asset accumulation within these clusters.

3. Trends of Hungarian automotive- and ICT industries in the first half of the 2000's

Many different sectors are included in our automotive ICT clusters that are not necessarily connected in other statistical typologies. For example, our ICT cluster definition contains national postal activities as well that relate to ICT only in the broad sense of the term, but present competitors for telecommunication services. Thus, postal activities and employees are part of regional ICT clusters and must be included in regional concentration analyses. However, the presence of national postal activities limits the following country-level

demonstration that is rather an introduction to the regional sections and not a sectoral analysis.

3.1 Automotive industry

The number of firms in automotive industry grew slightly from 421 to 456 (8% growth) between 2000 and 2005 with a solid yearly fluctuation. Labour growth was much faster, increasing by 26%, from 40198 to 50848, and showing similar yearly fluctuation. Thus, the average company size in terms of number of employees rose from 95 to 112, a rather large change.

Gross labour costs, including wages and related taxes, more than doubled in the automotive industry in this period. This means that an average company booked €779,000 in year 2000 as personnel costs, which rose to €1,550,000 by 2005. The annual cost of an average employee was €8,156 in the beginning and €13,900 in the middle of the decade. The main reason why labour costs jumped is due to a raise of labour related taxes; total taxes paid increased by 177%. During this time, the performance of companies improved significantly, but undeniably more moderately than labour costs increased. The gross value added increased by 15% in the sector, and the average value added per company rose from €2,975,000 to €3,154,000. However, this represented a fall from €31,000 to €28,000 per employees in the period. Long terms assets accumulation also showed a monotonic and fast rate of growth, specifically 88%.

Turnover increased by 55%, in which net export plays a decisive but slightly weakening role; export turnover rose by 50%. From another perspective, export sales produced 92% of turnover in year 2000 and 89% of turnover in year 2005. Automotive companies booked 9% of their net revenues as net result in 2000, which decreased to 7% by 2005. Total tax reduction fell from 115,471 to 9,441 over the course of the period under consideration.

The issued capital registered in automotive companies showed a big jump in the beginning of the period, probably due to the large number of market entries, growing moderately however after that. The average stock per companies was €1,245,000 in 2000 and €1,987,000 in 2005. The change in the structure of the company stock shows a growing role of foreign interest in automotive industry. State and municipal stock grew in absolute terms, but this type of ownership was marginal throughout the period. Stock owned by domestic individuals and companies decreased monotonically even in absolute terms by 40%, its share in total stock decreasing from 27% to 9% in the first half of the decade. Foreign-owned stock rose by 117% and determined the sector with its 90% share in 2005.

3.2 ICT industry

Surprisingly, the number of firms (at 5%) and number of employees (ar 12%) had declined in the ICT sector in the first half of the decade. The average company size was 532 in year 2000, which fell to 494 by 2005. One has to consider the effect the National Post Office

(NPO) on these figures, as it had 44,500 employees in the beginning and 32,182 in the end of the period. Taking out the NPO from the sector, it turns out that the size of remaining companies even rose slightly from 362 to 366.

Labour costs grew by 60%, while the number of employees decreased; average worker costs were €7,325 in 2000 and €13,327 in 2005. This growth, similar within the automotive industry, is highly connected to the growth of personnel related tax; the total tax to pay increased by 48%, while the value added increased only by 1.3 %. The value added per employee was €19,224 in 2000, growing to €22,028 by 2005. Long-term assets showed a monotonic 33% growth rate, which is much slower than we experienced in the automotive cluster. Turnover increased by 64%, while export increased by 80%. In other words, exports represented 53% of turnover in 2000 and 58% in 2005 for the whole cluster.

Table 2: Country-level data of the Hungarian automotive and ICT industry, 2000-2005 (1000 EUR)

	year	number of firms	number of employees	labour costs	value added	long term assets	net result	turnover	export turnover	tax to pay	total tax reduction	total stock	state and municipal stock	%	domestic stock	%	foreign-owned stock	%
Automotive	2000	421	40198	327872	1252543	1522468	611123	6829363	6258410	17711	115471	523986	1758	0,3	140924	26,9	374324	71,4
	2001*	269	51977	474535	1094813	1676530	272225	7409181	6661599	22225	91014	933714	1782	0,2	118687	12,7	809900	86,7
	2002	461	48032	528679	1087490	1741092	4855078	7500123	6808475	21039	82479	820205	5437	0,7	92176	11,2	722164	88,0
	2003	449	51376	603306	1277023	2046205	656412	8745104	7891346	52943	82354	869998	5203	0,6	89049	10,2	775513	89,1
	2004	462	51203	645572	1214814	2391316	656460	9054281	8170176	41860	9642	856271	3429	0,4	92312	10,8	759902	88,7
	2005	456	50848	706810	1438133	2864616	782639	10618125	9409276	49183	9441	906211	3518	0,4	85105	9,4	815366	90,0
ICT	2000	260	138542	1014800	2663312	4857623	506859	10118433	5363178	61953	83255	1752902	89109	5,1	419856	24,0	1202723	68,6
	2001*	257	131346	1239877	1797648	4313984	619121	12695049	7792665	56523	55655	1252307	88079	7,0	276665	22,1	872693	69,7
	2002	243	125399	1349383	2107101	5592912	374159	12595479	6940341	90656	50785	1749924	233912	13,4	378000	21,6	1117580	63,9
	2003	254	128572	1498569	2406104	5932263	1228839	13565192	7409513	131201	46671	1881720	218522	11,6	472417	25,1	1186632	63,1
	2004	252	129371	1573482	2520462	6049536	954687	14570506	7670958	83086	34544	1783834	85885	4,8	452003	25,3	1214235	68,1
	2005	248	122531	1633038	2699022	6503372	1288117	16596401	9681528	91436	54422	2013119	59294	2,9	379190	18,8	1552976	77,1

Source: self-edited on the basis of Tax Office data

Note: for unknown reasons, the number of firms is significantly lower in the whole dataset in years signed with *

The ownership structure shows huge annual fluctuation among the three main categories. The total stock registered in the industry showed a more or less stable growth rate of 15% in the period. Foreign-owned stock is decisive in the cluster but to a much weaker degree than in the automotive cluster, and stock grow linearly in none of the ownership categories. State-owned stock jumped from €89,109,000 (2000) to €233,912,000 (2002) in the first half of the period, then it again fell to €59,294,000 (2005), remaining only on the margins of ownership: 5% in 2000, 13% in 2002, and 3% in 2005. In addition to this, the National Post Office is only solely by the state, and its registered stock is around €54,000,000. Domestic stock grew in the middle of the period after a slight decrease in the beginning and fell again in year 2005, numbering 19-25% of the total stock. Foreign-owned stock presents the highest share with a 29% growth throughout the period, reaching 77% of total stock in 2005.

Some major features of structural change have to be underlined. Foreign-owned firms are decisive in automotive and ICT clusters. The share of this type of ownership in total issued capital covers 90% in the automotive and 77% in ICT cluster, and this also rose in absolute terms over the period. Total tax paid by the companies rose quickly as well, and total tax reduction fell in both clusters. Labour unit costs grew much more rapidly than value added per employee. These points might lead us to a conclusion that cost efficiency became less significant for firms in both automotive and ICT clusters.

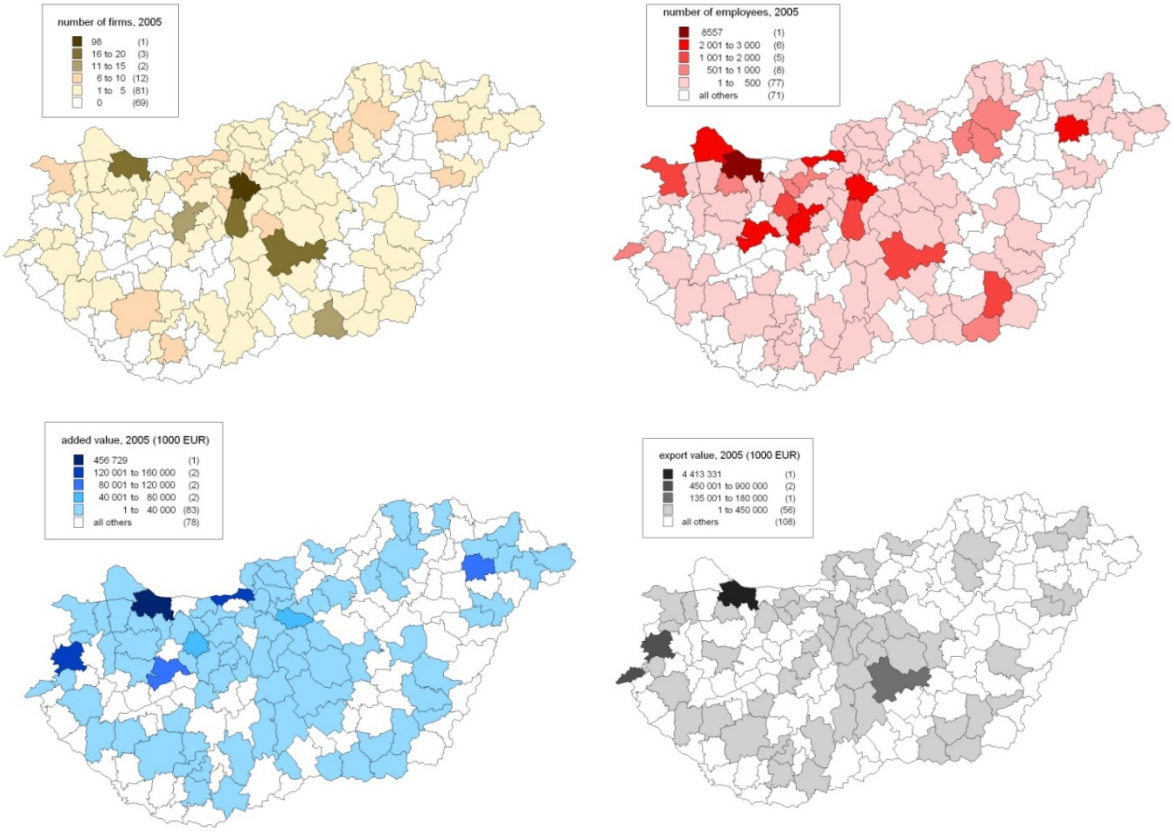
4. Regional clusters in the automotive industry

In this section we give a brief overview of the regional distribution of the main indicators of automotive clusters: number of firms, number of employees, value added, and export turnover. Then clustering tendencies in the first half of the decade will be introduced in selected regions. Regional features of ownership structure will be discussed in the end of the chapter.

The regional distribution of key indicators of automotive clusters is illustrated by ranges in the map of Hungary (figure 1). In the case of each indicator, one outstanding region composes a separate category on the maps presented in this chapter. Budapest stands out in terms of number of firms: 96 companies were registered in the capital within the automotive cluster. This is followed by a range of 16-20 companies in the regions Győr (location of Audi) and Kecskemét (location of Knorr-Bremse) as well as the Ráckeve region with the Budapest agglomeration. More then 10 companies were located in the regions of Székesfehérvár (Ford car components) and Szeged. In all other indicators, Győr is the outstanding region with much higher values than the other regions; the seats of foreign-owned companies are probably in Budapest, while their production sites are in other regions.

Figure 1: Regional distribution of key figures of the Hungarian automotive cluster, 2005

Source: self-edited



Source: self-edited

Győr is followed by six locations within which the number of employees is between 2000 and 3000: Budapest, Székesfehérvár, Mosonmagyaróvár (components for rail vehicles), Esztergom (location of Suzuki), Nyíregyháza, Veszprém (location of Continental-Teves). Veszprém is a traditional region for the chemical industry, with specialized university education. Value added is three times higher in Győr than in Esztergom and Szombathely (location of LUK). Export value was highly connected to Audi, which made the value in Győr more than four times higher than the Szombathely and Szentgotthárd (location of Opel) regions. Knorr-Bremse export activity also put Kecskemét on the map.

Table 3: Trends of Hungarian automotive cluster in selected regions (1000 Euros)

Sub-region	2000						2002						2005					
	n	Employees	labour costs	value added	export	long term asset	n	employees	labour costs	value added	export	long term asset	n	employees	labour costs	value added	export	long term asset
Eger	7	1904	14597	24614	135748	20634	9	1908	19335	27370	162994	25378	6	819	14018	16209	180056	39517
Esztergom	8	1688	14206	15499	325558	96817	8	1705	20748	55379	351538	88980	9	2905	44102	126514	921632	276556
Godollo	5*	3760	26079	61531	176807	30585	5	4946	47255	90110	335185	134918	4	4533	56869	58616	365663	256514
Gyor	14	8685	90934	540327	3600138	750392	17	8441	127786	443890	3552182	600671	19	8557	159856	456729	4413332	1289196
Kalocsa	3	186	906	1267	342	501	4	169	1115	1233	211	522	4	195	1666	1822	334	1900
Kecskemet	16	1142	8933	16937	50901	13744	18	1235	14019	20632	81856	17117	17	1334	21854	33382	144027	24544
Komlo	5	343	1942	3200	3875	1791	7	497	3756	4659	6245	3221	10	397	3671	4226	5728	4177
Mor	4	2635	19854	49149	175238	26869	3	1694	17288	45355	217412	21763	10	1729	20655	45507	230749	34973
Mosonmagyarovar	6	1188	8016	40684	145032	15446	7	1652	15816	31846	166832	26369	4	2093	27609	37366	288608	37716
Nyiregyhaza	7	1210	11364	24660	83971	34342	7	2233	31002	28156	163874	41926	9	2132	45353	81232	257087	45645
Rackeve	17	681	4475	13049	27838	15675	16	787	6645	14463	33384	17113	18	1080	12044	26390	54599	25496
Sopron-Fertod	5	873	5468	11350	16093	9473	6	1166	10372	12135	21528	11798	6	1425	14166	15370	23915	14696
Szekesfehervar	14	3626	30229	102824	307729	154926	14	3315	34411	50696	263952	103605	12	2282	29663	34402	231775	70277
Szombathely	5	3162	21292	67899	348320	54219	5	3333	33300	76257	343933	60354	5	3238	41303	149071	521292	70967
Tatabanya	3*	685	4162	5846	37975	43401	4**	869	8754	15145	86696	43196	8	824	11773	25832	98654	34583
Veszprem	6	2194	15518	43215	106179	52698	5	2241	22407	39124	133739	55446	4	2614	33560	100729	350430	78237

Source: self-edited, based on Tax Office data
Note: data available in year 1999 signed with *; in year 2001 signed with **; in year 2003 signed with ***

When selecting regions to show automotive clustering tendencies for the first half of the decade, we calculated location quotient (LQ) of the number of employees for all regions and each year from 2000 to 2005. This measure shows how the share of industry in a region relates to the share of industry in the country. If the value of LQ is higher than 1, the industry concentration is higher in the region than in the country average. As a first step, we removed regions for which the LQ was lower than 1 in 2000 and 2005. As a second step, we sorted out regions within which the LQ did not reach 1 in at least two other years in the period. Finally, we left out regions where number of companies did not reach 3 in all of the years presented1, and the regional automotive clusters can be found in table 3.

Only Budapest and Szentgotthárd were sorted out of the regions that were presented as outstanding ones in figure 1. The LQ of automotive cluster was lower than 1 in Budapest. Consequently, the automotive cluster hardly has a concentration force within the city. As a matter of fact, one can expect that an urbanization effect occurs in the capital, with a higher probability for services to concentrate. Only two companies were present in Szentgotthárd through the whole period, which cannot be interpreted as a clustering tendency, however high is the export activity of Opel is there. We sorted the 16 regions in terms of change in the number of companies and configured groups of high growth (+3-6 companies), moderate growth (+1-2 companies), stagnating, and moderate fall (-1-2 companies).

Regions where automotive clustering showed a high growth are: Győr, Komló, Mór, Tatabánya. Clustering occurs in these regions that are attractive enough for new companies to enter.

- **Győr** region is the emergent area of automotive clustering, being the location of Audi and the base of PANAC Automotive Cluster Organization. Five new companies entered the region in the first half of the decade; export turnover and long term asset accumulation also showed a positive shift. However, other indicators presented had fallen. The number of employees decreased and value added also went down. The latter is really interesting, because labour costs almost doubled, and this contributes to value added creation. A similar tendency can be found in **Mór**, albeit to a lower degree. The number of companies and export climbed, long term asset accumulation continued unabated, but the number of employees decreased sharply and value added also fell.
- **Komló** experienced fast growth in terms of number of firms, but the five entrants provided only fifty new jobs throughout the period. A similar trend occurred in **Tatabánya**, where five new companies established 140 jobs. However, firms in Komló are hardly expected to join cluster organizations, as the physical proximity of Tatabánya to other automotive locations provide fields for localization economies.

Regions with moderate growth: Esztergom, Kalocsa, Kecskemét, Nyíregyháza, Ráckeve, Sopron-Fertőd. These regions are probably less attractive to enter, but localisation externalities still exist.

- **Esztergom** region is the settlement for Suzuki where only one company entered, but the number of employees grew by 1,200, as value added likewise climbed by 716% and became the third in this sense in the country. **Nyíregyháza** and **Sopron-**

[1] The Hungarian Statistical Act allows data publication only if minimum 3 companies exist in certain industries and regions.

Fertőd followed similar concentration patterns but lower levels of value added and growth in export.

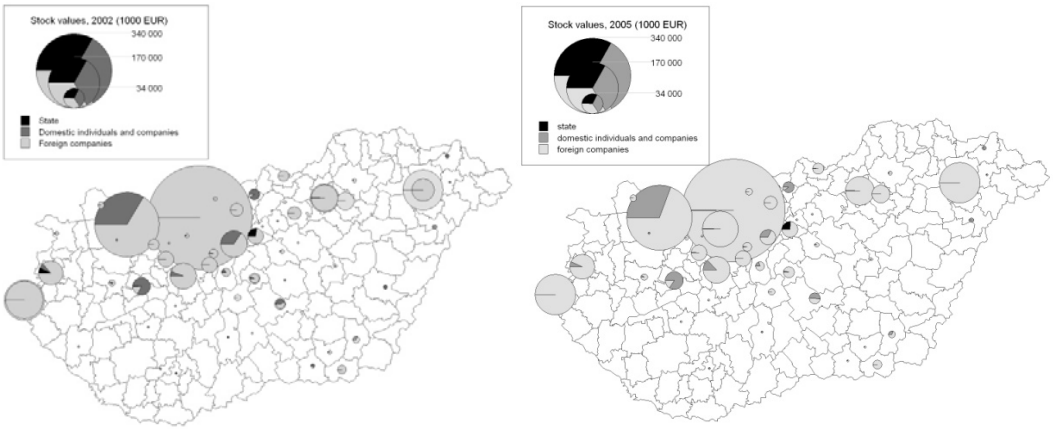
- **Kecskemét** and **Ráckeve** regions have a high number of companies but a low number of employees, and the entrance of one firm made the number of employees increase by 100 in Kecskemét and by 400 in Ráckeve. Knorr-Brense might perform well in value added and export, which pulled the indicators of the region up; this did not happen in Ráckeve.
- **Kalocsa** is in the inner periphery, where 3-4 automotive companies and 186-195 employees were successful at producing an LQ larger than 1.

The only region within which the number of firms **stagnated** was **Szombathely**, where five located firms increased the number of employees moderately. However, this region did not attract new companies to the cluster; these companies raised their value added and export to levels which are among the highest within the country.

The number of firms saw a **moderate fall** in five regions: Eger, Gödöllő, Mosonmagyaróvár, Székesfehérvár, Veszprém.

- The fall in the number of firms happened together with the sharp fall in the number of employees in the **Eger** and **Székesfehérvár** regions. Companies were relocated or might have failen in Székesfehérvár since value added, export and long term assets also decreased. In Eger, there might still be successful companies that could raise their export.
- The decrease in the number of firms was accompanied by a moderate increase in labour volume in **Veszprém**, but this has almost doubled in **Gödöllő** and **Mosonmagyaróvár** regions. Long terms asset accumulation occurred in all three regions, export volume also grew, but value added increased only in Veszprém. This latter region saw the fourth highest value added and export volumes.

Figure 2: Values of registered capital by owner categories in the Hungarian regional automotive clusters, 2002 and 2005



Source: self-edited

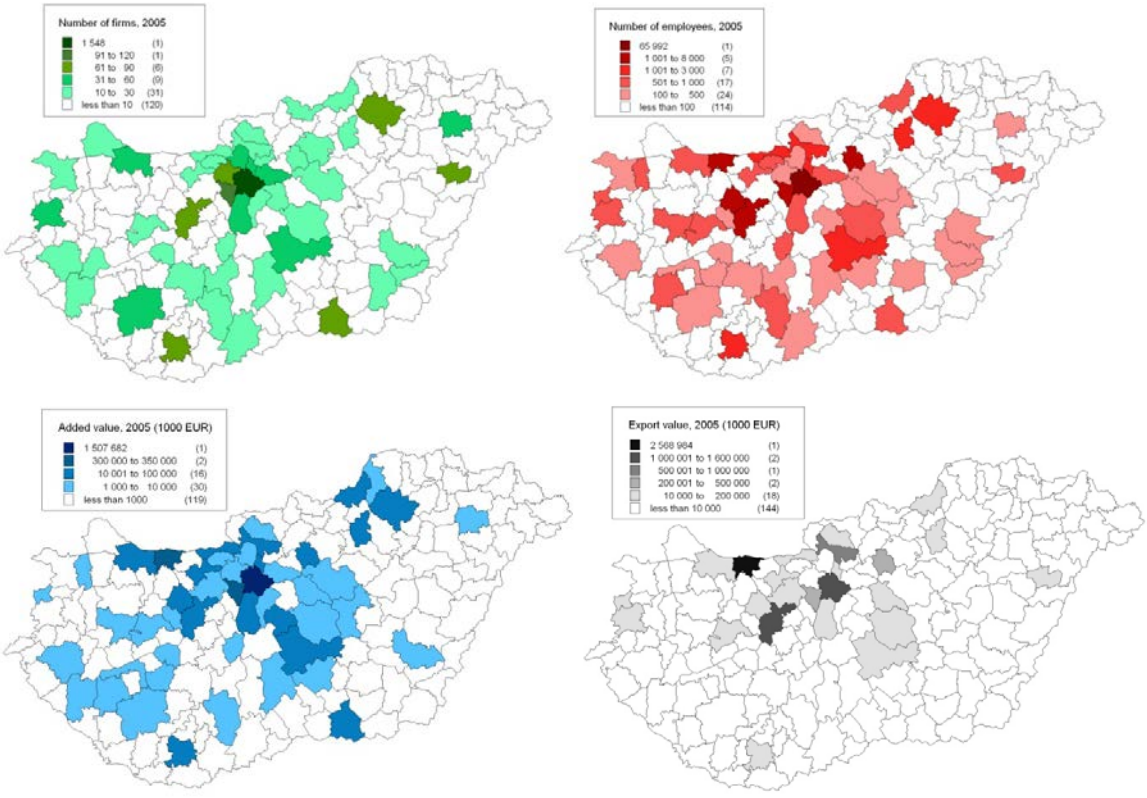
One cannot find the wide variety that was visible in terms of concentration in automotive clusters in the picture of ownership structure (figure 2). A decisive share of capital registered in the automotive clusters are owned by foreign companies. This concentrates in

Northern and Western Transdanubia, in regions like Esztergom, Győr, Szombathely, Székesfehérvár (ordered by size of hub), etc. The value of registered capital stands out from its surroundings in Eger and Nyíregyháza in the Northeast. Hardly any dynamics can be found in regional distribution, and only one new region emerged as capital concentration – Bicske, which is part of the Budapest agglomeration and neighbours Esztergom to the South.

5. Regional clusters in the ICT industry

Similar to the previous chapter, we present here a brief overview of the regional distribution of main indicators in ICT clusters: number of firms, number of employees, value added, export. Then clustering tendencies in the first half of the decade will be introduced in selected regions, and regional features of ownership structure will be discussed in the end of the section.

Figure 3: Regional distribution of key figures in Hungarian ICT industry, 2005



Source: self-edited

The role of Budapest stands out clearly in every indicator in the ICT cluster; only Komárom (location of Nokia) and Székesfehérvár (former location of IBM) outperform it

in export volume (figure 3). As national postal activities are included in our ICT cluster definition, one should be careful in analysing performance indicators; these might represent a large share of employment in regional centres.

In terms of number of firms, the capital is followed by regions of the Budapest agglomeration (Budaörs, Pilisvörösvár) and university centres like Debrecen, Miskolc, Pécs, Szeged and Székesfehérvár. Regions with smaller universities, like Győr, Kecskemét, Nyíregyháza and several agglomeration sub-regions, are in the third tier. The Komárom region (Nokia) has less than 10 firms in the ICT cluster and does not show up on the first map in figure 3. The number of employees already shows a different picture, and one might notice that other locations jump to the second group like Budaörs, Hatvan, Komárom, Mór, and Székesfehérvár, where the size of labour exceeds 3,000 employees. These possible ICT clusters are followed by agglomeration and university regions in the third group: Dunakeszi, Eger, Esztergom, Kecskemét, Miskolc, Pécs, and Vác.

Regional distribution of value added shows a very similar picture to labour distribution. However, two regions stand out from the others, Budaörs and Komárom. The third group contains various types of regions, and it is therefore hard to distinguish between the effect of national post activities in value added creation. As was mentioned before, Komárom and Székesfehérvár regions outperform Budapest in terms of export. These three locations are followed by Vác, Hatvan and Budaörs.

To show the clustering tendencies over time, we followed a similar process as in the case of the automotive cluster. We calculated the location quotient (LQ) for the number of employees for all regions and each year from 2000 to 2005. As a first step in selecting the regions, we eliminated regions within which the LQ was lower than 1 in 2000 and 2005. In the second step, we sorted out regions where the LQ did not reach 1 in at least two other years in the period. Interestingly, we found 2003 as a local maximum for most indicators in most of the regions. Lastly, we left out regions for which the number of companies did not reach 10 or the number of employees did not reach 500. Despite all of these steps, it is necessary to analyse some of the regions where the LQ was lower than 1 in 2000; these locations are present in table 4.

The number of firms increased in almost all of the locations from 2000 to 2003; this number decreased again from 2003 to 2005 in all regions but one. An interesting case is Komárom, for which the number of firms decreased throughout the whole period while labour volume grew dynamically.

The listed regions present various and complex dynamics. As such, we decided to sort them by size and dynamics of labour between 2003 and 2005, giving us four groups: dynamic big, falling big, raising small and stagnating small. We show how ICT clusters changed in absolute terms and how the indicators shifted relative to the size of labour.

Table 4: Trends of Hungarian ICT cluster in selected regions (1000 Euros)

Subregion	2000						2003						2005					
	n	employees	labour costs	value added	export	long term asset	n	employees	labour costs	value added	export	long term asset	n	employees	labour costs	value added	export	long term asset
Budaors	3*	15	26	20	0	99	208	4246	90524	240894	176269	720814	115	4331	96478	326274	234593	1104572
Budapest	1080	74788	650553	1472592	598164	3308297	3545	74777	961267	1537721	1386669	3805295	1549	65993	1002768	1507682	1546767	3822191
Cegled	4*	15	37	86	0	25	29	1112	8096	8208	40687	19514	18	814	5947	3564	18198	10111
Dorog	2*	5	15	27	0	0	14	666	3694	3805	5569	241	19	691	3665	3432	6048	260
Dunakesz	2*	6	10	61	0	147	81	858	12752	17249	85799	5884	44	1380	19029	27778	107496	4650
Esztergom	1*	0	0	0	0	0	38	1486	14418	27888	83601	39632	25	1471	17183	30614	102401	2404
Hatvan	6	885	6040	11969	52426	39867	17	1959	18448	33112	181480	20228	10	3347	41695	71630	548322	145562
Komarom	21*	146	964	2164	2852	1381	12	1827	20020	114949	2311114	73596	7	5565	70019	341233	4224860	186880
Ozd	12*	36	111	147	64	106	11	663	4162	10885	50050	5877	10	691	4777	10802	53471	6626
Pecs	59	3323	12776	21409	35914	53532	129	3410	32301	39134	67421	41984	69	2846	34460	42166	108408	55835
Szekesfehervar	64	18508	89767	546873	3083761	293921	127	10893	99964	109698	1858013	160758	82	7207	77831	40701	1841017	141845
Tatabanya	32*	1033	5502	8910	11600	3957	42	1110	11764	10108	48701	16484	36*	533	4450	-5162	39295	160059
Vac	25	3114	25167	53780	64587	40383	48	3223	47020	30719	630603	263811	26	2643	27305	31785	46186	59102

Note: LQ is lower than one in the cases when company number is signed with *

The volume of labour in dynamic big ICT clusters has more than 1000 employees per region and grew between 2003 and 2005. Three locations fulfilled these requirements: Budaörs, Hatvan, and Komárom. All of these were really small in the beginning of the period with a LQ lower than 1. In fact, ICT hardly even existed in Budaörs in 2000. Consequently, a significant amount of green-field investment pulled up these locations.

- **Komárom** performs the best export values in absolute terms and per employee in 2005. Volume of export doubled, though export per employee fell by half in two years from 2003. Though the number of companies increased through the whole period, labour volume grew dynamically with a higher intensity than did value added and export activity.
- **Hatvan** showed a similar pattern, to a lower degree however; all indicators grew dynamically in absolute terms. Both value added and export level grew faster than the number of employees.
- **Budaörs** saw the slowest growth in ICT, as labour and the number of firms fell sharply there. However, value added and export grew rapidly.

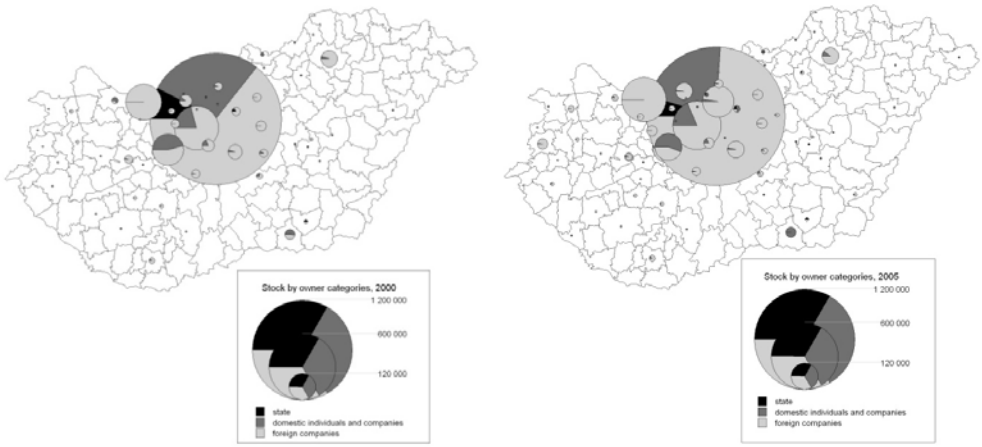
Regions that represent large but decreasing size of ICT labour formulate the group of falling big clusters. These are: Budapest, Esztergom, Pécs, Székesfehérvár, and Vác. The regions differ in many ways, but both the number of firms and employees decreased in all of them.

- **Budapest** is the biggest agglomeration of both ICT firms and labour. The number of firms fell by half from 2003 to 2005, and labour size also decreased by 12,000 (although a significant share of this fall is due to cuts in national postal activities). However, the decrease in value added was moderate, and a small growth in export and long-term assets occurred. Budapest produces the second largest amount of ICT export.
- **Székesfehérvár** is a very important location for ICT, however its role is diminishing in terms of labour volume and long-terms assets. The region produces the highest share of ICT export and still has the second largest volume of ICT labour.
- **Pécs** and **Vác** show similar patterns in size of labour and its change over time, as well as added value and long-term assets accumulation dynamics. On the other hand, Pécs follows an upgrading curve in terms of export, while this fell in Vác.

Esztergom and Dunakeszi regions are **small** but **probably raising** locations of ICT in 2003-2005, while almost no ICT existed there in 2000. **Esztergom** is a new location for ICT that has still a smaller volume of labour and would be difficult to forecast from the 2003 and 2005 indicators, because export activity increased but long terms accumulation fell sharply. The same happened in **Dunakeszi**, where a jump in the number of employees by 500 was accompanied by export growth. However, long term assets accumulation also stopped there.

Stagnating small locations of ICT are Cegléd, Dorog, Ózd, and Tatabánya. These locations are very similar to the previous group but produced much lower levels of export growth accompanied by a decrease in labour volume.

Figure 4: Values of registered capital by owner categories in the Hungarian regional ICT clusters,



Source: self-edited

The size of registered capital indicates an explicit concentration of ICT industry in the Budapest agglomeration. The big hub of Budapest is followed by Budaörs, Komárom and Székesfehérvár in 2000, although the order changed by 2005, with Dunakeszi overtaking Székesfehérvár. The ownership structure varies among regions; ICT capital in Komárom and Dunakeszi are almost fully owned by foreign companies. More than half of the stock in Székesfehérvár was owned by domestic companies and individuals in 2005. One-sixth of stock is in domestic hands in Budapest and Budaörs; Budapest also represents a significant but decreasing volume of state-owned stock (which probably is the result of the National Post Office).

6. Conclusion

In this analysis, we presented a brief overview of industrial dynamics and regional distribution of Hungarian automotive and ICT clusters in the first half of the 2000's. Our data show that sectors related to the automotive cluster grew in all terms throughout the period, while sectors related to the ICT cluster had a local maxima of indicators in the middle of this period. Labour unit costs grew much faster than value added per employee in both industries, which leads us to the conclusion that cost efficiency grew less relevant for foreign firms in both automotive and ICT industries.

The cross-sectoral difference we expected and introduced in section 1 is visible in the regional distribution of the two clusters. Automotive industries tend to cluster in areas where foreign-owned firms located their sites, and new firms that enter those regions are attracted by localization externalities. On the other hand, ICT concentrates in Budapest and

its agglomeration; urbanization externalities might occur when new firms come off and enter ICT clusters.

We also demonstrated the number of firms, labour size, value added and export changed over time in selected regions where automotive and ICT sectors were concentrated. The patterns of growth and decline in regional concentrations vary among regions in both industries. Major indicators like the number of firms, number of employees, value added and export value changed considerably over time. This means that clustering is a long term process and that the concentration of firms depends on their strategy and the global market of their products.

Győr saw a growing concentration within the automotive industry. New companies entered the region, the number of employees also grew, and there was likewise growth in value added and exports. Localization externalities attracted a smaller number of new firms to Esztergom, with labour volume increasing moderately there. Szombathely stagnated in terms of number of firms. Though the period we investigated is very short with respect to analyzing cluster formations, we might conclude that the automotive cluster in Győr was in the phase of attracting new companies in the first half of the decade. Esztergom and Szombathely, where localization externalities are weaker, are probably on the periphery of the automotive cluster.

The picture of ICT clustering is a bit more complex in Hungary than is the case for automotive clustering. Indicators in Budapest fell, but other hubs emerged in its agglomeration. Our interpretation of this finding is that big companies moved from Budapest to industrial parks that are close to the city but which offer lower rental prices and overhead costs. The number of firms and labour volume also fell in other traditional clusters, like Székesfehérvár, as IBM relocated its production site to Asia. Firms in Székesfehérvár increased their exports, but the region is losing its attractiveness. Komárom emerged as a new location for ICT industry with the green-field investment of Nokia, but it has hardly attracted any new firms after that.

References

ANTONELLI, C. (1994), Technology districts, localized spillovers, and productivity growth: the Italian evidence on technological externalities in core regions. International Review of Applied Economics, 12, pp. 18-30.

BRENNER, T. (2004), Local Industrial Cluster: Existence, Emergence and Evolution. Routledge, London - New York.

CARTER, A. P. (2007), Measurement of the clustering and dispersion of innovation. In Polenske K R (ed) The Economic Geography of Innovation, pp. 13-29. Cambridge University Press, Cambridge.

EC (2002), Enterprise Clusters and Networks. European Commission, DG Enterprise, Brussels.

EC (2005), Towards an European Research Area, Science, Technology and Innovation. Key Figures 2005. European Commission, DG Research, Brussels.

FLORIDA, R. (2002), The Rise of the Creative Class. Basic Books, New York.

GROSZ, A. (2006), Clusterization processes in the automotive industry. Discussio Papers No. 52. Centre for Regional Studies, Hungarian Academy of Sciences, Pécs.

JACOBS, J. (1969), The Economy of Cities. Random House, New York.

KETELS, C.; SÖLVELL, Ö. (2005), Clusters in the EU 10 new member countries. Europe INNOVA, Center for Strategy and Competitiveness, Stockholm.

LENGYEL, B.; CADIL, V. (2009), Innovation policy challenges in transition countries: foreign business R&D in the Czech Republic and Hungary. Transition Studies Review 16, 174-188.o.

LENGYEL, B.; LEYDESDORFF, L. (2009), Regional innovation systems in Hungary: the failing synergy at the national level. Regional Studies, forthcoming.

MARSHALL, A. [1890] (1920), Principles of Economics. 8th edition, London, Macmillan

MILLER, P. (2001), Business Clusters in the UK – A First Assessment. DTI, London. www.dti.gov.uk/clusters/map

PORTER, M. (1990), The Competitive Advantage of Nations. New York: The Free Press.

SAXENIAN, A. (1994) Regional Advantage: Culture and Competition in Silicon Valley and Route 128. Harvard University Press, Cambridge.

SZANYI, M. (2008), A versenyképesség javítása együttműködéssel: regionális klaszterek. Napvilág Kiadó, Budapest.

UNCTAD (2005), World Investment Report 2005. Transnational Corporations and the and the Internationalization of R&D. United Nations, New York.

EIIW Discussion Papers

ISSN 1430-5445:
Standing orders (usually 13 issues or more p.a.): academic rate 95 Euro p.a.; normal rate 250 Euro p.a.
Single orders: academic rate 10 Euro per copy; normal rate 20 Euro per copy.

Die Zusammenfassungen der Beiträge finden Sie im Internet unter:
The abstracts of the publications can be found in the internet under:

http://www.eiiw.eu

No. 100 **Gavrilenkov, E.:** Macroeconomic Situation in Russia - Growth, Investment and Capital Flows, October 2002

No. 101 **Agata, K.:** Internet, Economic Growth and Globalization, November 2002

No. 102 **Blind, K.; Jungmittag, A.:** Ausländische Direktinvestitionen, Importe und Innovationen im Dienstleistungsgewerbe, February 2003

No. 103 **Welfens, P.J.J.; Kirn, T.:** Mittelstandsentwicklung, BASEL-II-Kreditmarktprobleme und Kapitalmarktperspektiven, Juli 2003

No. 104 **Standke, K.-H.**: The Impact of International Organisations on National Science and Technology Policy and on Good Governance, March 2003

No. 105 **Welfens, P.J.J.:** Exchange Rate Dynamics and Structural Adjustment in Europe, May 2003

No. 106 **Welfens, P.J.J.; Jungmittag, A.; Kauffmann, A.; Schumann, Ch.:** EU Eastern Enlargement and Structural Change: Specialization Patterns in Accession Countries and Economic Dynamics in the Single Market, May 2003

No. 107 **Welfens, P.J.J.:** Überwindung der Wirtschaftskrise in der Eurozone: Stabilitäts-, Wachstums- und Strukturpolitik, September 2003

No. 108 **Welfens, P.J.J.:** Risk Pricing, Investment and Prudential Supervision: A Critical Evaluation of Basel II Rules, September 2003

No. 109 **Welfens, P.J.J.; Ponder, J.K.:** Digital EU Eastern Enlargement, October 2003

No. 110 **Addison, J.T.; Teixeira, P.:** What Have We Learned About The Employment Effects of Severance Pay? Further Iterations of Lazear et al., October 2003

No. 111 **Gavrilenkov, E.:** Diversification of the Russian Economy and Growth, October 2003

No. 112 **Wiegert, R.:** Russia's Banking System, the Central Bank and the Exchange Rate Regime, November 2003

No. 113 **Shi, S.:** China’s Accession to WTO and its Impacts on Foreign Direct Investment, November 2003

No. 114 **Welfens, P.J.J.:** The End of the Stability Pact: Arguments for a New Treaty, December 2003

No. 115 **Addison, J.T.; Teixeira, P.**: The effect of worker representation on employment behaviour in Germany: another case of -2.5%, January 2004

No. 116 **Borbèly, D.:** EU Export Specialization Patterns in Selected Accession Countries, March 2004

No. 117 **Welfens, P.J.J.:** Auf dem Weg in eine europäische Informations- und Wissensgesellschaft: Probleme, Weichenstellungen, Politikoptionen, Januar 2004

No. 118 **Markova, E.:** Liberalisation of Telecommunications in Russia, December 2003

No. 119 **Welfens, P.J.J.; Markova, E.:** Private and Public Financing of Infrastructure: Theory, International Experience and Policy Implications for Russia, February 2004

No. 120 **Welfens, P.J.J.:** EU Innovation Policy: Analysis and Critique, March 2004

No. 121 **Jungmittag, A.; Welfens, P.J.J.:** Politikberatung und empirische Wirtschaftsforschung: Entwicklungen, Probleme, Optionen für mehr Rationalität in der Wirtschaftspolitik, März 2004

No. 122 **Borbèly, D.:** Competition among Cohesion and Accession Countries: Comparative Analysis of Specialization within the EU Market, June 2004

No. 123 **Welfens, P.J.J.:** Digitale Soziale Marktwirtschaft: Probleme und Reformoptionen im Kontext der Expansion der Informations- und Kommunikationstechnologie, Mai 2004

No. 124 **Welfens, P.J.J.; Kauffmann, A.; Keim, M.:** Liberalization of Electricity Markets in Selected European Countries, July 2004

No. 125 **Bartelmus, P.:** SEEA Revision: Accounting for Sustainability?, August 2004

No. 126 **Welfens, P.J.J.; Borbèly, D.:** Exchange Rate Developments and Stock Market Dynamics in Transition Countries: Theory and Empirical Analysis, November 2004

No. 127 **Welfens, P.J.J.:** Innovations in the Digital Economy: Promotion of R&D and Growth in Open Economies, January 2005

No. 128 **Welfens, P.J.J.:** Savings, Investment and Growth: New Approaches for Macroeconomic Modelling, February 2005

No. 129 **Pospiezna, P.:** The application of EU Common Trade Policy in new Memberstates after Enlargement – Consequences on Russia's Trade with Poland, March 2005

No. 130 **Pospiezna, P.; Welfens, P.J.J.:** Economic Opening up of Russia: Establishment of new EU-RF Trade Relations in View of EU Eastern Enlargement, April 2005

No. 131 **Welfens, P.J.J.:** Significant Market Power in Telecommunications: Theoretical and Practical Aspects, May 2005

No. 132 **Welfens, P.J.J.:** A Quasi-Cobb Douglas Production Function with Sectoral Progress: Theory and Application to the New Economy, May 2005

No. 133 **Jungmittag, A.; Welfens, P.J.J:** Institutions, Telecommunications Dynamics and Policy Challenges: Theory and Empirical Analysis for Germany, May 2005

No. 134 **Libman, A.:** Russia's Integration into the World Economy: An Interjurisdictional Competition View, June 2005

No. 135 **Feiguine, G.:** Beitritt Russlands zur WTO – Probleme und Perspektiven, September 2005

No. 136 **Welfens, P.J.J.:** Rational Regulatory Policy for the Digital Economy: Theory and EU Policy Options, October 2005

No. 137 **Welfens, P.J.J.:** Schattenregulierung in der Telekommunikationswirtschaft, November 2005

No. 138 **Borbèly, D.:** Determinants of Trade Specialization in the New EU Member States, November 2005

No. 139 **Welfens, P.J.J.:** Interdependency of Real Exchange Rate, Trade, Innovation, Structural Change and Growth, December 2005

No. 140 **Borbély D., Welfens, P.J.J.:** Structural Change, Innovation and Growth in the Context of

EU Eastern Enlargement, January 2006

No. 141 **Schumann, Ch.:** Financing Studies: Financial Support schemes for students in selected countries, January 2006

No. 142 **Welfens, P.J.J.:** Digitale Innovationen, Neue Märkte und Telekomregulierung, März 2006

No. 143 **Welfens, P.J.J.:** Information and Communication Technology: Dynamics, Integration and Economic Stability, July 2006

No. 144 **Welfens, P.J.J.:** Grundlagen rationaler Transportpolitik bei Integration, August 2006

No. 145 **Jungmittag, A.:** Technological Specialization as a driving Force of Production Specialization, October 2006

No. 146 **Welfens, P.J.J.:** Rational Regulatory Policy for the Digital Economy: Theory and EU-Policy Options, October 2006

No. 147 **Welfens, P.J.J.:** Internationalization of EU ICT Industries: The Case of SAP, December 2006

No. 148 **Welfens, P.J.J.:** Marktwirtschaftliche Perspektiven der Energiepolitik in der EU: Ziele, Probleme, Politikoptionen, Dezember 2006

No. 149 **Vogelsang, M.:** Trade of IT Services in a Macroeconomic General Equilibrium Model, December 2006

No. 150 **Cassel, D., Welfens, P.J.J.:** Regional Integration, Institutional Dynamics and International Competitiveness, December 2006

No. 151 **Welfens, P.J.J., Keim, M.:** Finanzmarktintegration und Wirtschaftsentwicklung im Kontext der EU-Osterweiterung, März 2007

No. 152 **Kutlina, Z.:** Realwirtschaftliche und monetäre Entwicklungen im Transformationsprozess ausgewählter mittel- und osteuropäischer Länder, April 2007

No. 153 **Welfens, P.J.J.; Borbély, D.:** Structural Change, Growth and Bazaar Effects in the Single EU Market, September 2008

No. 154 **Feiguine, G.:** Die Beziehungen zwischen Russland und der EU nach der EU-Osterweiterung: Stand und Entwicklungsperspektiven, Oktober 2008

No. 155 **Welfens, P.J.J.:** Ungelöste Probleme der Bankenaufsicht, Oktober 2008

No. 156 **Addison J.T.:** The Performance Effects of Unions. Codetermination, and Employee Involvement: Comparing the United States and Germany (With an Addendum on the United Kingdom), November 2008

No. 157 **Welfens, P.J.J.:** Portfoliomodell und langfristiges Wachstum: Neue Makroperspektiven, November 2008

No. 158 **Welfens, P.J.J.:** Growth, Structural Dynamics and EU Integration in the Context of the Lisbon Agenda, November 2008

No. 159 **Welfens, P.J.J.:** Growth, Innovation and Natural Resources, December 2008

No. 160 **Islami, M.:** Interdependence Between Foreign Exchange Markets and Stock Markets in Selected European Countries, December 2008

No. 161 **Welfens, P.J.J.:** Portfolio Modelling and Growth, January 2009

No. 162 **Bartelmus, P.:** Sustainable Development – Has It Run Its Course?, January 2009

No. 163 **Welfens, P.J.J.:** Intégration Européenne et Mondialisation: Défis, Débats, Options, February 2009

No. 164 **Welfens, P.J.J.:** ЭКОНОМИЧЕСКИЙ РОСТ, ИННОВАЦИИ И ПРИРОДНЫЕ РЕСУРСЫ, February 2009

No. 165 **Welfens, P.J.J.; Vogelsang, M.:** Regulierung und Innovationsdynamik in der EU-Telekommunikationswirtschaft, February 2009

No. 166 **Welfens, P.J.J.:** The International Banking Crisis: Lessons and EU Reforms, February 2009

No. 167 **Schröder, C.:** Financial System and Innovations: Determinants of Early Stage Venture Capital in Europe, March 2009

No. 168 **Welfens, P.J.J.:** Marshall-Lerner Condition and Economic Globalization, April 2009

No. 169 **Welfens, P.J.J.:** Explaining Oil Price Dynamics, May 2009

No. 170 **Welfens, P.J.J.; Borbély, D.:** Structural Change, Innovation and Growth in the Single EU Market, August 2009

No. 171 **Welfens, P.J.J.:** Innovationen und Transatlantische Bankenkrise: Eine ordnungs-politische Analyse, August 2009

No. 172 **Erdem, D.; Meyer, K.:** Natural Gas Import Dynamics and Russia´s Role in the Security of German´s Supply Strategy, December 2009

No. 173 **Welfens P.J.J; Perret K.J.:** Structural Change, Specialization and Growth in EU 25, January 2010

No. 174 **Welfens P.J.J.; Perret K.J.; Erdem D.:** Global Economic Sustainability Indicator: Analysis and Policy Options for the Copenhagen Process, February 2010

No. 175 **Welfens, P.J.J.:** Rating, Kapitalmarktsignale und Risikomanagement: Reformansätze nach der Transatlantischen Bankenkrise, Februar 2010

No. 176 **Mahmutovic, Z.:** Patendatenbank: Implementierung und Nutzung, Juli 2010

No. 177 **Welfens, P.J.J.:** Toward a New Concept of Universal Services: The Role of Digital Mobile Services and Network Neutrality, November 2010

No. 178 **Perret J.K.:** A Core-Periphery Pattern in Russia – Twin Peaks or a Rat´s Tail, December 2010

No. 179 **Welfens P.J.J.:** New Open Economy Policy Perspectives: Modified Golden Rule and Hybrid Welfare, December 2010

No. 180 **Welfens P.J.J.:** European and Global Reform Requirements for Overcoming the Banking Crisis, December 2010

No. 181 **Szanyi, M.:** Industrial Clusters: Concepts and Empirical Evidence from East-Central Europe, December 2010

No. 182 **Szalavetz, A.:** The Hungarian automotive sector – a comparative CEE perspective with special emphasis on structural change, December 2010

No. 183 **Balázs Lengyel:** The Hungarian ICT sector – a comparative CEE perspective with special emphasis on structural change, December 2010

EIIW Economic Policy Analysis:

No. 1 **Welfens, P.J.J.:** Globalisierung der Wirtschaft und Krise des Sozialstaats: Ist die Wirtschaftswissenschaft am Ende?, April 1997

No. 2 **Welfens, P.J.J.:** Nach der D-Mark kommt die E-Mark: Auf dem Weg zur EU-Währungsunion, Juli 1997

No. 3 **Welfens, P.J.J.:** Beschäftigungsförderliche Steuerreform in Deutschland zum Euro-Start: Für eine wachstumsorientierte Doppelsteuerreform, Oktober 1998

Fordern Sie den EIIW Newsletter an: www.eiiw.eu

Please subscribe to EIIW Newsletter: www.eiiw.eu

Weitere Beiträge von Interesse:
Titels of related interest:

Most recent books also see the last page.

WELFENS, P.J.J. (2011), Zukunftsfähige Wirtschaftspolitik für Deutschland und Europa, Heidelberg: Springer.

WELFENS, P.J.J.; EMONS, O.; SCHRÖDER, C. (2011), Europäische Innovations- und Spezialisierungsdynamik im Gesundheitssektor, Stuttgart: Lusius & Lucius.

ISLAMI, M. (2010), Interdependenz zwischen Devisen- und Aktienmärkten in ausgewählten EU-Ländern; Hamburg: Verlag Dr. Kovač.

VOGELSANG, M. (2010), Digitalization in Open Economies, Heidelberg: Springer.

WELFENS, P.J.J.; et al. (2009), A Europe of achievements in a Changing World, European Commission.

WELFENS, P.J.J.; BORBÉLY, D. (2009), Europäische Integration und Digitale Weltwirtschaft, Band 4: EU-Osterweiterung, IKT und Strukturwandel, Stuttgart: Lucius & Lucius.

KEIM, Martin (2009), Europäische Integration und Digitale Weltwirtschaft, Band 3: Finanzmarktintegration in Europa: Implikationen für Stabilität und Wachstum in sozialen Marktwirtschaften; Stuttgart: Lucius & Lucius.

BLEISCHWITZ, R.; WELFENS, P.J.J.; ZHANG, Z. (2009), Sustainable Growth and Resource Productivity, Sheffield: Greanleaf.

WELFENS, P.J.J.; ADDISON, J.T. (2009), Innovation, Employment and Growth Policy Issues in the EU and the US, Heidelberg: Springer.

WELFENS, P.J.J.; RYAN, C.; CHIRATHIVAT, S.; KNIPPING, F. (2009), EU-ASEAN, Facing Economic Globalisation, Heidelberg: Springer.

WELFENS, P.J.J. (2009), Transatlantische Bankenkrise, Stuttgart: Lucius & Lucius.

WELFENS, P.J.J.; WOLF, H.C.; WOLTERS, J. (eds., 2008), International Economics and Economic Policy, Heidelberg: Springer.

WELFENS, P.J.J.; WALTHER-KLAUS, E. (eds., 2008), Digital Excelence, University Meets Economy, Heidelberg: Springer.

WELFENS, P.J.J. (2008), Digital Integration, Growth and Rational Regulation, Heidelberg: Springer.

WELFENS, P.J.J. (2007), Innovation in Macroeconomics, Heidelberg: Springer

WELFENS, P.J.J.; WESKE, M. (eds., 2007), Digital Economic Dynamics, Innovations, Networks and Regulations, Heidelberg: Springer.

WELFENS, P.J.J., WESKE, M. (eds., 2006): Innovations, Digital Economic Dynamics and Regulatory Policy, Heidelberg: Springer.

WELFENS, P.J.J., KNIPPING, F., CHIRATHIVAT, S., RYAN, C. (eds., 2006): Integration in Asia and Europe: Historical Dynamics, Political Issues and Economic Perspectives, Heidelberg: Springer.

BROADMAN, H.G., PAAS, T., WELFENS, P.J.J. (eds., 2006): Economic Liberalization and Integration Policy Options for Eastern Europe and Russia, Heidelberg: Springer.

BORBÉLY, D. (2006): Trade Specialization in the Enlarged European Union, Heidelberg/Berlin: Springer.

JUNGMITTAG, A. (2006): Internationale Innovationsdynamik, Spezialisierung und Wirtschaftswachstum in der EU, Heidelberg: Physica.

WELFENS, P.J.J., WZIATEK-KUBIAK, (eds., 2005): Structural Change and Exchange Rate Dynamics – The Economics of EU Eastern Enlargement; Heidelberg: Springer.

WELFENS, P.J.J., ZOCHE, P., JUNGMITTAG, A. (et al. 2005): Internetwirtschaft 2010 (final Report for the German Federal Government; joint study EIIW and Fraunhofer Institute for System Dynamics and Innovation, Karlsruhe), Heidelberg: Physica.

GRAHAM, E., ODING, N., WELFENS, P.J.J., (2005): Internationalization and Economic Policy Reforms in Transition Countries, Heidelberg: Springer.

GAVRILENKOW, E., WELFENS, P.J.J., (2005): Infrastructure, Investments and Economic Integration: Perspectives for Eastern Europe and Russia, Moscow: HSE.

APOLTE, T.; CASPERS, R.; WELFENS, P.J.J. (2004), Ordnungsökonomische Grundlagen nationaler und internationaler Wirtschaftspolitik, Stuttgart: Lucius & Lucius.

GAVRILENKOV, E.; WELFENS, P.J.J.; WIEGERT, R. (2004), Economic Opening Up and Growth in Russia, Heidelberg and New York: Springer.