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Sándor Richter

Changes in the Structure of Intra-Visegrad Trade after the Visegrad Countries' Accession to the European Union

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Abstract

After the EU accession of the Visegrad countries (the Czech Republic, Hungary, Poland and Slovakia) in 2004 one of the most remarkable developments was a sudden upturn in mutual trade of this region's countries. In 2007 the value of aggregate intra-Visegrad trade was two and a half times higher than in 2003. The rate of growth in these countries' trade with the 'old' EU member states was only half as much as that. As part of a research project in search of explanation for the upturn of mutual trade, this paper addresses the questions how the structure of mutual trade of the Visegrad countries developed in the post-accession period compared to the immediate pre-accession period and the early years of transition and what directions of specialization are discernible. It is looking for explanatory factors for the differences in dynamism and commodity structure of mutual trade across periods and regions respectively, and investigates the role foreign-owned enterprises may have played in the upturn of mutual trade. The methodology applied includes traditional descriptive analysis based on SITC commodity groups; a comparison of pre-accession and post-accession developments in the composition of trade by factor inputs and skills respectively; an investigation focused on trade increments analysed by the marginal industry trade method (MIIT). Finally indicators of revealed comparative advantage (RCA) are calculated. The various trade structure indicators presented in the paper show that the EU accession has not brought about any abrupt changes in commodity patterns and revealed comparative advantages. In bilateral trade relations, apart from some exceptions, the changes observed were typically continuous and gradual, overarching the whole period 2000-2007. This is, however, no reason to claim that the EU accession played a minor role in the upturn of mutual trade in the region concerned – but the effect is not focused on the year of accession. With the date of accession approaching, the firms involved in intra-Visegrad trade may have gradually elaborated their new, geographically more diversified sales/procurement strategy. In the new strategic concepts of the main exporting firms (mostly multinationals) the Visegrad region itself is thought to have been upgraded both as a target for sales and as a host of potential cooperation partners for production.

Keywords: *intra-regional trade, Visegrad, CEFTA, trade patterns, intra-industry trade, revealed comparative advantage, marginal intra-industry trade*

JEL classification: *F13, F14, F15, F23.*

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Changes in the structure of intra-Visegrad trade after the Visegrad countries' accession to the European Union*

1. Introduction

Since their EU accession in 2004, the mutual trade of the Visegrad countries has been expanding much faster than these countries' trade with the 'old' EU members and also much more dynamically than before accession. After the collapse of this trade in the early 1990s, this is a surprising new development requiring explanation.

More than four decades of quasi-isolation from the mainstream world economy after the Second World War had serious detrimental consequences for the Visegrad countries' external economic relations. Artificial, non-market prices, rigidities due to the lack of convertible or at least transferable foreign exchange to settle intra-regional payments, and the overwhelming role of state institutions in virtually all aspects of trade in intra-Visegrad (and in Visegrad Group–Soviet) economic relations led to distorted specialization- and enterprise-behaviour patterns that could not be maintained once liberalization had opened up the Visegrad economies to western competition. [1]

In January 1991 hard currency payments, market prices and the usual standards of international commodity exchange replaced the peculiar former rules in trade among the CMEA[2] countries, providing the prelude to the formal dissolution of the organization in July of the same year. Intra-regional trade was based on MFNT basis in January 1991. The Visegrad summit meeting in February 1991, with the participation of Czechoslovakia, Hungary and Poland, proposed political, economic and cultural cooperation in the region, and the participating countries agreed on starting negotiations on establishing free trade. Nevertheless it was clear that the conclusion of the Europe Agreement was the absolute priority for the government in any of the three countries.[3]

Immediately after the political changes in 1989/90, political and economic motives mixed in the Visegrad countries' considerations on the future development of their external economic relations. One aspect was the intention to diminish the dependence on the Soviet

[1] For a collection of papers presented at a conference organized by IIASA on various aspects of the problems mentioned here see Gács, and Winckler, 1994.

[2] Council for Mutual Economic Cooperation, in the non-communist literature of that era more frequently called COMECON.

[3] Richter (1997), p. 2.

Union. The other main motive was to restore the traditional relations with the developed western world, above all with Western Europe. Much less attention was paid to the intra-Visegrad relations, which were regarded as part of the communist heritage and treated correspondingly in a lukewarm manner at best. After the conclusion of the Europe Agreements it took one year until the agreement on the establishment of the Central European Free Trade Agreement (CEFTA) was arrived at in December 1992.[4]

The fear of an institutionalization of regional cooperation is obvious from the fact that CEFTA had no organization, or headquarters, or any paid employees. The Czechoslovak refusal and the Polish and Hungarian hesitance to enter into deeper regional cooperation in 1990-91 cannot be understood without taking into consideration the suspicion in these countries that behind the western attempts to bring together the countries of the region was nothing else but a disguised intention to postpone or cancel their accession to the European Union. In the political rhetoric of those years it was not rare to hear arguments from the West that the Visegrad countries should first prove that they could cooperate with *each other* and only then seek closer relations with the EU or apply for membership. Although in principle this argument was not rejected, it had been clear for most experts who knew the problems of foreign trade in the countries concerned that a performance criterion for the success of regional cooperation measured in terms of high shares of intra-regional trade in total trade would be a mistake. The Visegrad countries were in the early stages of rearranging their external trade relations, and it was likely that this process would result in a temporary or even a longer-term decline in intra-regional trade. It was a well-grounded fear that the inability to boost intra-regional trade would be regarded as a proof of the Visegrad countries' inability to become part of a broader European integration framework.

On 21 December 1992, the Czech Republic, Hungary, Poland and Slovakia signed the CEFTA Document, an agreement on the gradual creation of a free trade area concerning trade in industrial goods, and a gradual reduction of certain, but not all, barriers to trade in agricultural goods. In the following years Slovenia, Romania and Bulgaria joined the agreement, and in 2003, immediately before the founder countries' accession to the EU, Croatia acceded as well.

Mutual trade of the Visegrad partners was not particularly significant in the last two decades of communism and it further declined when the transition began.[5] Concerning Visegrad trade shares in total trade, the lowest level reached by Poland was 4.8% for exports and 3.7% for imports in 1993; in the case of Hungary 4.0% for exports in 1992 and 5.2% for imports in 1993. For Czechoslovakia we cannot identify the turning point for trade as the separation of the Czech and the Slovak Republics in January 1993 makes a com-

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[4] For details see Richter and Tóth G. (1994)

[5] Source of the following statistical analysis is Richter (2001)

parison of the successor states' trade data with those of the former Czechoslovakia practically impossible (see Tables 1.1 to 1.5)

Table 1.1

Czechoslovakia:
Share of individual countries and groups of countries in total CSFR trade, in %

EXPORTS

	Total	Poland	Hungary	**Visegrad***	Soviet Union	EU (12)
1985	100	7.7	4.7	**12.4**	43.7	9.1
1989	100	8.5	4.0	**12.5**	30.5	18.2
1990	100	6.2	4.1	**10.3**	25.2	26.9
1991	100	7.3	4.3	**11.6**	19.6	40.7
1992	100	3.8	4.4	**8.2**	10.9 [1]	49.5

IMPORTS

	Total	Poland	Hungary	**Visegrad***	Soviet Union	EU (12)
1985	100	8.0	5.8	**13.8**	46.0	8.6
1989	100	8.6	4.8	**13.4**	29.7	17.8
1990	100	8.6	3.4	**12.0**	21.6	24.0
1991	100	4.7	1.9	**6.6**	29.9	34.6
1992	100	3.6	1.6	**5.2**	24.6 [1]	44.0

1) Former USSR.

* As the Czech Republic and Slovakia constituted one state in the years concerned yet, 'Visegrad' is equal here to Hungary plus Poland.

Source: 1985-1991: Jahrbuch des Außenhandels der Tschechoslowakei; 1992: Aktualni Statisticke Informace No. 10 (Foreign Trade).

Table 1.2

Czech Republic:
Share of individual countries and groups of countries in total Czech trade, in %

EXPORTS

	Total	Slovakia	Poland	Hungary	**Visegrad**	Russia	EU-15
1993	100	21.5	2.7	2.2	**26.4**	4.5	49.4
1994	100	16.4	3.9	2.7	**23.0**	3.9	54.1
1995[1]	100	13.9	4.5	1.7	**20.1**	2.9	60.9
1996[1]	100	14.3	5.5	1.8	**21.6**	3.2	58.2

IMPORTS

	Total	Slovakia	Poland	Hungary	**Visegrad**	Russia	EU-15
1993	100	17.5	2.5	1.4	**21.4**	9.8	52.3
1994	100	14.2	2.8	1.1	**18.1**	8.4	55.7
1995[1]	100	11.8	2.7	0.9	**15.4**	7.4	61.1
1996[1]	100	9.6	2.9	1.0	**13.5**	7.4	62.4

Figures converted according to 1996 methodology.

Source: Statistical Yearbook of the Czech Republic, several issues; Czech Statistical Office: External Trade 1-12/1996.

Table 1.3

Slovak Republic:
Share of individual countries and groups of countries in total Slovak trade, in %

EXPORTS

	Total	Czech Rep.	Poland	Hungary	**Visegrad**	Russia	EU-15
1993	100	42.4	2.9	4.5	**49.8**	4.7	29.5
1994	100	37.4	2.8	5.5	**45.7**	4.1	35.0
1995	100	35.2	4.4	4.6	**44.2**	3.9	37.4
1996	100	31.0	4.8	4.6	**40.4**	3.5	41.3

IMPORTS

	Total	Czech Rep.	Poland	Hungary	**Visegrad**	Russia	EU-15
1993	100	35.9	1.9	1.3	**39.1**	19.5	27.9
1994	100	29.6	2.4	1.7	**33.7**	18.0	33.4
1995	100	27.7	2.8	2.2	**32.7**	16.6	34.8
1996	100	24.5	2.5	2.0	**29**	17.7	36.9

Source: Statistical Yearbook of the Slovak Republic, several issues; Statistical Office of the Slovak Republic, Foreign Trade of the Slovak Republic 1-12/1996.

Table 1.4

Hungary:
Share of individual countries and groups of countries in Hungary's total trade, in %

EXPORTS

	Total	CSFR	Czech Republic	Slovak Republic	Poland	**Visegrad**	Russia [1]	EU-15
1985	100	5.7	.	.	3.8	**9.5**	33.6	22.6
1989	100	5.1	.	.	3.2	**8.3**	25.1	33.6
1990	100	4.1	.	.	1.7	**5.8**	20.2	42.1
1991	100	2.1	.	.	2.1	**4.2**	13.4	58.6
1992	100	2.7	.	.	1.3	**4.0**	13.1	62.3
1993	100	3.3	1.9	1.4	1.8	**5.1**	10.7	58.1
1994	100	.	1.8	1.3	2.1	**5.2**	7.5	63.7
1995	100	.	1.6	1.7	2.6	**5.9**	6.4	62.7
1996	100	.	2.2	1.9	3.0	**7.1**	5.9	62.7

IMPORTS

	Total	CSFR	Czech Republic	Slovak Republic	Poland	**Visegrad**	Russia [1]	EU-15
1985	100	5.0	.	.	4.7	**9.7**	30.0	29.9
1989	100	5.2	.	.	3.3	**8.5**	22.1	39.7
1990	100	4.7	.	.	2.4	**7.1**	19.1	43.1
1991	100	4.1	.	.	1.9	**6.0**	15.3	56.7
1992	100	4.3	.	.	1.6	**5.9**	16.9	60.0
1993	100	4.0	2.1	1.9	1.2	**5.2**	19.5	54.4
1994	100	.	2.4	2.4	1.3	**6.1**	12.0	61.1
1995	100	.	2.4	2.4	1.6	**6.4**	11.8	61.5
1996	100	.	3.0	2.4	1.8	**7.2**	12.5	59.8

1) 1985-1992 USSR.

Source: Külkereskedelmi Statisztikai Evkönyv, several issues; Statisztikai Havi Közlemenyek 1/1997.

Table 1.5

Poland:

Share of individual countries and groups of countries in Poland's total trade, in %

EXPORTS

	Total	CSFR	Czech Republic	Slovak Republic	Hungary	**Visegrad**	Russia [1]	EU-15
1985	100	6.2	.	.	3.2	**9.4**	28.4	29.0
1989	100	5.5	.	.	1.6	**7.1**	20.8	39.6
1990	100	3.9	.	.	0.9	**4.8**	14.5	52.7
1991	100	4.6	.	.	0.7	**5.3**	11.0	64.2
1992	100	3.8	.	.	1.3	**5.1**	5.5	65.7
1993	100	.	2.4	1.2	1.2	**4.8**	4.6	69.2
1994	100	.	2.7	1.1	1.1	**4.9**	5.4	69.2
1995	100	.	3.1	1.2	1.2	**4.5**	5.6	70.0

IMPORTS

	Total	CSFR	Czech Republic	Slovak Republic	Hungary	**Visegrad**	Russia [1]	EU-15
1985	100	6.0	.	.	3.0	**9.0**	34.4	25.3
1989	100	5.7	.	.	1.6	**7.3**	18.1	42.2
1990	100	3.1	.	.	0.8	**3.9**	17.0	51.1
1991	100	3.3	.	.	0.9	**4.2**	14.1	59.0
1992	100	3.2	.	.	0.9	**4.1**	8.5	62.0
1993	100	.	1.9	0.9	0.9	**3.7**	6.8	64.7
1994	100	.	2.3	0.9	1.0	**4.2**	6.8	65.3
1995	100	.	3.1	1.3	1.2	**5.5**	6.7	64.6

1) 1985-1991 former USSR.

Sources: 1985-1990: Rocznik statystyczny handlu zagranicznego; 1991-1994: Rocznik statystyczny; 1995: Central Statistical Office, Handel zagraniczny 1-12/1995.

1.1 Dramatic rearrangement in intra-Visegrad trade in the wake of transition to a market economy

The comparison of pre- and post-1990 structures in mutual trade of the Czech Republic, Hungary, Poland and Slovakia shows the immediate impact of the transition to a market economy generally, and that of the collapse of the CMEA trade system followed by the rapid geographical reorientation in particular. In 1989 still more than half of intra-Visegrad trade fell on machinery and transport equipment (SITC 7), reflecting the most important characteristic of the mutual trade of pre-transition Visegrad countries under the protective shield of the peculiar CMEA trading system. Except for semi-finished products (SITC 6, with a 16% share) no other commodity group had a strong position. This set-up had profoundly changed by 1995. The share of machinery and transport equipment lost close to 40 percentage points. In the emerging post-transition intra-Visegrad trade structure, inputs to production have gained in importance: semi-finished products (SITC 6), chemicals (SITC 5) and energy sources (SITC 3). There was a characteristic change between 1995

and 1998: the share of machinery and transport equipment (SITC 7) regained some of its earlier share, but was still far from the very high pre-transition levels.

In exports of the Czech Republic, Hungary, Poland and Slovakia to the European Union, the transition to a market economy also brought about significant rearrangements. It is interesting to note that remarkable gains in shares had been recorded especially in those two commodity groups (SITC 7 and 8, machinery and transport equipment; consumer goods) where the loss was so strong in intra-Visegrad trade. In 1989 the share of machinery in Visegrad exports to the EU was 14%, corresponding to the level where it 'landed' in intra-Visegrad trade after the dramatic decline between 1989 and 1995. Parallel to this, in exports to the EU this commodity group's share rose to 25% in 1995 and to 43% by 1998, attaining a level which was already not so far from the share it had recorded in intra-Visegrad trade in the last pre-transition year.

1.2 The upturn after EU accession

After the EU accession of the Visegrad countries in 2004, one of the most remarkable developments was the sudden upturn in mutual trade. In 2007 the value of aggregate intra-Visegrad trade was two and a half times higher than in 2003. The rate of growth in these countries' trade with the 'old' EU member states was only half as much as that.[6] As data of Tables 1.6 to 1.9 illustrate, in the post-accession years each of the Visegrad countries had higher (in most cases substantially higher) export growth rates in trade with individual members of the group than in trade with the EU-15.[7] Also, individual Visegrad countries had higher export growth rates to other Visegrad members in the post-accession period than in the years before EU accession.[8]

These developments are reflected in the changes concerning the geographical distribution of trade (see Tables 1.10 and 1.11). While the relative significance of trade with other Visegrad countries increased substantially both in the immediate pre-accession years (2000-2003) and the immediate post-accession years, the shifts were stronger in favour of intra-Visegrad trade in the years after accession in the case of all four countries both in exports and imports. The post-accession increment relative to the pre-accession increment in intra-Visegrad trade was especially remarkable in the case of Hungarian and Slovak exports and Czech imports. In 2007 the Visegrad Group's share in Hungarian exports and imports was already substantially higher than in 1985, then still under the extreme protectionist umbrella of the CMEA. The same is the case for Polish intra-Visegrad exports (Poland's intra-Visegrad share in imports in 2007 still lagged somewhat behind the 1985

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[6]   Own calculations based on Eurostat data (COMEXT).

[7]   The only exception is Slovak exports to the Czech Republic (1 in 12 observations).

[8]   12 in 12 observations.

share). Similar comparisons cannot be made in the case of the Czech Republic and Slovakia, as these two countries constituted still one state back in 1985 and their trade was internal and not foreign trade. However, the recent changes are highly interesting: The share of intra-Visegrad exports in total Slovak exports decreased substantially in the years before the EU accession only to undergo a strong revival after the accession. In imports intra-Visegrad purchases made up one fifth of the total Slovak imports in 2000; three years after the country's EU accession this share was close to one third. In 2009 the value of Slovak imports from the Visegrad Group amounted to as much as three quarters of the imports from the EU-15. Though less spectacularly, the relatively high share of the Czech Republic's trade with the Visegrad Group in its total trade reflect the survival of the Czech–Slovak special relations nearly two decades after the peaceful separation of the two states.

This clear increase in the relative significance of the intra-Visegrad trade for each member of the group must appear as a loss of relative significance for other trading partners. The figures in Table 1.11 testify that it was the EU-15 which lost importance. In the case of exports the shrinkage of this group's share accelerated substantially after the EU accession of the Visegrad countries, except for Slovakia. The same shrinkage in significance of the EU-15 took place in imports, too, but here the shrinkage was somewhat slower after the EU accession in the case of two countries, the Czech Republic and Hungary.

That means that the EU accession gave an important impetus to mutual trade of the countries concerned. This sudden acceleration of trade expansion cannot be explained by a removal of trade barriers upon accession. Free trade for industrial commodities had been long in place. Most of the restrictions on agricultural and food industry products had also been already removed by 1 May 2004, and this applies to trade with the EU-15 and intra-regional trade as well.[9]

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[9] Nevertheless, according to Hornok (2010) the elimination of non-traditional trade barriers following EU accession may have been a significant contribution to the upturn in trade flows. The author mentions the following non-traditional trade barriers: eliminated border waiting time and customs procedures; elimination of technical barriers through completion of harmonization; lower legal and information costs for exporters; and reduced political risk.

Table 1.6

Czech Republic: Exports to Visegrad and the EU-15, 1999-2007

Years	Hungary		Poland		Slovakia		EU-15	
	EUR million	Growth rate, %	EUR million	Growth rate, %	EUR million	Growth rate, %	EUR million	Growth rate, %
1999	440.4		1,374.6		2,038.4		17,289.7	
2000	591.2	34.2	1,710.7	24.5	2,420.5	18.7	21,592.7	24.9
2001	704.5	19.2	1,931.6	12.9	2,995.5	23.8	25,682.5	18.9
2002	1,012.9	43.8	1,924.2	-0.4	3,141.6	4.9	27,840.8	8.4
2003	981.6	-3.1	2,061.8	7.2	3,425.7	9.0	30,070.7	8.0
2004	1,450.8	47.8	2,852.7	38.4	4,589.2	34.0	38,087.7	26.7
2005	1,709.9	17.9	3,437.5	20.5	5,417.2	18.0	41,416.1	8.7
2006	2,266.7	32.6	4,297.4	25.0	6,372.0	17.6	49,610.2	19.8
2007	2,783.5	22.8	5,362.8	24.8	7,838.9	23.0	57,182.6	15.3
Annual average growth rate								
1999-2003		**22.2**		**10.7**		**13.9**		**14.8**
2004-2007		**24.3**		**23.4**		**19.5**		**14.5**

Source: Eurostat database (COMEXT), own calculations.

Table 1.7

Hungary: Exports to Visegrad and the EU-15, 1999-2007

Years	Czech Republic		Poland		Slovakia		EU-15	
	EUR million	Growth rate, %	EUR million	Growth rate, %	EUR million	Growth rate, %	EUR million	Growth rate, %
1999	346.2		487.2		261.3		17,902.2	
2000	508.6	46.9	655.4	34.5	314.1	20.2	22,928.8	28.1
2001	616.2	21.2	678.6	3.5	459.3	46.2	25,225.8	10.0
2002	689.4	11.9	772.3	13.8	526.2	14.6	27,425.0	8.7
2003	782.7	13.5	866.4	12.2	747.9	42.1	28,062.8	2.3
2004	1,060.9	35.5	1,279.2	47.6	861.0	15.1	31,575.0	12.5
2005	1,543.3	45.5	1,638.5	28.1	,450.9	68.5	33,149.4	5.0
2006	2,033.1	31.7	2,420.4	47.7	2,320.2	59.9	36,756.1	10.9
2007	2,600.7	27.9	2,862.3	18.3	3,195.7	37.7	40,677.0	10.7
Annual average growth rate								
1999-2003		**22.6**		**15.5**		**30.1**		**11.9**
2004-2007		**34.8**		**30.8**		**54.8**		**8.8**

Source: Eurostat database (COMEXT), own calculations.

Table 1.8

Poland: Exports to Visegrad and the EU-15, 1999-2007

Years	Czech Republic		Hungary		Slovakia		EU-15	
	EUR million	Growth rate, %	EUR million	Growth rate, %	EUR million	Growth rate, %	EUR million	Growth rate, %
1999	974.0		504.9		334.5		18,089.9	
2000	1,303.8	33.9	706.9	40.0	477.0	42.6	24,018.2	32.8
2001	1,595.4	22.4	841.6	19.1	576.1	20.8	27,823.7	15.8
2002	1,736.8	8.9	982.5	16.7	606.0	5.2	29,915.3	7.5
2003	1,923.4	10.7	1,145.5	16.6	772.4	27.5	32,710.1	9.3
2004	2,609.0	35.6	1,549.3	35.2	1,077.5	39.5	40,602.0	24.1
2005	3,287.5	26.0	2,048.2	32.2	1,376.6	27.8	46,721.9	15.1
2006	4,888.4	48.7	2,681.9	30.9	1,845.4	34.1	56,165.5	20.2
2007	5,533.7	13.2	2,914.1	8.7	2,157.3	16.9	63,722.8	13.5
Annual average growth rate								
1999-2003		18.5		22.7		23.3		16.0
2004-2007		28.5		23.4		26.0		16.2

Source: Eurostat database (COMEXT), own calculations.

Table 1.9

Slovakia: Exports to Visegrad and the EU-15, 1999-2007

Years	Czech Republic		Hungary		Poland		EU-15	
	EUR million	Growth rate, %	EUR million	Growth rate, %	EUR million	Growth rate, %	EUR million	Growth rate, %
1999	1,716.8		429.7		513.3		5,698.5	
2000	2,209.4	28.7	625.5	45.6	751.6	46.4	7,589.3	33.2
2001	2,323.5	5.2	757.3	21.1	820.2	9.1	8,444.3	11.3
2002	2,301.6	-0.9	832.0	9.9	813.2	-0.9	9,245.9	9.5
2003	2,472.4	7.4	941.5	13.2	924.0	13.6	11,734.3	26.9
2004	2,916.7	18.0	1,134.0	20.4	1,207.3	30.7	13,337.6	13.7
2005	3,635.3	24.6	1,459.0	28.7	1,625.5	34.6	14,847.7	11.3
2006	4,578.7	26.0	2,034.7	39.5	2,075.1	27.7	19,154.7	29.0
2007	5,351.4	16.9	2,526.6	24.2	2,647.3	27.6	24,679.4	28.8
Annual average growth rate								
1999-2003		9.5		21.7		15.8		19.8
2004-2007		22.4		30.6		29.9		22.8

Source: Eurostat database (COMEXT), own calculations.

Table 1.10

Geographical distribution of the Visegrad countries' trade in selected years

in %

Reporting country	Exports					Imports				
	2000	2003	2004	2007	2009	2000	2003	2004	2007	2009
Czech Republic										
Hungary	1.9	2.3	2.6	3.1	2.5	1.6	2.0	2.1	3.0	2.4
Poland	5.4	4.8	5.1	5.9	5.8	3.6	4.1	4.8	6.3	7.0
Slovakia	7.7	8.0	8.3	8.7	9.0	6.1	5.2	5.5	6.3	6.6
Visegrad	*15.0*	*15.0*	*16.0*	*17.7*	*17.3*	*11.4*	*11.3*	*12.4*	*15.6*	*15.9*
EU-15	68.5	69.8	68.7	64.4	64.2	62.8	58.9	66.6	63.1	59.7
Rest of the world	16.5	15.1	15.3	17.9	18.5	25.9	29.8	21.0	21.4	24.4
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Hungary										
Czech Republic	1.7	2.1	2.4	3.8	3.2	2.0	2.4	2.8	3.5	3.6
Poland	2.1	2.3	2.9	4.2	3.8	2.0	2.8	3.2	3.9	4.1
Slovakia	1.0	2.0	1.9	4.2	5.0	1.8	1.9	2.0	3.0	4.1
Visegrad	*4.8*	*6.3*	*7.2*	*12.1*	*11.9*	*5.8*	*7.1*	*8.1*	*10.5*	*11.8*
EU-15	75.1	73.7	70.7	59.6	59.1	58.4	55.0	57.8	55.6	53.3
Rest of the world	20.0	20.0	22.2	28.3	29.0	35.7	37.9	34.1	34.0	34.8
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Poland										
Czech Republic	3.8	4.0	4.3	5.5	5.8	3.2	3.4	3.8	3.9	4.0
Hungary	2.1	2.4	2.6	2.9	2.7	1.6	1.8	2.0	2.2	1.9
Slovakia	1.4	1.6	1.8	2.2	2.3	1.5	1.5	1.6	1.9	2.4
Visegrad	*7.2*	*8.1*	*8.7*	*10.6*	*10.8*	*6.3*	*6.8*	*7.4*	*8.0*	*8.3*
EU-15	69.9	68.8	67.3	62.9	64.0	61.1	61.1	65.6	63.3	61.8
Rest of the world	22.9	23.1	24.0	26.5	25.2	32.6	32.1	27.0	28.7	29.9
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Slovakia										
Czech Republic	17.2	12.8	13.4	12.6	12.9	14.9	14.4	18.4	17.3	18.8
Hungary	4.9	4.9	5.2	6.0	6.4	2.1	3.4	3.8	6.7	7.1
Poland	5.9	4.8	5.5	6.2	7.2	3.1	3.5	4.3	4.9	4.9
Visegrad	*28.0*	*22.5*	*24.1*	*24.8*	*26.6*	*20.1*	*21.4*	*26.5*	*29.0*	*30.8*
EU-15	59.2	60.8	59.6	58.3	55.8	49.1	51.5	50.8	43.9	41.9
Rest of the world	12.8	16.7	16.3	17.0	17.6	30.8	27.1	22.6	27.1	27.3
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: Own calculations based on COMEXT trade.

Table 1.11

Changes in the geographical distribution of the Visegrad countries' trade in selected years

in percentage points

Reporting country	Change in exports shares		Change in imports shares		Post-accession change relative to pre-accession change	
	Pre-accession 2000/2003 (a)	Post-accession 2004/2007 (b)	Pre-accession 2000/2003 (c)	Post-accession 2004/2007 (d)	Exports (b)-(a)	Imports (d)-(c)
Czech Republic						
Hungary	0.4	0.5	0.4	0.9	0.1	0.5
Poland	-0.6	0.8	0.5	1.4	1.4	0.9
Slovakia	0.3	0.4	-1.0	0.8	0.1	1.8
Visegrad	*0.0*	*1.7*	*0.0*	*3.1*	*1.6*	*3.2*
EU-15	1.3	-4.3	-3.9	-3.5	-5.6	0.3
Rest of the world	-1.3	2.6	3.9	0.4	3.9	-3.5
Hungary						
Czech Republic	0.4	1.4	0.4	0.7	1.0	0.3
Poland	0.1	1.3	0.7	0.7	1.2	0.0
Slovakia	0.9	2.2	0.2	1.0	1.3	0.9
Visegrad	*1.4*	*5.0*	*1.3*	*2.4*	*3.5*	*1.1*
EU-15	-1.5	-11.1	-3.4	-2.2	-9.6	1.1
Rest of the world	0.0	6.1	2.1	-0.2	6.1	-2.3
Poland						
Czech Republic	0.3	1.2	0.2	0.1	1.0	-0.2
Hungary	0.4	0.3	0.2	0.2	0.0	0.0
Slovakia	0.2	0.4	0.1	0.3	0.2	0.3
Visegrad	*0.8*	*1.9*	*0.5*	*0.6*	*1.1*	*0.1*
EU-15	-1.0	-4.4	0.0	-2.3	-3.4	-2.3
Rest of the world	0.2	2.5	-0.5	1.7	2.3	2.2
Slovakia						
Czech Republic	-4.4	-0.9	-0.5	-1.1	3.6	-0.6
Hungary	0.0	0.8	1.3	2.9	0.8	1.6
Poland	-1.1	0.8	0.5	0.7	1.8	0.2
Visegrad	*-5.5*	*0.7*	*1.3*	*2.4*	*6.2*	*1.1*
EU-15	1.5	-1.4	2.4	-6.9	-2.9	-9.3
Rest of the world	4.0	0.7	-3.6	4.5	-3.3	8.1

Source: Own calculations based on Table 1.10.

2. Defining the research task

2.1 Intra-Visegrad trade relations and trade theory

The Visegrad countries are at a relatively similar level of development. Compensations for employees per month are similar in the region: EUR 1005 (Hungary), EUR 1134 (Slovakia), EUR 883 (Poland) and EUR 1283 (the Czech Republic), all 2010 data. For compari-

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son, the respective figure is EUR 3217 in the EU-15, on average.[10] These economies do not differ considerably either in their resources, technology or output structure. This implies that the Heckscher-Ohlin theory will probably not convey sufficient explanation for the rapid expansion of mutual trade among the Visegrad countries. More support is expected from other explanations of international trade, namely, from economies of scale and intra-industry trade.[11] After decade-long isolation the Visegrad countries became an important target of foreign investors; 50% to 80% of their exports are accomplished by multinational firms.[12] A considerable though not quantifiable part of these exports is intra-firm trade. Theories of economies of scale and intra-industry trade, respectively, may deliver insights concerning the reasons for the increased trade flows in the region concerned.

Support for understanding the current weight of intra-Visegrad trade and predicting its growth potential is provided by gravity models.[13] Gravity models calculated for the CMEA bloc as a whole in the early 1990s predicted the collapse of mutual trade from the artificially high levels that had emerged under the protectionist 'umbrella' of the CMEA and the revival of trade relations with Western Europe.[14] Another section of this research project, conducted by Neil Foster, was devoted to the evaluation of gravity determinants in intra-Visegrad trade after these countries' accession to the EU.[15]

2.2 Working hypothesis

The massive involvement of foreign-owned enterprises in manufacturing and export trade has decisively changed the specialization patterns in mutual trade of the Visegrad countries and this shift coincided with the EU accession of these countries. The dynamism observed in the recent development of mutual trade is supposed to be explained by the emerging specialization patterns which, in turn, are shaped by the rearranged division of labour within foreign-owned enterprises with location sites in more than one Visegrad countries.

2.3 Research questions

- How did trade *volumes* in mutual trade of the Central and East European countries develop in the first four years of their EU membership (2004-2007) compared to the last

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[10] Gross wages plus indirect labour costs, according to national account concept; wiiw database.

[11] Krugman and Obstfeld (1994), pp. 113-138.

[12] Estimation by Gábor Hunya, wiiw.

[13] Linder (1961) and Linemann (1966).

[14] Havrylyshyn and Pritchett (1991); Baldwin (1994).

[15] Foster (2011) and, in a summarized version, also Chapter 3 in Foster, Hunya, Pindyuk and Richter (2011).

few years before accession (1999-2003)? What is the relation of the expansion of mutual trade to trade with the 'old' EU members?

- How did the *structure* of mutual trade develop in the post-accession period compared to the immediate pre-accession period and the early years of transition? What directions of specialization are discernible?

- What are the *explanatory factors* for the differences in dynamism and commodity structure of mutual trade across periods and regions, respectively?

- What role did *foreign-owned enterprises* play in the upturn of mutual trade?

2.4 Methodology applied

- The first approach was based on a traditional descriptive analysis based on SITC commodity groups.

- That was followed by a comparison of pre-accession and post-accession developments in the composition of trade by factor inputs and skills, respectively.

- Next the investigation was focused on trade increments, analysed by the marginal industry trade method (MIIT).

- Finally indicators of revealed comparative advantage (RCA) were calculated.

The methodology applied will be discussed in detail in the respective chapters.

3. Basic features of intra-Visegrad trade before and after the EU accession of the countries concerned[16]

In Table 3.1 growth rates in the bilateral trade relations in the pre-accession period (between 1999 and 2003) and the post-accession period (between 2003 and 2007) are compared. Although trade expanded very rapidly in both periods, as the difference in growth rates in the last column of the table illustrates, even in the less spectacular case (Poland's exports to Hungary) the growth differential was over 32 percentage points. But in five of the 12 observations the differential was over 100 percentage points.

Table 3.2 shows that in intra-Visegrad trade the individual bilateral trade relations (altogether 6 cases) were of different weight. The most important was the Czech–Slovak relation, accounting for 40% of total Visegrad trade in 1999 and already less than one third in 2007, but representing still the most significant case. The EU accession made the distribution of individual bilateral relations more even. Nevertheless, the Czech–Polish relation remained the second most important in 2007 as well, together with the Czech–Slovak case delivering more than half of total intra-Visegrad trade in that year.

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[16] Chapter 3 was first published in Richter (2009).

Table 3.3 displays the weight of individual countries in intra-Visegrad trade. In total intra-Visegrad trade both before and after the EU accession, the Czech Republic had the highest share (over one third), although it had been shrinking to some extent. The Slovak share, amounting to more than a quarter of the total, had also been declining. Nevertheless these two countries provided 58% of total intra-Visegrad trade in 2007, while Hungary and Poland only 44%. Compared to its economic strength (GDP) the Slovak Republic is over-represented in intra-Visegrad trade, while Poland is under-represented. Comparing the Czech Republic and Hungary, it is obvious from the figures the intra-Visegrad trade is more important for the Czech Republic than for Hungary.

Figures 3.1 to 3.12 and Tables 3.4 to 3.7 clearly show the unambiguous correlation of the upturn in mutual trade with the date of accession.

Concerning the composition of trade in the case of Czech exports to the Visegrad countries, the role of machinery and transport equipment has been dominant over the whole period, followed by semi-finished manufactured products, the former slowly gaining ground over time. Machinery and transport equipment has clearly gained ground in exports to Hungary while in exports to Poland and Slovakia the commodity composition has remained more diverse.

In Hungarian exports to the Visegrad countries, the astonishing pace of expansion was accompanied by a huge shift towards machinery and transport equipment at the expense of all other commodity groups. This shift was the most spectacular in exports to the Czech Republic; deliveries to the other two countries remained slightly more diversified.

The composition of Poland's exports varies by trading partner. In deliveries to Hungary, machinery and transport equipment became dominant, just as in Polish imports from Hungary, but in exports to the Czech Republic and Slovakia other items such as semi-finished manufactured products, consumer durables and mineral fuels are as important as or more important than machinery and transport equipment; food and live animals are also gaining ground.

It is interesting to note that Slovakia, the heart of the new auto-motive cluster in Central Europe, has been unable as yet to join to the regional boom in trade of machinery and transport equipment. Here the group of semi-finished manufactured products is the most important item, followed by mineral fuels.

Trade between Hungary and the Czech Republic and between the Czech Republic and Slovakia are the two extreme cases in the group. The former is characterized by a strong specialization in one commodity group (machinery and transport equipment), the latter by the more diversified composition of trade in the Visegrad Group. These two bilateral trade

relations were compared in more detail. The comparison was made using SITC 3-digit level data (279 commodity groups) and relying on characteristics of the ten most important commodities by trading value.

In Hungary's exports to the Czech Republic the concentration was high and increasing after accession. In 1999 the ten most important items amounted to 43%, in 2007 already to 56% of total exports to the Czech Republic (see Table 3.8). In the same period, in Czech exports to Hungary the degree of concentration was rising as well, but from a lower level and to a smaller extent: from 39% to 45% (see Table 3.11). In Tables 3.9 and 3.12 the stability of the commodity composition is investigated. In Hungary's export there was a remarkable variability: of the ten most important items in 1999 only one was still present in the exports in 2007, the change was continuous. In Czech exports to Hungary stability is the characteristic feature: half of the ten most important items in 1999 remained in that group in 2007. Tables 3.10 and 3.13 display the process of growing specialization from another angle. In 1999 the ten most important commodities in mutual exports belonged to 5 (Hungary) and 4 (Czech Republic) individual SITC 1-digit commodity groups, respectively, but in 2007 only to 3, and of these one specific group (SITC 07, machinery and transport equipment) absorbed 8 (Hungary) and 7 (Czech Republic) of the ten most important export items.

In the Czech–Slovak trade relations the ten most important items provide a smaller share of total trade than in the Hungarian–Czech trade, and the concentration has not increased over the years (Tables 3.16 and 3.19). A further sign of the lower level of variability (see Tables 3.17 and 3.20) is that in Czech exports to Slovakia 7 commodities out of the ten most important items in 1999 were present in 2007 as well (in Slovak exports to the Czech Republic 6 items). Tables 3.18 and 3.21 illustrate another side of the much higher diversity in the Czech–Slovak trade than in the Hungarian–Czech one.

Finally, intra-industry trade was scrutinized for the year 2007 in the circle of the ten most important items (SITC 3-digit level). In the case of a perfectly inter-industry trade, the number of common commodity groups would have been 0, corresponding to bilateral deliveries in 20 different commodity groups, while in the case of a perfectly intra-industry trade there would have been deliveries in not more than 10 common commodity groups. In the Hungarian–Czech bilateral trade relation of the ten most important export items of both countries, altogether 16 different commodity groups were represented (of altogether 279 groups), that means that in four commodity groups both countries exported to the other one (Table 3.14). In Czech–Slovak bilateral trade, 6 commodity groups were present in both countries' exports to the other one (Table 3.22).

Focusing on intra-industry trade within the ten most important export items of both countries, Table 3.15 shows that in Hungarian exports to the Czech Republic common com-

modity groups made up 21% of the total, in Czech exports to Hungary 50%. The respective shares were higher in Czech–Slovak trade, 63% each (Table 3.22). In Czech–Hungarian bilateral relation the automotive cluster dominated in intra-industry trade; this cluster was of slightly less significance in Czech exports to Slovakia and of much less relevance in Slovak exports to the Czech Republic.

Table 3.1

Growth rates in intra-Visegrad-Group trade 1999-2007

Relation	Exports in EUR million			Rate of growth		Difference in growth rates (percentage points)
	1999	2003	2007	1999/2003	2003/2007	
CZ > HU	440	982	2,799	122.9	185.2	62.28
HU > CZ	346	783	2,625	126.1	235.4	109.36
Total	787	1,764	5,425	124.3	207.5	83.17
CZ > PL	1,375	2,062	5,299	50.0	157.0	107.02
PL > CZ	974	1,923	5,666	97.5	194.6	97.11
Total	2,349	3,985	10,965	69.7	175.1	105.46
CZ > SK	2,038	3,426	7,738	68.1	125.9	57.80
SK > CZ	1,717	2,473	5,337	44.1	115.8	71.76
Total	3,755	5,899	13,075	57.1	121.7	64.57
HU > PL	487	866	2,905	77.8	235.3	157.47
PL > HU	505	1,146	2,972	26.9	159.4	32.56
Total	992	2,012	5,877	102.8	192.1	89.31
HU > SK	261	748	2,907	186.2	288.7	102.48
SK > HU	430	941	2,529	119.1	168.6	49.51
Total	691	1,689	5,436	144.5	221.8	77.29
PL > SK	334	772	2,230	130.9	188.7	57.76
SK > PL	513	924	2,640	80.0	185.6	105.55
Total	848	1,697	4,870	100.1	187.0	86.88

Source: Eurostat database (COMEXT), own calculations.

Table 3.2

Share of individual bilateral relations in total Visegrad trade in selected years, in %

Relation	1999	in %	2003	in %	2007	in %
CZ-HU	787	8	1,764	10	5425	12
PL-CZ	2349	25	3,985	23	10965	24
CZ-SK	3755	40	5,899	35	13075	29
SK-HU	691	7	1,689	10	5436	12
SK-PL	848	9	1,697	10	4870	11
PL-HU	992	11	2,012	12	5877	13
Total	**9421**	**100**	**17,046**	**100**	**45647**	**100**

Source: Eurostat database (COMEXT), own calculations.

Table 3.3

Share of individual Visegrad countries' trade in total Visegrad trade in selected years, in %

Relation	1999	2003	2007
CZ -Visegrad	37	34	32
HU- Visegrad	13	16	18
PL - Visegrad	22	23	24
SK - Visegrad	28	27	26
Total	100	100	100

Source: Eurostat database (COMEXT), own calculations.

Table 3.4

Exports of the Czech Republic to other Visegrad countries by commodity groups in 1999-2007

(in EUR million)

to Hungary	1999	2000	2001	2002	2003	2004	2005	2006	2007
food and live animals	13	19	27	41	51	105	115	112	139
beverages and tobacco	2	3	2	4	4	11	12	16	18
crude materials, inedible, except fuels	17	25	21	16	18	17	15	16	21
mineral fuels, lubricants and related materials	52	63	86	69	57	100	113	164	77
animal and vegetable oils, fats and waxes	1	5	3	3	3	2	2	1	0
chemicals and related products, n.e.s.	69	85	97	105	104	146	144	228	326
manufactured goods classified chiefly by material	135	175	218	241	266	359	342	430	563
machinery and transport equipment	124	175	201	475	408	607	808	1,141	1,440
miscellaneous manufactured articles	28	41	50	58	70	98	126	151	206
comm. & trans. not class. elsewhere in the SITC	-	1	1	0	-	5	32	8	7
Total	440	591	704	1,013	982	1,451	1,710	2,267	2,799

to Poland	1999	2000	2001	2002	2003	2004	2005	2006	2007
food and live animals	73	173	150	143	160	161	201	250	299
beverages and tobacco	3	3	7	6	3	11	22	32	39
crude materials, inedible, except fuels	25	45	60	53	44	99	84	127	172
mineral fuels, lubricants and related materials	74	96	132	92	86	140	205	234	301
animal and vegetable oils, fats and waxes	7	4	3	3	2	4	8	5	4
chemicals and related products, n.e.s.	227	250	297	279	266	317	379	464	503
manufactured goods classified chiefly by material	441	528	635	621	628	828	1,014	1,212	1,508
machinery and transport equipment	412	475	509	595	755	1,084	1,203	1,561	1,903
miscellaneous manufactured articles	112	135	138	132	117	177	285	382	499
comm. & trans. not class. elsewhere in the SITC	2	1	-	0	0	31	37	29	71
Total	1,375	1,711	1,932	1,924	2,062	2,853	3,437	4,297	5,299

to Slovakia	1999	2000	2001	2002	2003	2004	2005	2006	2007
food and live animals	171	196	242	244	233	341	505	580	709
beverages and tobacco	80	77	90	108	105	103	161	124	198
crude materials, inedible, except fuels	55	58	63	77	81	100	111	142	177
mineral fuels, lubricants and related materials	110	140	182	220	283	406	508	580	768
animal and vegetable oils, fats and waxes	7	14	22	8	9	12	14	15	11
chemicals and related products, n.e.s.	280	328	359	351	355	463	548	654	728
manufactured goods classified chiefly by material	515	620	744	767	826	1,121	1,184	1,413	1,744
machinery and transport equipment	597	722	967	1,002	1,158	1,556	1,807	2,162	2,606
miscellaneous manufactured articles	219	260	325	360	374	465	560	687	785
comm. & trans. not class. elsewhere in the SITC	4	6	1	2	2	22	19	15	13
Total	2,038	2,420	2,995	3,142	3,426	4,589	5,417	6,372	7,738

Source: Eurostat database (COMEXT), own calculations.

Figure 3.1

Exports of the Czech Republic to Hungary, in EUR million

Source: Eurostat database (COMEXT), own calculations.

Figure 3.2

Exports of the Czech Republic to Poland, in EUR million
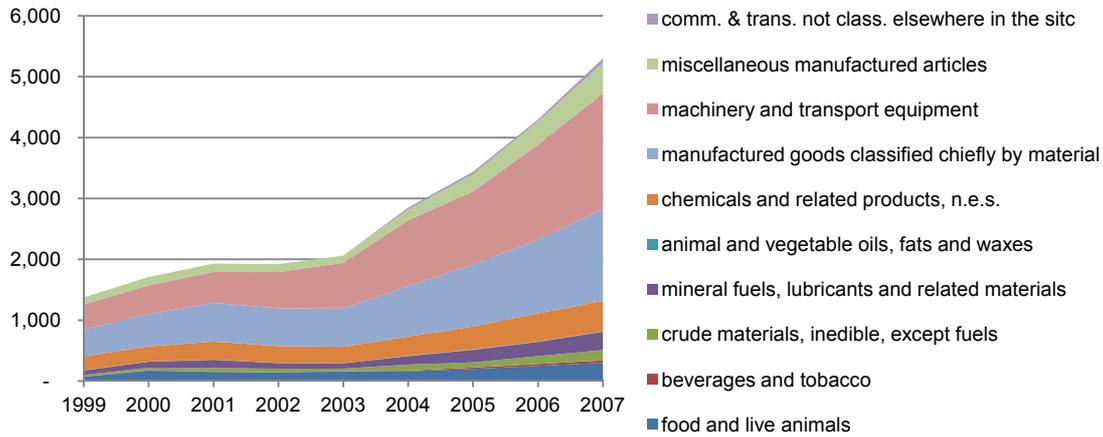
Source: Eurostat database (COMEXT), own calculations.

Figure 3.3

Exports of the Czech Republic to Slovakia, in EUR million
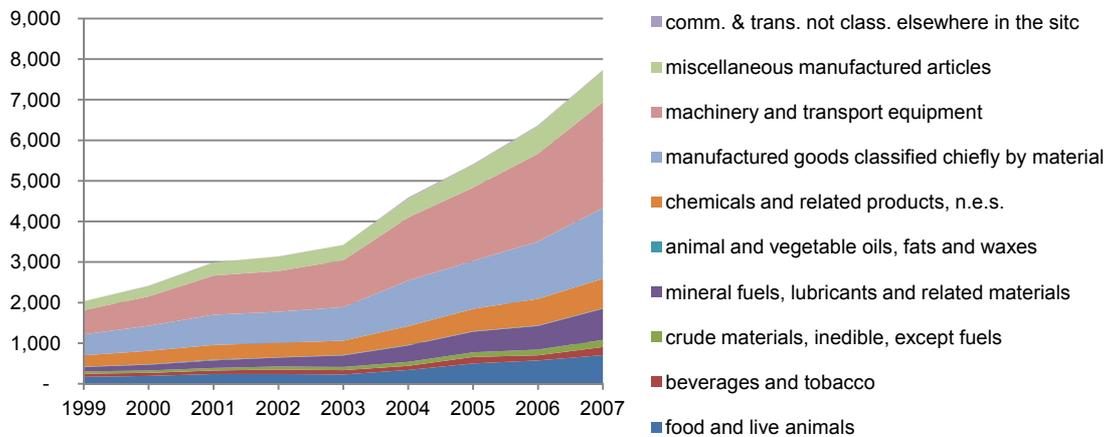
Source: Eurostat database (COMEXT), own calculations.

Table 3.5

Exports of Hungary to other Visegrad countries by commodity groups, 1999-2007

(EUR million)

to Czech Republic	1999	2000	2001	2002	2003	2004	2005	2006	2007
food and live animals	66	65	63	81	85	97	97	119	128
beverages and tobacco	7	10	8	7	8	10	15	19	27
crude materials, inedible, except fuels	6	12	12	14	10	13	13	17	20
mineral fuels, lubricants and related materials	1	45	28	4	4	8	10	9	16
animal and vegetable oils, fats and waxes	1	1	2	2	3	7	1	1	12
chemicals and related products, n.e.s.	58	77	91	100	94	141	148	193	268
manufactured goods classified chiefly by material	72	86	114	123	137	171	221	262	326
machinery and transport equipment	109	179	250	305	384	549	892	1,228	1,594
miscellaneous manufactured articles	28	33	45	49	54	65	63	129	166
comm. & trans. not class. elsewhere in the SITC	0	1	3	4	5	2	83	57	70
Total	346	509	616	689	783	1,061	1,543	2,033	2,625

to Poland	1999	2000	2001	2002	2003	2004	2005	2006	2007
food and live animals	93	102	86	97	85	108	101	128	201
beverages and tobacco	7	7	10	10	9	12	11	12	16
crude materials, inedible, except fuels	12	17	19	15	15	17	10	21	26
mineral fuels, lubricants and related materials	3	8	9	5	33	38	17	13	27
animal and vegetable oils, fats and waxes	5	9	3	2	1	4	3	1	5
chemicals and related products, n.e.s.	136	174	188	211	239	296	329	395	473
manufactured goods classified chiefly by material	96	104	120	145	152	180	221	342	441
machinery and transport equipment	93	181	181	225	281	561	740	1,310	1,450
miscellaneous manufactured articles	39	49	59	59	47	61	102	140	167
comm. & trans. not class. elsewhere in the SITC	4	4	5	3	3	3	105	60	100
Total	487	655	679	772	866	1,279	1,639	2,420	2,905

to Slovakia	1999	2000	2001	2002	2003	2004	2005	2006	2007
food and live animals	38	37	56	43	41	49	91	132	164
beverages and tobacco	3	3	3	4	5	6	10	14	23
crude materials, inedible, except fuels	7	12	16	24	26	40	47	33	48
mineral fuels, lubricants and related materials	21	18	33	46	34	84	155	114	277
animal and vegetable oils, fats and waxes	3	4	4	3	6	8	1	2	12
chemicals and related products, n.e.s.	42	62	68	83	76	111	164	250	303
manufactured goods classified chiefly by material	57	68	95	96	110	140	218	281	355
machinery and transport equipment	63	78	117	171	369	341	592	1,321	1,546
miscellaneous manufactured articles	25	32	62	52	79	80	100	95	118
comm. & trans. not class. elsewhere in the SITC	2	1	5	5	4	2	73	79	62
Total	259	313	454	521	744	859	1,378	2,242	2,845

Source: Eurostat database (COMEXT), own calculations.

Figure 3.4

Hungary's exports to the Czech Republic, in EUR million

- comm. & trans. not class. elsewhere in the sitc
- miscellaneous manufactured articles
- machinery and transport equipment
- manufactured goods classified chiefly by material
- chemicals and related products, n.e.s.
- animal and vegetable oils, fats and waxes
- mineral fuels, lubricants and related materials
- crude materials, inedible, except fuels
- beverages and tobacco
- food and live animals

Source: Eurostat database (COMEXT), own calculations.

Figure 3.5

Hungary's exports to Poland, in EUR million

- comm. & trans. not class. elsewhere in the sitc
- miscellaneous manufactured articles
- machinery and transport equipment
- manufactured goods classified chiefly by material
- chemicals and related products, n.e.s.
- animal and vegetable oils, fats and waxes
- mineral fuels, lubricants and related materials
- crude materials, inedible, except fuels
- beverages and tobacco
- food and live animals
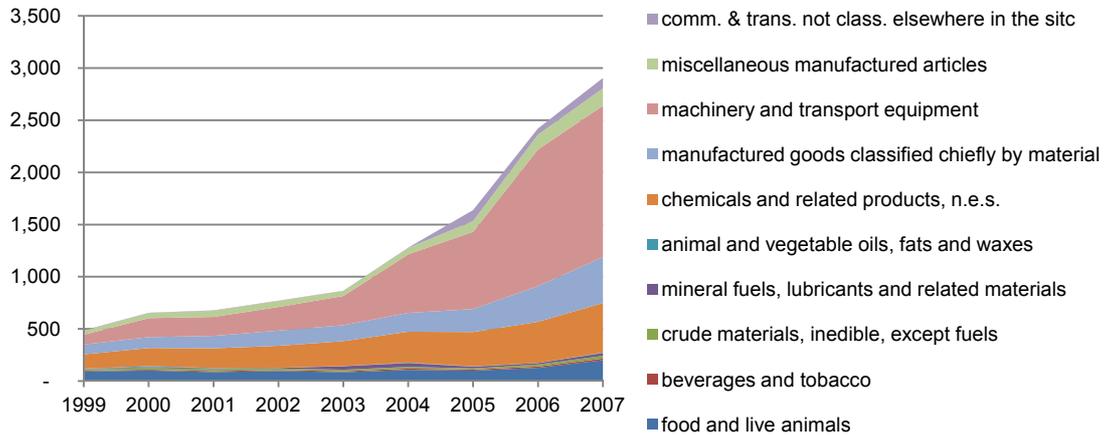
Source: Eurostat database (COMEXT), own calculations.

Figure 3.6

Hungary's exports to Slovakia, in EUR million

- comm. & trans. not class. elsewhere in the sitc
- miscellaneous manufactured articles
- machinery and transport equipment
- manufactured goods classified chiefly by material
- chemicals and related products, n.e.s.
- animal and vegetable oils, fats and waxes
- mineral fuels, lubricants and related materials
- crude materials, inedible, except fuels
- beverages and tobacco
- food and live animals
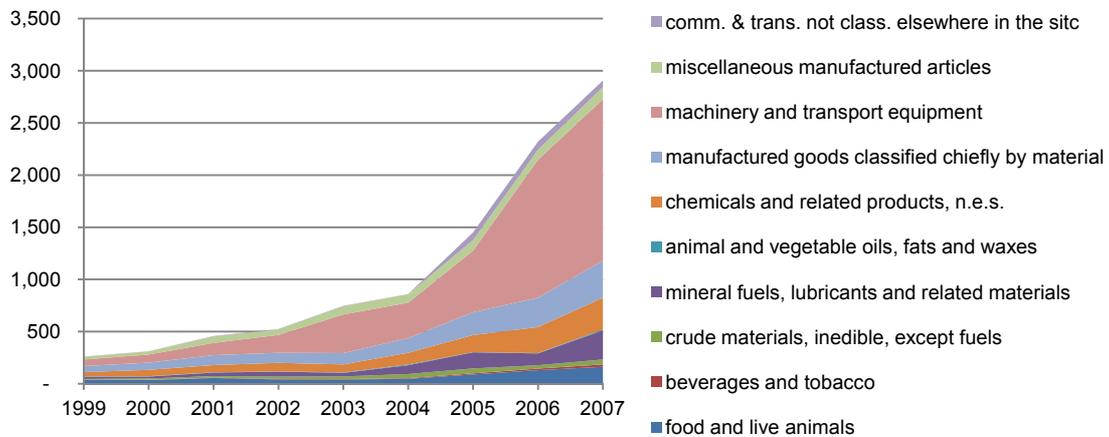
Source: Eurostat database (COMEXT), own calculations.

Table 3.6

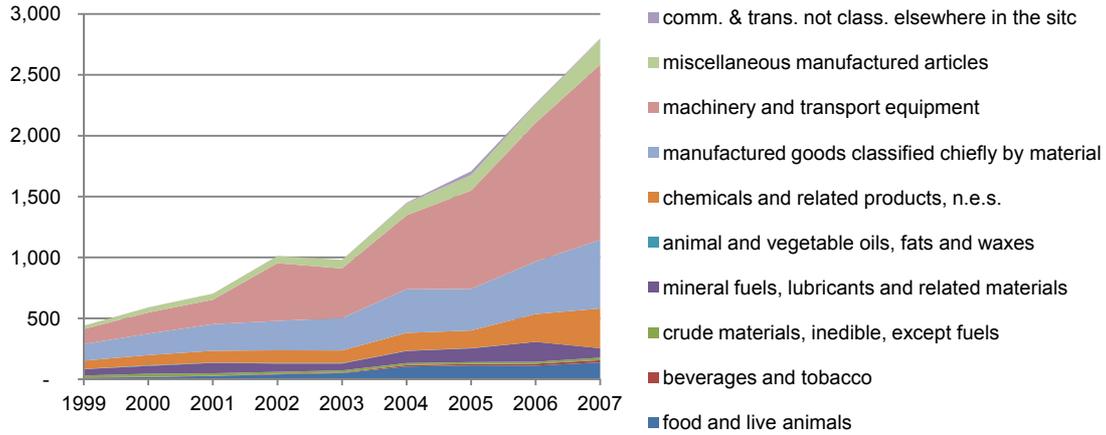## Exports of Poland to other Visegrad countries by commodity groups, 1999-2007

(EUR million)

to Czech Republic	1999	2000	2001	2002	2003	2004	2005	2006	2007
food and live animals	116	146	169	177	191	265	365	493	560
beverages and tobacco	1	2	5	10	8	12	19	60	71
crude materials, inedible, except fuels	33	40	48	54	77	105	85	117	133
mineral fuels, lubricants and related materials	100	152	224	251	332	493	461	775	741
animal and vegetable oils, fats and waxes	1	1	1	0	0	0	3	6	11
chemicals and related products, n.e.s.	106	149	175	179	184	250	342	424	499
manufactured goods classified chiefly by material	306	395	481	526	534	748	888	1,229	1,484
machinery and transport equipment	179	235	261	289	316	386	638	1,125	1,409
miscellaneous manufactured articles	132	183	231	251	283	352	486	660	758
comm. & trans. not class. elsewhere in the SITC	0	0	0	0	0	0	0	0	0
Total	974	1,304	1,595	1,737	1,923	2,609	3,287	4,888	5,666

to Hungary	1999	2000	2001	2002	2003	2004	2005	2006	2007
food and live animals	59	72	86	85	99	139	224	287	291
beverages and tobacco	0	0	3	6	5	29	71	83	87
crude materials, inedible, except fuels	6	6	5	5	6	7	10	11	13
mineral fuels, lubricants and related materials	32	26	25	30	41	52	74	66	55
animal and vegetable oils, fats and waxes	0	0	0	0	0	0	1	1	3
chemicals and related products, n.e.s.	60	74	91	115	124	160	187	223	235
manufactured goods classified chiefly by material	169	234	248	290	324	402	419	594	582
machinery and transport equipment	128	231	298	339	381	512	776	1,124	1,396
miscellaneous manufactured articles	51	64	86	112	167	248	286	294	310
comm. & trans. not class. elsewhere in the SITC	-	0	0	0	-	-	0	0	0
Total	505	707	842	982	1,146	1,549	2,048	2,682	2,972

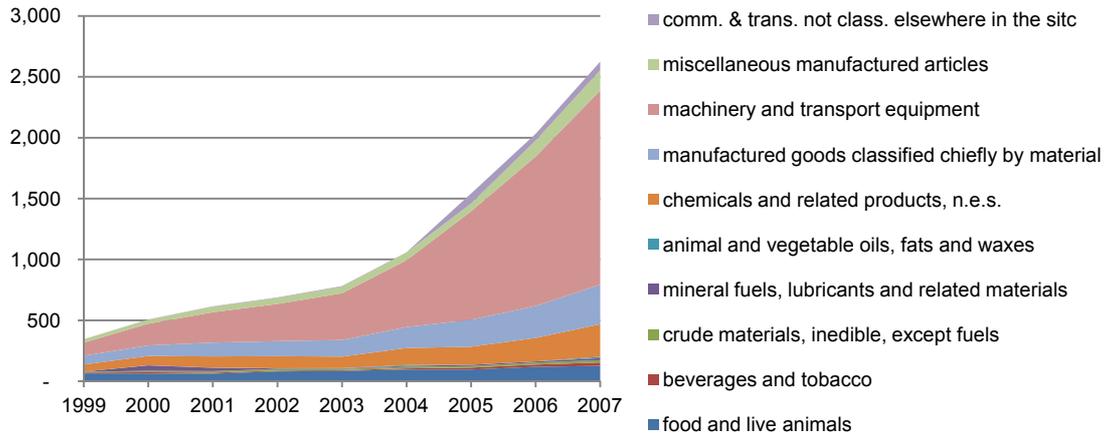| to Slovakia	1999	2000	2001	2002	2003	2004	2005	2006	2007
food and live animals	30	36	37	48	54	90	151	188	218
beverages and tobacco	0	0	0	0	0	5	15	20	26
crude materials, inedible, except fuels	7	11	19	32	32	36	37	54	71
mineral fuels, lubricants and related materials	90	108	127	107	129	270	276	341	293
animal and vegetable oils, fats and waxes	0	0	0	0	0	0	1	6	5
chemicals and related products, n.e.s.	37	69	64	69	80	100	134	184	210
manufactured goods classified chiefly by material	80	124	154	163	200	276	369	466	603
machinery and transport equipment	49	73	100	86	143	156	203	336	464
miscellaneous manufactured articles	42	55	74	102	134	143	191	251	339
comm. & trans. not class. elsewhere in the SITC	0	1	0	0	-	1	0	0	0
Total	334	477	576	606	772	1,077	1,377	1,845	2,230

Source: Eurostat database (COMEXT), own calculations.

Figure 3.7

Poland's exports to the Czech Republic, in EUR million

- comm. & trans. not class. elsewhere in the sitc
- miscellaneous manufactured articles
- machinery and transport equipment
- manufactured goods classified chiefly by material
- chemicals and related products, n.e.s.
- animal and vegetable oils, fats and waxes
- mineral fuels, lubricants and related materials
- crude materials, inedible, except fuels
- beverages and tobacco
- food and live animals

Source: Eurostat database (COMEXT), own calculations.

Figure 3.8

Poland's exports to Hungary, in EUR million

- comm. & trans. not class. elsewhere in the sitc
- miscellaneous manufactured articles
- machinery and transport equipment
- manufactured goods classified chiefly by material
- chemicals and related products, n.e.s.
- animal and vegetable oils, fats and waxes
- mineral fuels, lubricants and related materials
- crude materials, inedible, except fuels
- beverages and tobacco
- food and live animals
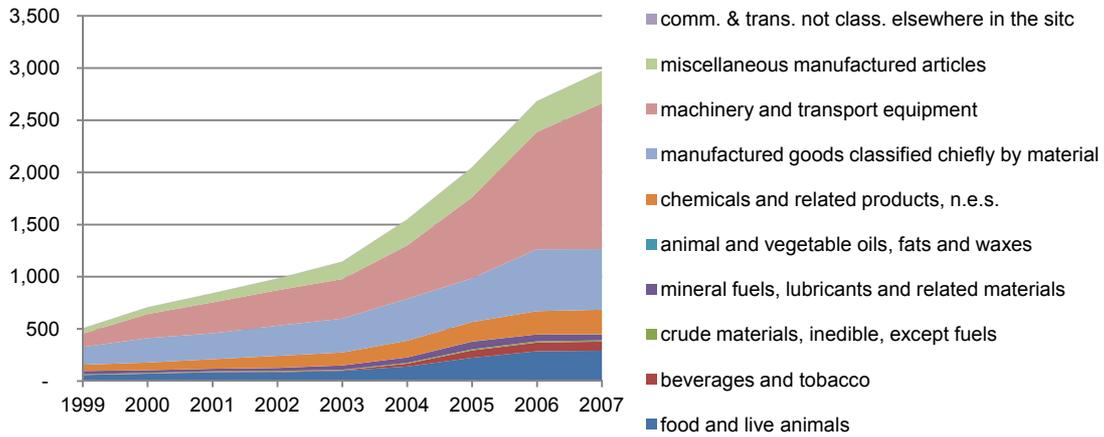
Source: Eurostat database (COMEXT), own calculations.

Figure 3.9

Poland's exports to Slovakia, in EUR million

- comm. & trans. not class. elsewhere in the sitc
- miscellaneous manufactured articles
- machinery and transport equipment
- manufactured goods classified chiefly by material
- chemicals and related products, n.e.s.
- animal and vegetable oils, fats and waxes
- mineral fuels, lubricants and related materials
- crude materials, inedible, except fuels
- beverages and tobacco
- food and live animals
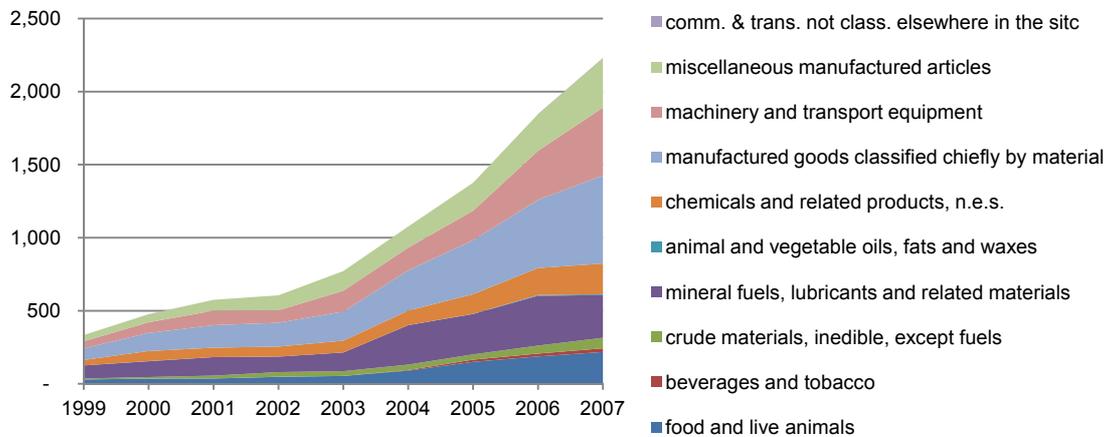
Source: Eurostat database (COMEXT), own calculations.

Table 3.7

Exports of Slovakia to other Visegrad countries by commodity groups, 1999-2007
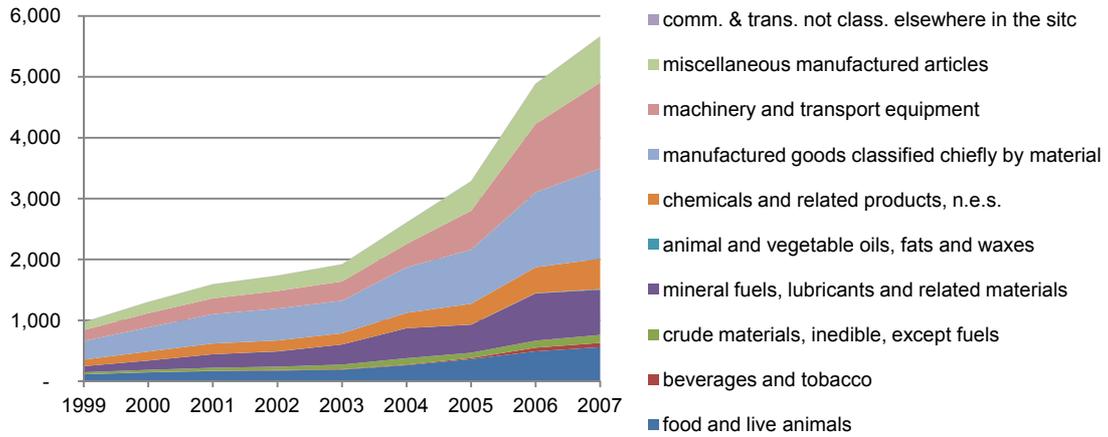
(EUR million)

to Czech Republic	1999	2000	2001	2002	2003	2004	2005	2006	2007
food and live animals	108	121	145	164	175	218	317	376	431
beverages and tobacco	38	34	36	36	50	33	28	33	41
crude materials, inedible, except fuels	65	79	86	86	89	137	149	178	188
mineral fuels, lubricants and related materials	223	393	403	352	439	504	547	627	711
animal and vegetable oils, fats and waxes	7	7	9	10	18	21	17	13	12
chemicals and related products, n.e.s.	251	300	294	277	272	295	364	420	453
manufactured goods classified chiefly by material	576	763	778	739	790	1,047	1,212	1,513	1,694
machinery and transport equipment	291	331	365	404	415	477	631	975	1,253
miscellaneous manufactured articles	130	156	188	206	225	246	301	377	476
comm. & trans. not class. elsewhere in the SITC	28	26	19	28	1	22	72	68	80
Total	1,717	2,209	2,323	2,302	2,473	3,000	3,639	4,579	5,337

to Hungary	1999	2000	2001	2002	2003	2004	2005	2006	2007
food and live animals	25	30	40	47	49	100	184	226	291
beverages and tobacco	1	1	1	4	3	7	3	4	6
crude materials, inedible, except fuels	38	46	53	57	50	56	81	96	120
mineral fuels, lubricants and related materials	65	131	135	172	144	242	160	234	263
animal and vegetable oils, fats and waxes	0	3	3	3	5	9	10	7	7
chemicals and related products, n.e.s.	41	51	63	62	67	81	110	122	160
manufactured goods classified chiefly by material	131	179	214	215	265	313	372	533	689
machinery and transport equipment	102	151	178	206	261	230	335	519	721
miscellaneous manufactured articles	22	27	63	57	97	113	121	172	224
comm. & trans. not class. elsewhere in the SITC	5	6	7	9	-	6	146	121	47
Total	430	626	757	832	941	1,158	1,523	2,035	2,529

to Poland	1999	2000	2001	2002	2003	2004	2005	2006	2007
food and live animals	39	47	60	57	64	57	89	162	131
beverages and tobacco	1	0	1	0	0	3	3	2	1
crude materials, inedible, except fuels	16	20	23	24	23	38	53	57	82
mineral fuels, lubricants and related materials	27	106	130	111	104	155	234	294	324
animal and vegetable oils, fats and waxes	0	0	0	0	1	3	1	2	4
chemicals and related products, n.e.s.	86	110	105	108	109	139	171	220	250
manufactured goods classified chiefly by material	233	314	325	326	406	539	655	807	912
machinery and transport equipment	88	125	132	134	166	224	307	435	762
miscellaneous manufactured articles	17	21	31	39	51	53	71	84	146
comm. & trans. not class. elsewhere in the SITC	7	8	11	14	-	8	26	11	28
Total	513	752	820	813	924	1,218	1,611	2,075	2,640

Source: Eurostat database (COMEXT), own calculations.

Figure 3.10

Slovakia's exports to the Czech Republic, in EUR million

- comm. & trans. not class. elsewhere in the sitc
- miscellaneous manufactured articles
- machinery and transport equipment
- manufactured goods classified chiefly by material
- chemicals and related products, n.e.s.
- animal and vegetable oils, fats and waxes
- mineral fuels, lubricants and related materials
- crude materials, inedible, except fuels
- beverages and tobacco
- food and live animals
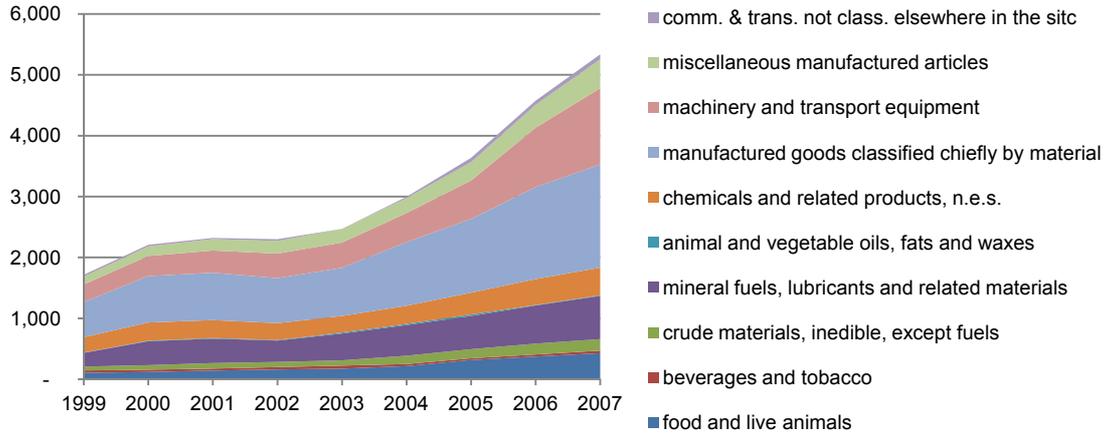
Source: Eurostat database (COMEXT), own calculations.

Figure 3.11

Slovakia's exports to Hungary, in EUR million

- comm. & trans. not class. elsewhere in the sitc
- miscellaneous manufactured articles
- machinery and transport equipment
- manufactured goods classified chiefly by material
- chemicals and related products, n.e.s.
- animal and vegetable oils, fats and waxes
- mineral fuels, lubricants and related materials
- crude materials, inedible, except fuels
- beverages and tobacco
- food and live animals
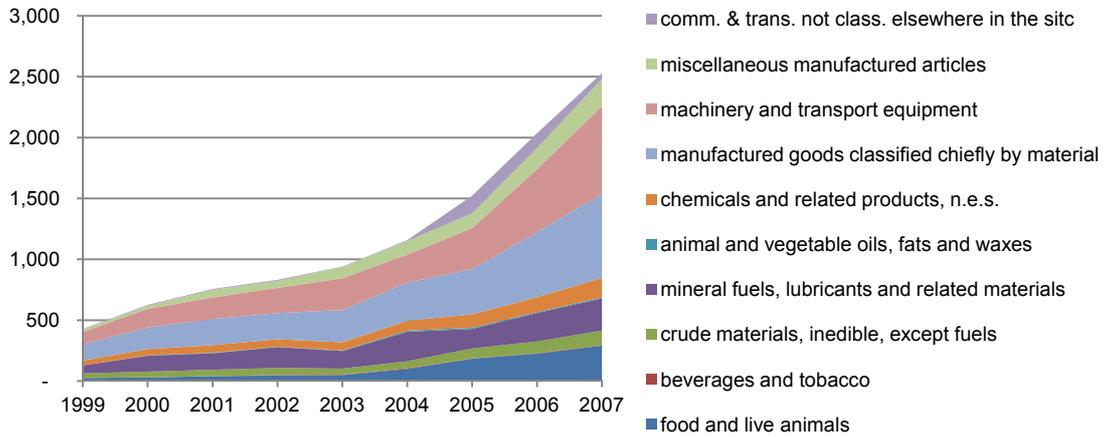
Source: Eurostat database (COMEXT), own calculations.

Figure 3.12

Slovakia' exports to Poland, in EUR million

- comm. & trans. not class. elsewhere in the sitc
- miscellaneous manufactured articles
- machinery and transport equipment
- manufactured goods classified chiefly by material
- chemicals and related products, n.e.s.
- animal and vegetable oils, fats and waxes
- mineral fuels, lubricants and related materials
- crude materials, inedible, except fuels
- beverages and tobacco
- food and live animals
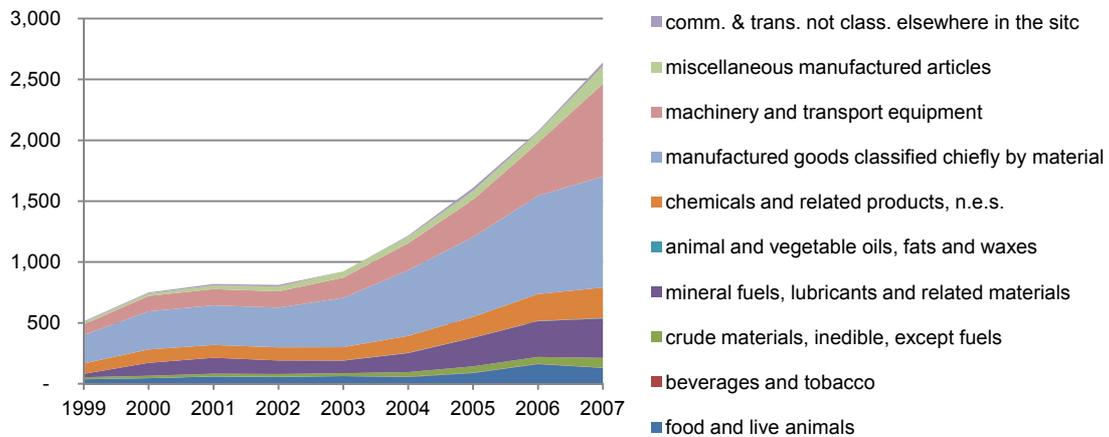
Source: Eurostat database (COMEXT), own calculations.

Table 3.8

Hungary: Exports to the Czech Republic, ten most important commodities,
in selected years, EUR million

(total: 279 commodity groups)

	SITC 3-digit	1999	SITC 3-digit	2003	SITC 3-digit	2007
	713	59	713	178	713	517
	542	16	784	40	764	371
	684	14	778	37	781	100
	642	10	612	22	784	98
	022	9	684	22	775	84
	778	9	764	22	999	69
	893	9	641	21	773	60
	522	9	542	18	772	56
	641	7	775	16	799	55
	775	7	893	14	874	53
Total		148		390		1,463
Share in total in%		*43*		*50*		*56*
Memo: total exports, EUR million		346		783		2,625

Source: Eurostat database (COMEXT), own calculations.

Table 3.9

Hungary: Exports to the Czech Republic, number of common commodity groups
in exports of the ten most important items in two selected years

Years	Number of common commodity groups
1999 & 2003	7
2003 & 2007	4
1999 & 2007	1

Source: Eurostat database (COMEXT), own calculations.

Table 3.10

Hungary: Exports to the Czech Republic, frequency of items by commodity groups
in the exports of the ten most important items in selected years

	1999	2003	2007
SITC 0	1		
SITC 5	2	1	
SITC 6	3	3	
SITC 7	3	5	8
SITC 8	1	1	1
SITC 9			1

Source: Eurostat database (COMEXT), own calculations.

Table 3.11

Czech Republic: Exports to Hungary, ten most important commodities, in selected years, EUR million

(total: 279 commodity groups)

SITC 3-digit	1999	SITC 3-digit	2003	SITC 3-digit	2007
781	30	781	110	781	258
321	28	676	55	784	242
554	21	784	49	759	154
784	15	759	35	752	149
514	14	752	30	676	103
334	13	764	29	514	103
641	13	514	27	554	75
676	13	554	27	773	69
782	12	334	23	772	64
511	12	776	20	778	56
Total most important 10 items	170		405		1,272
Share in total in %	*39*		*41*		*45*
Memo: total exports, EUR mn	440		982		2,799

Source: Eurostat database (COMEXT), own calculations.

Table 3.12

Czech Republic: Exports to Hungary, number of common commodity groups in exports of the ten most important items in two selected years

Years	Number of common commodity groups
1999 & 2003	6
2003 & 2007	6
1999 & 2007	5

Source: Eurostat database (COMEXT), own calculations.

Table 3.13

Czech Republic: Exports to Hungary, frequency of items by commodity groups in the exports of the ten most important items in selected years

	1999	2003	2007
SITC 3	2	1	
SITC 5	3	2	2
SITC 6	2	1	1
SITC 7	3	6	7

Source: Eurostat database (COMEXT), own calculations.

Table 3.14

Incidence of commodity groups in the ten most important export items, 2007

16 commodity groups SITC 3-digit	Hungary	Czech Republic
514		X
554		X
676		X
713	X	
752		X
759		X
764	X	
772	X	X
773	X	X
775	X	
778		X
781	X	X
784	X	X
799	X	
874	X	
999	X	

Source: Eurostat database (COMEXT), own calculations.

Table 3.15

Identical commodity groups in mutual trade of Hungary and the Czech Republic in the ten most important export items at SITC 3-digit level, 2007

Commodity groups SITC 3-digit	Hungary EUR million	Czech Republic EUR million
772	56	64
773	60	69
781	100	258
784	98	242
Total	314	633
Share in first ten, in %	*21*	*50*

772	electrical apparatus for switching or protecting electrical circuits or for making connections to or in electrical circuits (e.g., switches, relays, fuses, lightning arresters, voltage limiters, surge suppressors, plugs and sockets, lamp-holders
773	equipment for distributing electricity, n.e.s.
781	motor cars and other motor vehicles principally designed for the transport of persons (other than motor vehicles for the transport of ten or more persons, including the driver), including station-wagons and racing cars
784	parts and accessories of the motor vehicles of groups 722, 781, 782 and 783

Source: Eurostat database (COMEXT), own calculations.

Table 3.16

Czech Republic: Exports to Slovakia, ten most important commodities, in selected years, EUR million

(total: 279 commodity groups)

SITC 3-digit	1999	SITC 3-digit	2003	SITC 3-digit	2007
781	171	784	251	784	541
321	68	781	203	351	393
676	61	321	103	781	309
784	56	699	95	699	224
542	55	676	86	676	190
122	54	351	85	321	183
699	53	542	71	542	165
893	34	893	68	334	142
511	34	642	63	893	140
892	33	122	61	764	135
Total	618		1,084		2,421
Share in total, in %	*30*		*32*		*31*
Memo: total exports, EUR mn	2,038		3,426		7,738

Source: Eurostat database (COMEXT), own calculations.

Table 3.17

Czech Republic: Exports to Slovakia, number of common commodity groups in exports of the ten most important items in two selected years

Years	Common product groups
1999 & 2003	8
2003 & 2007	8
1999 & 2007	7

Source: Eurostat database (COMEXT), own calculations.

Table 3.18

Czech Republic: Exports to Slovakia, frequency of items by commodity groups in the exports of the ten most important items in selected years

	1999	2003	2007
SITC 1	1	1	
SITC 3	1	2	3
SITC 5	2	1	1
SITC 6	2	3	2
SITC 7	2	2	3
SITC 8	2	1	1

Source: Eurostat database (COMEXT), own calculations.

Table 3.19

Slovakia: Exports to the Czech Republic, ten most important commodities, in selected years, EUR million

SITC 3-digit	1999	SITC 3-digit	2003	SITC 3-digit	2007
334	201	334	380	334	691
673	93	673	157	673	339
784	66	784	80	674	179
542	65	542	68	761	152
641	57	674	57	764	147
674	44	642	51	784	135
651	41	699	49	781	113
642	35	661	48	542	96
661	32	651	46	699	93
699	31	351	43	671	78
Total	665		977		2,023
Share in total in %	*39*		*40*		*38*
Memo: total exports, EUR mn	1,717		2,473		5,337

Source: Eurostat database (COMEXT), own calculations.

Table 3.20

Slovakia: Exports to the Czech Republic, number of common commodity groups in exports of the ten most important items in two selected years

Years	Common product groups
1999 & 2003	8
2003 & 2007	5
1999 & 2007	6

Source: Eurostat database (COMEXT), own calculations.

Table 3.21

Slovakia: Exports to the Czech Republic, frequency of items by commodity groups in the exports of the ten most important items in selected years

	1999	2003	2007
SITC 3	1	2	1
SITC 5	1	1	1
SITC 6	7	6	4
SITC 7	1	1	4

Source: Eurostat database (COMEXT), own calculations.

Table 3.22

Incidence of commodity groups in the ten most important export items, 2007

14 commodity groups	Czech Republic	Slovakia
321	X	
334	X	X
351	X	
542	X	X
671		X
673		X
674		X
676	X	
699	X	X
761		X
764	X	X
781	X	X
784	X	X
893	X	

Source: Eurostat database (COMEXT), own calculations.

Table 3.23

**Identical commodity groups in mutual trade of Slovakia and the Czech Republic
in the ten most important export items at SITC 3-digit level, 2007**

SITC 3 digit	CZ exp to SK	SK exp to CZ
334	142	691
542	165	96
699	224	93
764	135	147
781	309	113
784	541	135
Total	1,516	1,275
Share in the first 10, in %	*63*	*63*
	2,421	2,023

334	petroleum oils and oils obtained from bituminous minerals (other than crude), preparations, n.e.s., containing by weight 70% or more of petroleum oils or of oils obtained from bituminous minerals, these oils being the basic constituents of the preparations; waste oils
542	medicaments (including veterinary medicaments)
699	manufactures of base metal, n.e.s.
764	telecommunications equipment, n.e.s., and parts, n.e.s., and accessories of apparatus falling within division 76 76 = telecommunications and sound-recording and repr. apparatus and equipm.
781	motor cars and other motor vehicles principally designed for the transport of persons (other than motor vehicles for the transport of ten or more persons)
784	parts and accessories of the motor vehicles of groups 722, 781, 782 and 783

Source: Eurostat database (COMEXT), own calculations.

4. Composition of the Visegrad countries' trade by factor inputs and labour skills[17]

4.1 Comparison by factor inputs (Taxonomy I)

The developments in intra-Visegrad trade are displayed in Figure 4.1. As the data reveal, the most important segment was that of the *capital-intensive* industries, which made up about one third of the turnover. The second place was taken by *mainstream* industries at the beginning and *technology-driven* industries towards the end of the respective period. *Marketing-driven* industries and especially *labour-intensive* industries had a smaller, 10% to 15% share. The relatively low proportion of *labour-intensive* industries is well explained by the similar wage levels in euro terms in the countries concerned. The strong shift in favour of *technology-driven* industries reflects an important upgrading of exports in the period concerned driven principally by the activities of foreign-owned companies located in the Visegrad Group countries.

Visegrad countries' exports to the EU-15 show partly different features as compared to intra-Visegrad trade (Figure 4.2). The most important item is *technology-driven* industries delivering about one third of the exports, followed by *mainstream* industries with about a quarter of the turnover. Reflecting the differences in endowment, *capital-intensive* industries play a smaller, *labour-intensive* industries a larger role here than in intra-Visegrad exports. *Marketing-driven* industries are also less relevant than in intra-Visegrad exports.

The most important difference between the Visegrad Group and the EU-15 as export destinations was that *technology-driven* industries were the dominant commodity group in exports to the EU-15 in the whole period concerned while, though spectacularly gaining in significance over the period, they were substantially less important in intra-Visegrad exports. The emerging picture probably reflects the change in attitude in export-oriented and engineering sector-based multinationals operating in the Visegrad region. Earlier exports (often intra-firm deliveries) were predominantly deliveries from a production site in one of the Visegrad countries to the mother company or to the markets in the EU-15, and to a much smaller extent deliveries to other countries. This attitude is assumed to have started to change with the spectacularly growing deliveries of the same circle of exporters to affiliates and/or markets in other Visegrad countries.

The division of the period 2000-2007 into a pre-accession and a post-accession segment did not any reveal outstanding changes. In intra-Visegrad exports the group of *technology-driven* industries gained substantially in importance but the process was gradual, with no significant change in the speed of the rearrangement. A less spectacular yet remarkable change (a drop) occurred in the weight of *capital-intensive* industries, but the date of EU accession seems to play no role in the process. In the Visegrad Group exports to the EU-15 only one group displayed a change related to the EU accession, namely that of *la-*

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[17] The here applied taxonomy for factor inputs and labour skills was elaborated by Peneder (2001).

bour-intensive industries where the shrinkage of the group's share unambiguously accelerated after the accession.

Figure 4.1

Intra-Visegrad trade (based on export statistics) by Taxonomy I
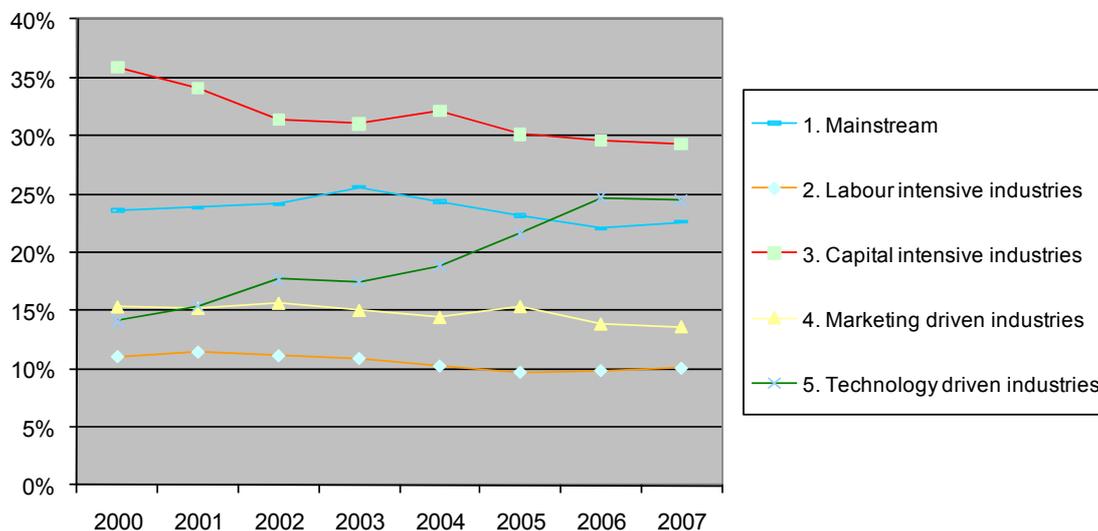
Source: Eurostat database (COMEXT), own calculations.

Figure 4.2

Visegrad Group exports to the EU-15 by Taxonomy I
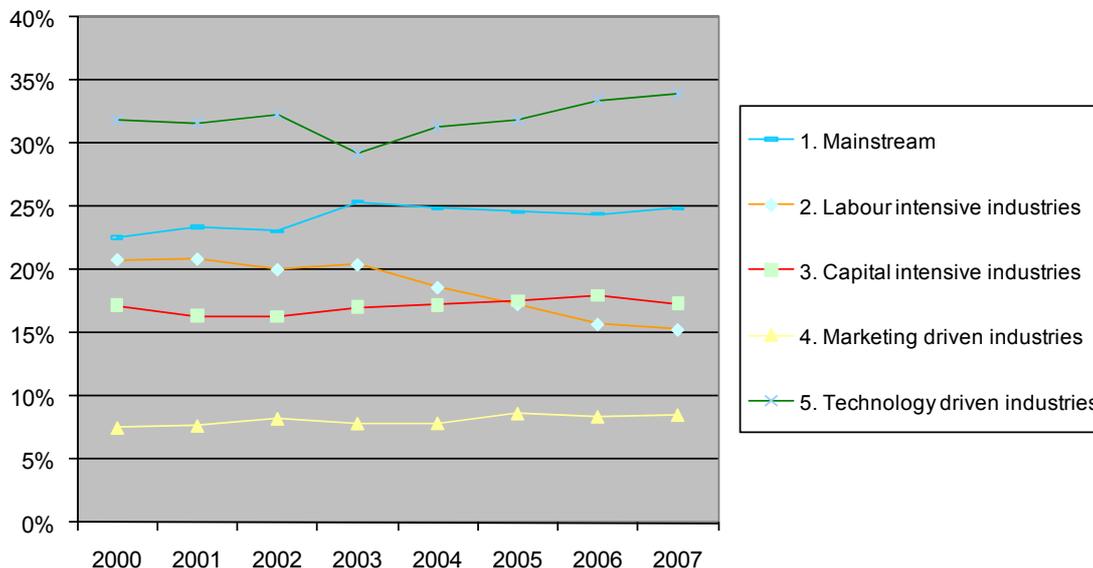
Source: Eurostat database (COMEXT), own calculations.

Finally, it is worth comparing the intra-bloc trade of the Visegrad Group with that of the EU-15 (Figures 4.1 and 4.3). While the proportions are similar in the *mainstream, labour-intensive* and *marketing-driven* industries, *capital-intensive* industries have a much higher weight in intra-Visegrad than in intra-EU-15 trade, while the opposite is true for *technology-*

driven industries. Nevertheless, the share of *technology-driven* industries substantially increased in intra-Visegrad trade in the period 2000-2007 (from 14% to 24%) while in intra-EU-15 trade it dropped from close to 38% to 31%, but the gap has remained substantial yet.

Figure 4.3
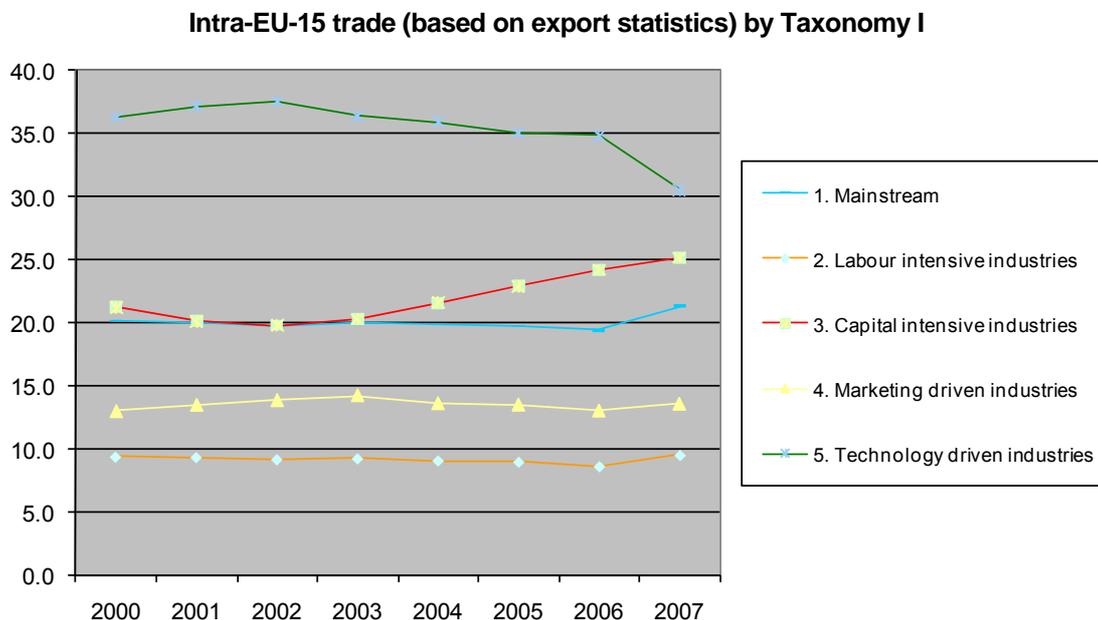
Intra-EU-15 trade (based on export statistics) by Taxonomy I

Source: Eurostat database (COMEXT), own calculations.

4.1.1   Developments in individual Visegrad countries' trade

In the Czech Republic's exports to the Visegrad Group only the share of *technology-driven* industries changed (increased) remarkably (Figure 4.4), but this took place before the EU accession, while it came to halt thereafter, remaining at a lower level than in the case of exports to the EU-15 (Figure 4.5). A gradual but remarkable increase in weight of this group was observed in Czech exports to the EU-15, but here the EU accession did not play any role.

Looking at Czech exports to individual Visegrad countries, it is remarkable that *technology-driven* exports had the highest share in deliveries to Hungary (Figure 4.6), in the second half of the period concerned already matching the share of this commodity group in Czech exports to the EU-15. The bulk of the expansion took place, however, in the years before accession. At the beginning of the period *technology-driven* industries had a higher share in exports to Slovakia (Figure 4.8) than in exports to the other three Visegrad countries, but this commodity group's share did not increase over the period, contrary to exports to the other three countries (Figures 4.6 to 4.8).

Hungarian export data suggest that this country is the driving force behind the expansion of *technology-driven* industries in intra-Visegrad trade (Figure 4.9). While in Hungary's ex-

ports to the EU-15 (Figure 4.10) half of the turnover fell on this group over the whole pe-
riod, in Hungary's deliveries to the Visegrad countries the share of *technology-driven* in-
dustries nearly doubled and, by the end of the period, it also made up close to half of the
deliveries. Remarkably, in Hungary's case the stormy expansion took place predominantly
after the country's EU accession. Of Hungary's three intra-Visegrad destinations, Slovakia
experienced the largest rearrangement within seven years, with the share of *technology-
driven* industries rising from 18% to 51%, practically the whole expansion having occurred
in the post-EU accession period (Figures 4.11 to 4.13).

In Poland's intra-Visegrad exports there were relatively mild shifts in the composition of
trade by Taxonomy I commodity groups (Figure 4.14). *Capital-intensive* industries pre-
served their dominance with one third of the turnover. An increase in the share of *technol-
ogy-driven* industries took place but, compared to the Czech Republic and Hungary, from a
low (13%) to a somewhat higher level (18%). Similarly, in Polish exports to the EU-15 *tech-
nology-driven* industries had a lower share in the total than in those of Hungary and the
Czech Republic (Figure 4.15). A marginal increase of this share, however, did take place,
practically in the post-accession period. A significant change in Poland's exports to the
EU-15 took place in the case of *capital-intensive* industries: here EU accession brought
about a strong reduction in the share of this group, from around 30% before accession to
20% by 2007.

In Polish exports to individual Visegrad countries it is worth noting that *technology-driven*
industries play only a modest role in exports to Slovakia (here the group's share is even
declining) and to the Czech Republic. In exports to Hungary the weight of this group was
already relatively high before accession and it became the most important commodity
group in the post-accession years with a share surpassing that of the respective indicator
in Poland's exports to the EU-15 (Figures 4.16 and 4.18).

Slovakia's exports to the Visegrad Group display features similar to Poland's exports to the
same region (Figures 4.19 and 4.14). *Capital-intensive* industries fulfil a key role in Slova-
kia's intra-Visegrad exports although with a slowly declining trend. The share of *technol-
ogy-driven* industries was on the rise, but from a fairly low to a moderate level. The bulk of
the expansion observed took place in the post-accession years. This relatively minor role
of *technology-driven* industries in Slovakia's Visegrad Group exports is in sharp contrast of
the dominant role this group obtained over the years concerned in the exports to the
EU-15, with the complete expansion taking place in the post-accession years (Fig-
ure 4.20).

There is no significant difference in the composition of Slovakia's exports to individual
Visegrad countries by factor intensity. *Capital-intensive* industries had a predominant,
though gradually diminishing, role in all bilateral trade relations (Tables 4.21 and 4.23).

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Figure 4.4

Czech exports to the Visegrad Group by Taxonomy I

- 1. Mainstream
- 2. Labour intensive industries
- 3. Capital intensive industries
- 4. Marketing driven industries
- 5. Technology driven industries
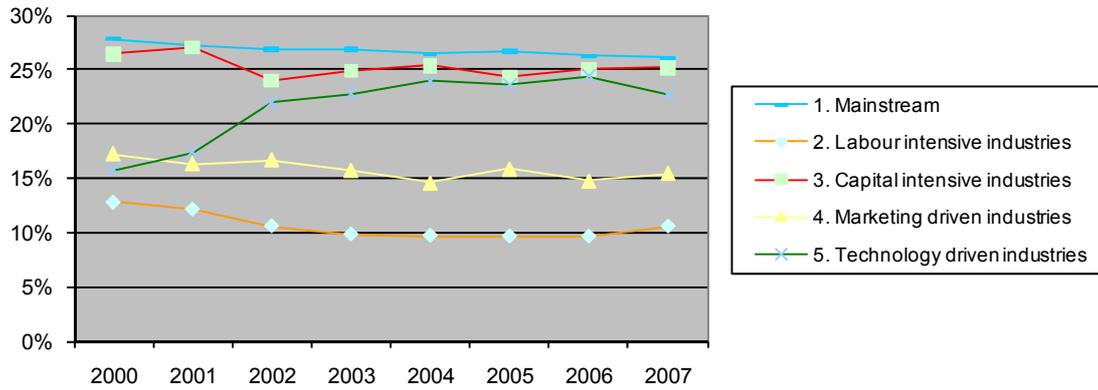
Source: Eurostat database (COMEXT), own calculations.

Figure 4.5

Czech exports to the EU-15 by Taxonomy I

- 1. Mainstream
- 2. Labour intensive industries
- 3. Capital intensive industries
- 4. Marketing driven industries
- 5. Technology driven industries

Source: Eurostat database (COMEXT), own calculations.

Figure 4.6

Czech exports to Hungary by Taxonomy I

- 1. Mainstream
- 2. Labour intensive industries
- 3. Capital intensive industries
- 4. Marketing driven industries
- 5. Technology driven industries

Source: Eurostat database (COMEXT), own calculations.

Figure 4.7

Czech exports to Poland by Taxonomy I

Source: Eurostat database (COMEXT), own calculations.

Figure 4.8

Czech exports to Slovakia by Taxonomy I

Source: Eurostat database (COMEXT), own calculations.
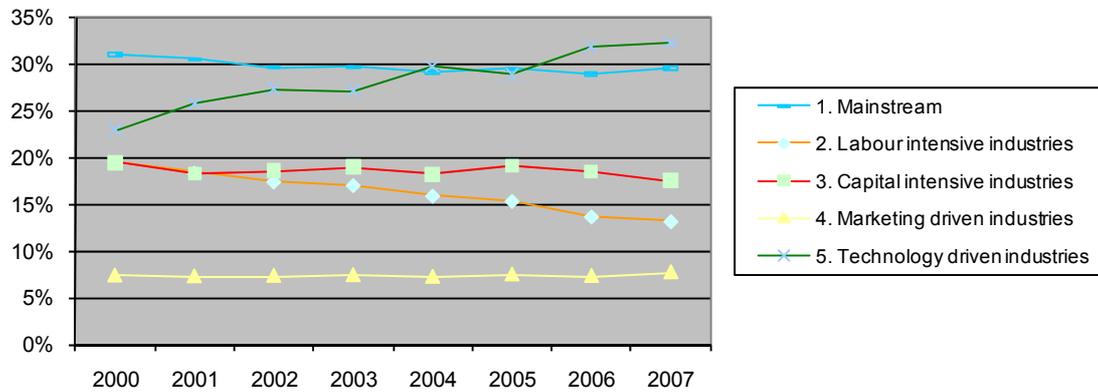
38

Figure 4.9

Hungarian exports to the Visegrad Group by Taxonomy I

Source: Eurostat database (COMEXT), own calculations.

Figure 4.10

Hungarian exports to the EU-15 by Taxonomy I

Source: Eurostat database (COMEXT), own calculations.

Figure 4.11

Hungarian exports to the Czech Republic by Taxonomy I

Source: Eurostat database (COMEXT), own calculations.

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Figure 4.12

Hungarian exports to Poland by Taxonomy I

Source: Eurostat database (COMEXT), own calculations.

Figure 4.13

Hungarian exports to Slovakia by Taxonomy I

Source: Eurostat database (COMEXT), own calculations.

Figure 4.14

Polish exports to the Visegrad Group by Taxonomy I

Figure 4.15

Polish exports to the EU-15 by Taxonomy I
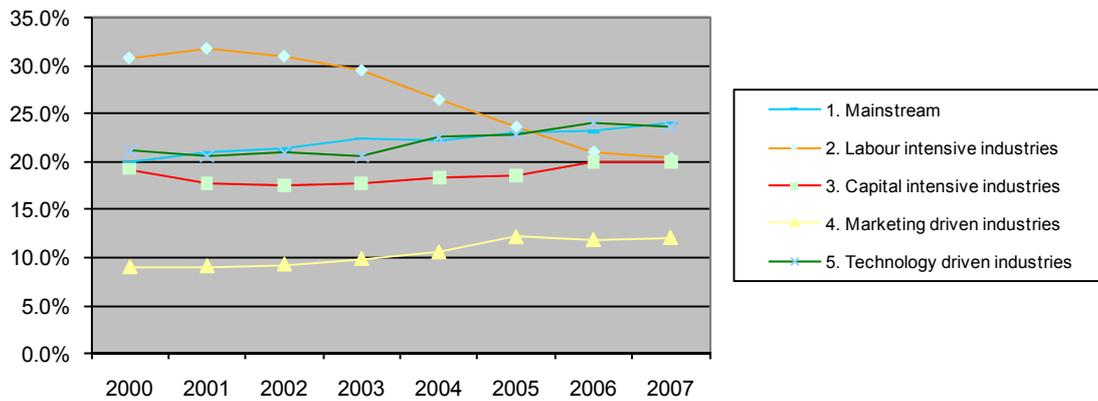
Figure 4.16

Polish exports to the Czech Republic by Taxonomy I

Figure 4.17

Polish exports to Hungary by Taxonomy I

Figure 4.18

Polish exports to Slovakia by Taxonomy I

Figure 4.19

Slovak exports to the Visegrad Group by Taxonomy I

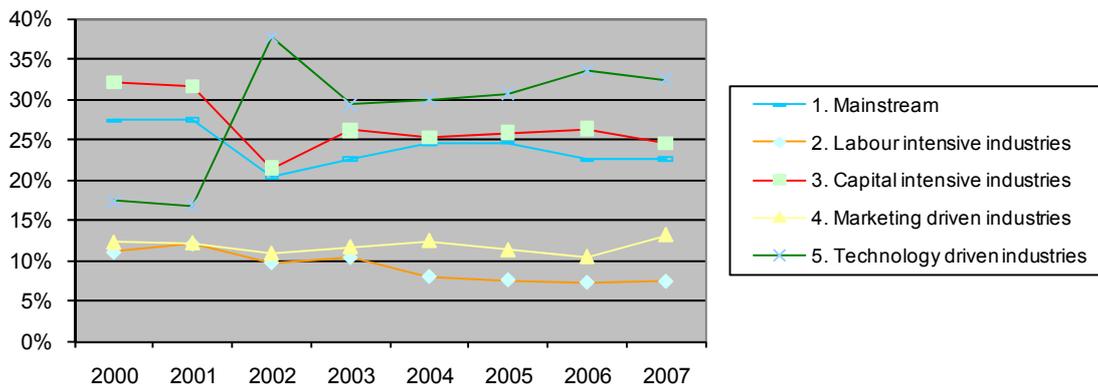Source: Eurostat database (COMEXT), own calculations.

Figure 4.20

Slovak exports to the EU-15 by Taxonomy I

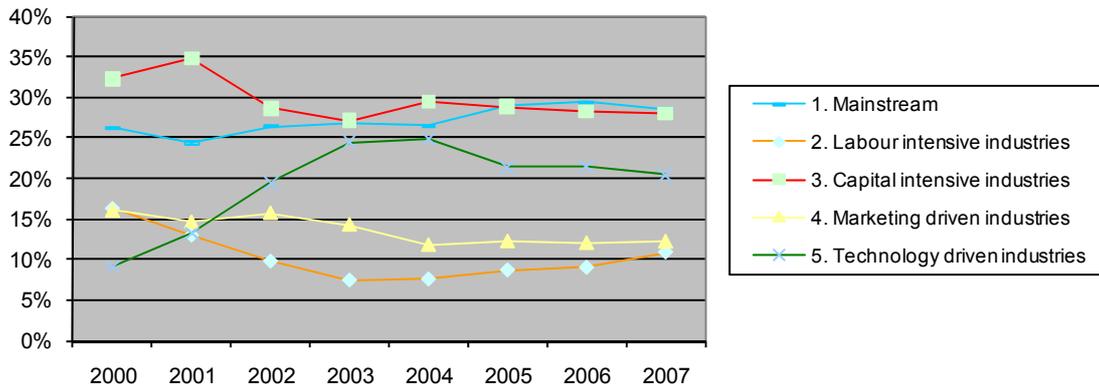Source: Eurostat database (COMEXT), own calculations.

Figure 4.21

Slovak exports to the Czech Republic by Taxonomy I
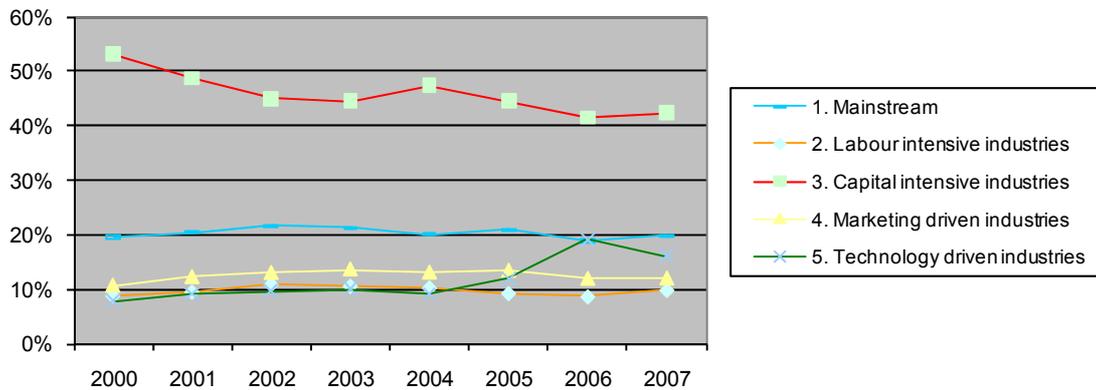
Source: Eurostat database (COMEXT), own calculations.

Figure 4.22

Slovak exports to Hungary by Taxonomy I

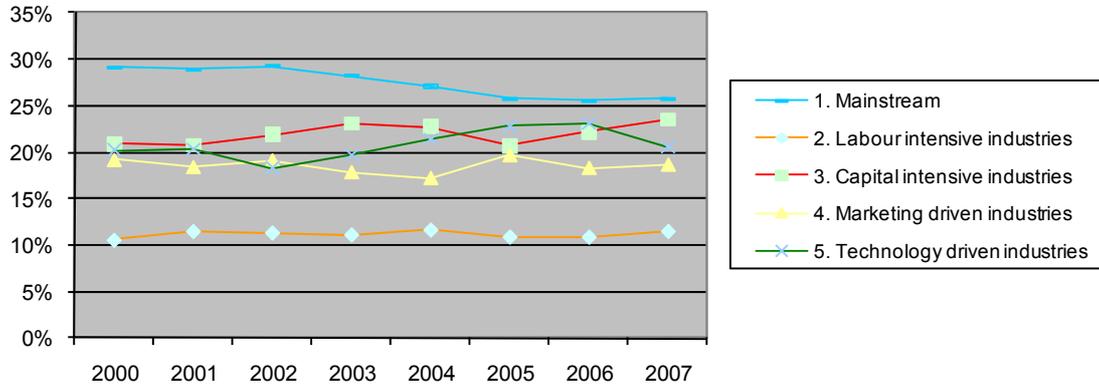*Source:* Eurostat database (COMEXT), own calculations.

Figure 4.23

Slovak exports to Poland by Taxonomy I
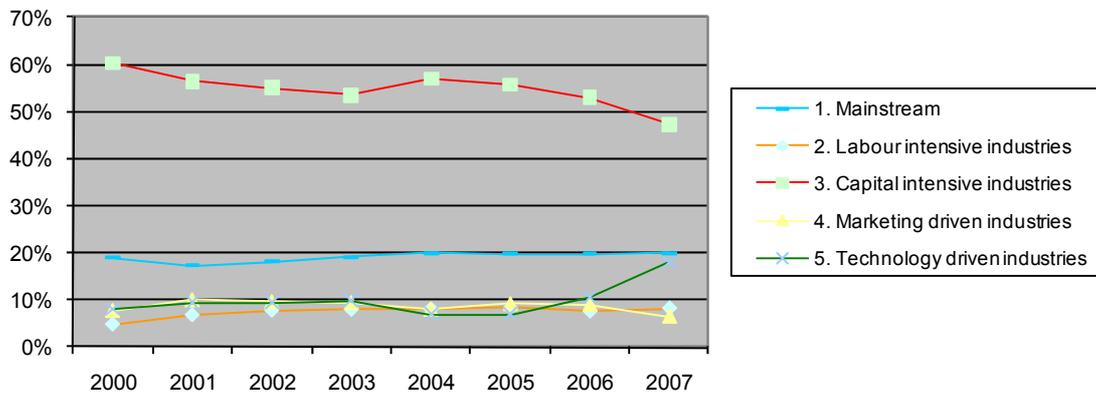
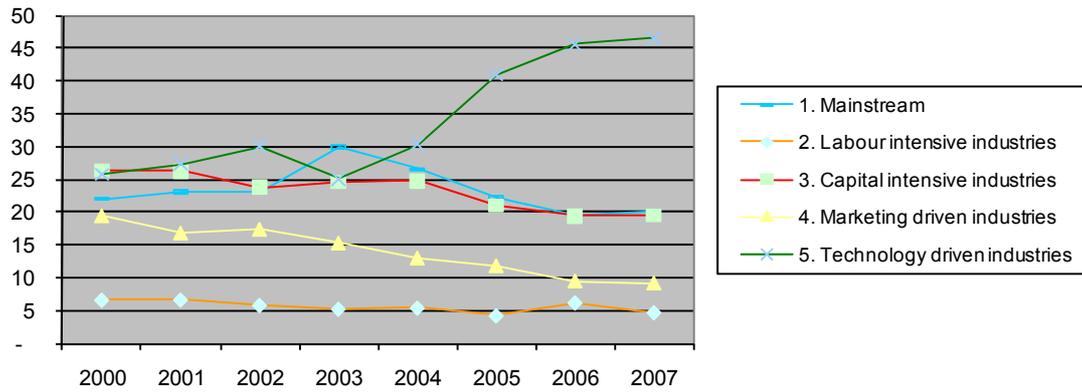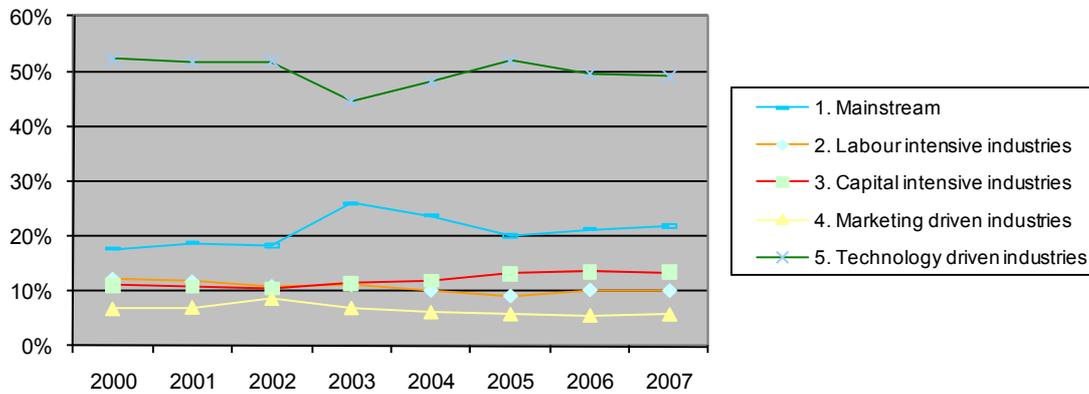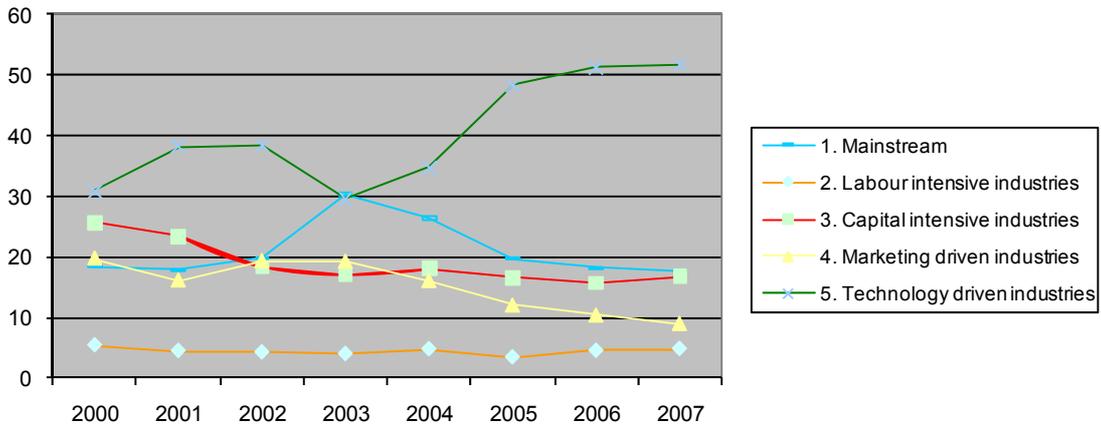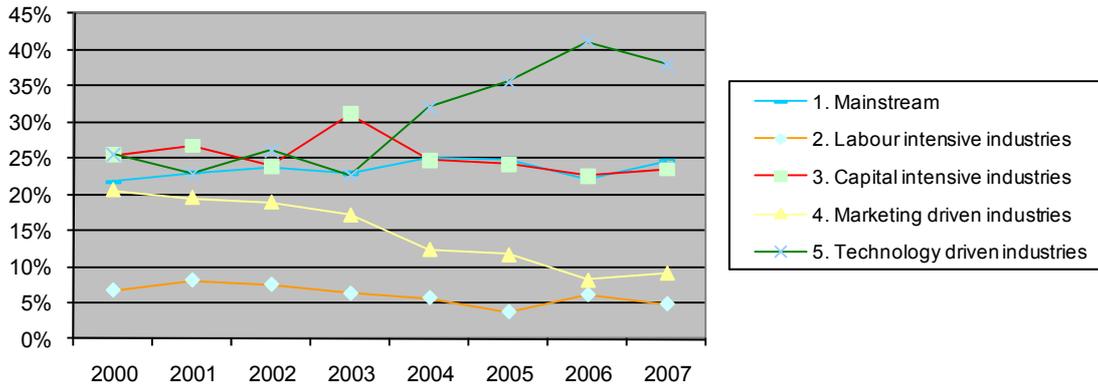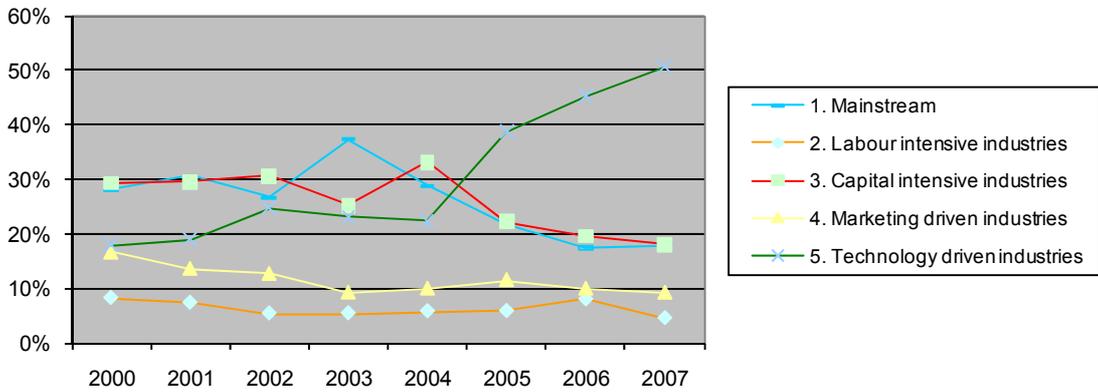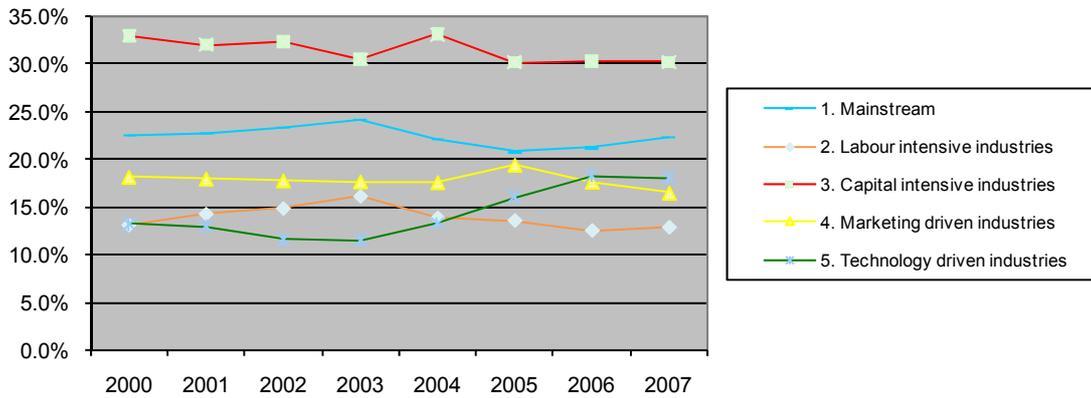*Source:* Eurostat database (COMEXT), own calculations.

4.2 Comparison by labour skills (Taxonomy II)

Shifts in the composition of the intra-Visegrad exports and in Visegrad exports to the EU-15 reflect an upgrade of the export structure by skills (Figures 4.24 and 4.25). The share of *low skill* industries shrank in both destinations over the period concerned. Nevertheless in the intra-Visegrad trade *low skill* industries still amounted to more than a third of the total turnover, substantially above the respective share in exports to the EU-15 (20% at the end of the period). On the other extreme of the scale *high skill* industries were more relevant in Visegrad exports to the EU-15 than in intra-Visegrad trade, and the shift to the favour of this segment's share in total trade was stronger in the case of the destination EU-15 than in the intra-Visegrad trade. For the two *medium skill* subgroups diverging tendencies were observed. In exports to the EU-15 the share of commodities related to *blue collar* workers decreased and that of the white collar workers increased, while in the intra-Visegrad trade exactly the opposite tendency was observed. All in all, the general picture is that the Visegrad countries' exports to the EU-15 reflect a more modern economy than trade within the Visegrad bloc.

In the case of exports decomposed by skill intensity the date of accession seems to have no any special meaning, trends already present before accession were carried on without substantial changes.

Individual members of the Visegrad Group had typically more advanced composition of exports by skills towards the EU-15 than in the case of exports to any of the Visegrad members (Figures 4.27 to 4.31 for the Czech Republic.; Figures 4.32 to 4.36 for Hungary; Figures 4.37 to 4.41 for Poland and Figures 4.42 to 4.46 for Slovakia). *High skill* industries had higher share, *low skill* industries lower share in destination EU-15 compared to destination other Visegrad countries. Poland's case is an outlier, in as much as *high skill* industries' share was as low in the exports to the EU-15 as in the exports to any of the Visegrad countries (Figure 4.38 and Figures 4.39-4.41). Nevertheless, similarly to the other Visegrad countries, *low skill* industries had a higher share in Poland's intra-Visegrad trade than in deliveries to the EU-15 (Figures 4.37 and 4.38). It is worth mentioning a characteristic feature of Hungarian exports, namely that in exports to other Visegrad countries the originally remarkable weight of *low skill* industries dropped radically to nearly half of the initial share measured at the beginning of the period concerned (Figure 4.32). This improvement could not be observed in the exports of any other Visegrad country.

There is a striking difference between the composition of intra-Visegrad and intra-EU-15 trade in two respects (Figures 4.24 and 4.26). First, *low skill* industries make up one third of the former and only one fifth of the latter trade flows. Second, *high skill* industries' weight is twice as high in the intra-EU-15 trade (21-22%) than in the intra-Visegrad trade (9-10%). This unfavourable relation has not changed over the whole period concerned.

Figure 4.24

Intra-Visegrad trade (based on export statistics) by Taxonomy II
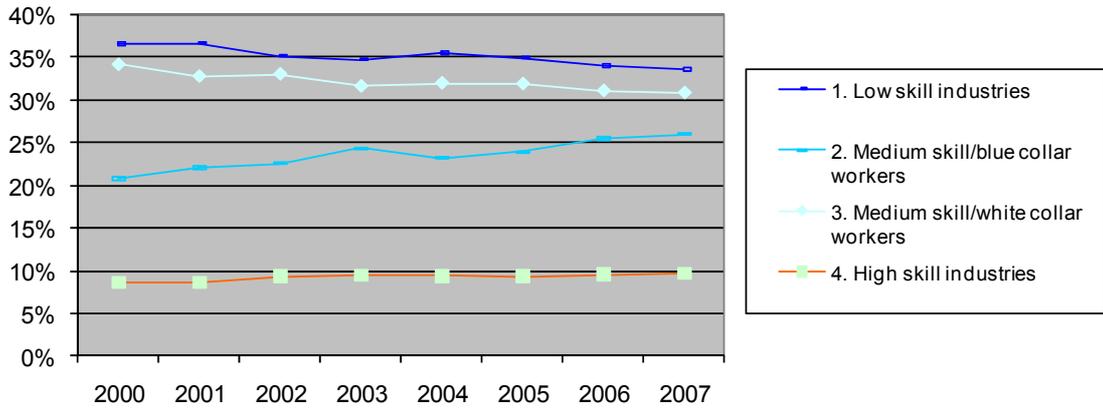
Source: Eurostat database (COMEXT), own calculations.

Figure 4.25

Visegrad Group exports to the EU-15 by Taxonomy II

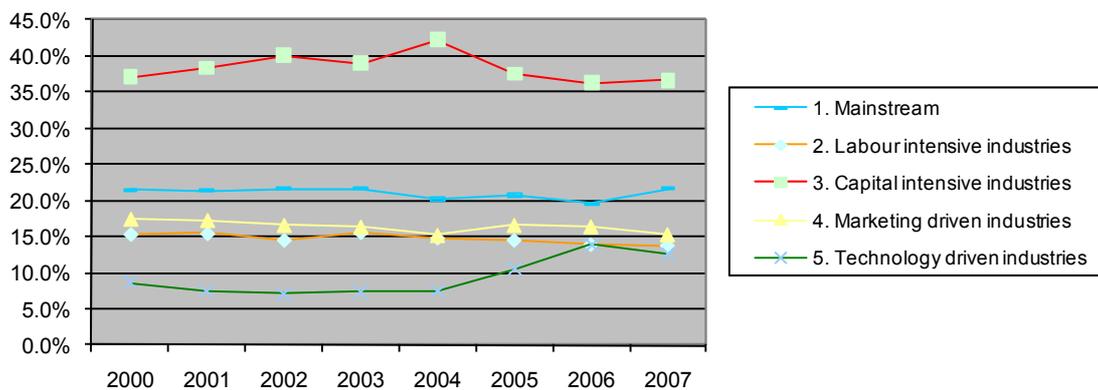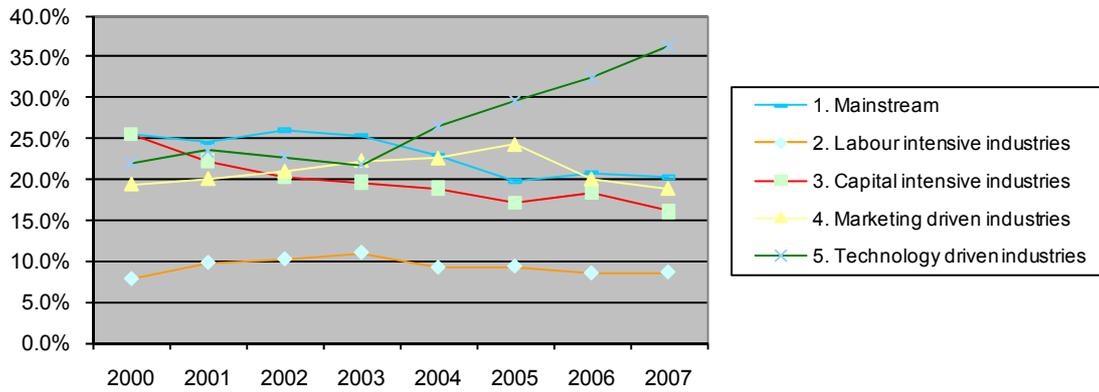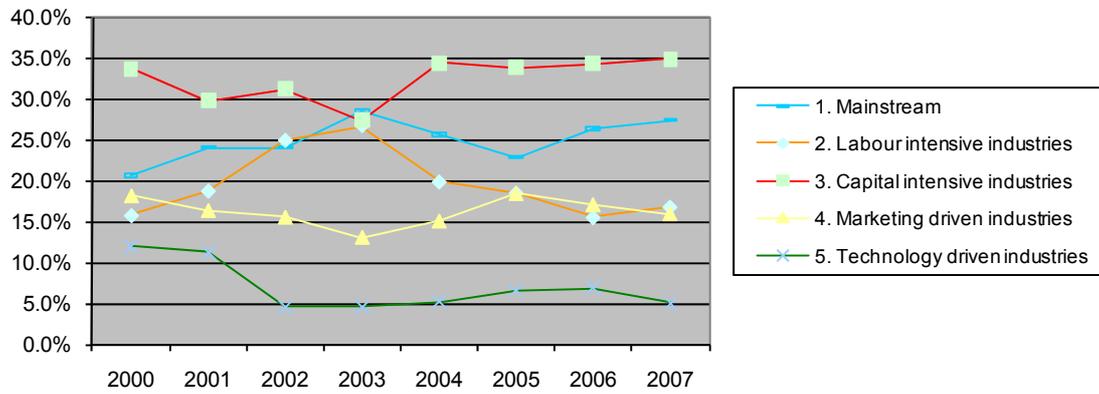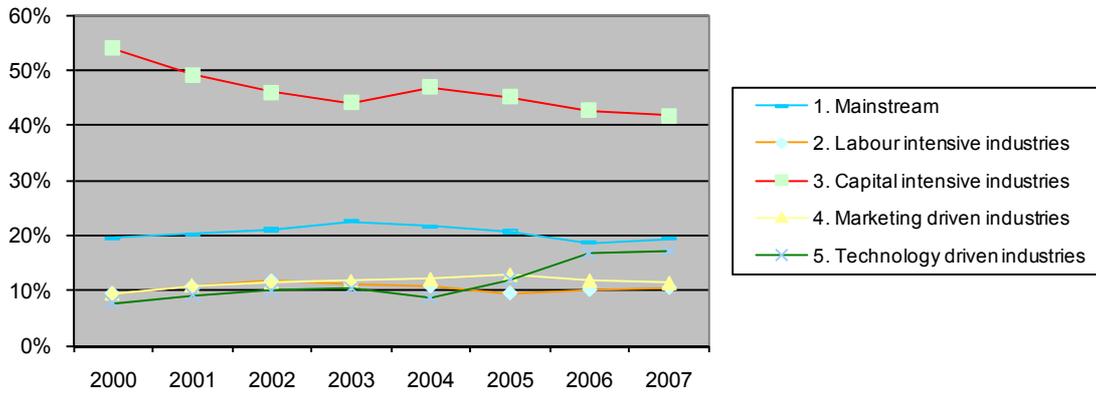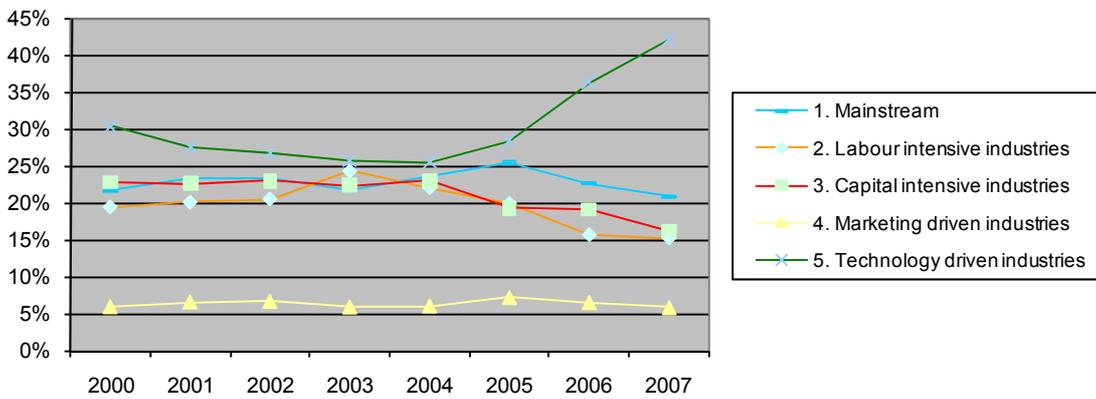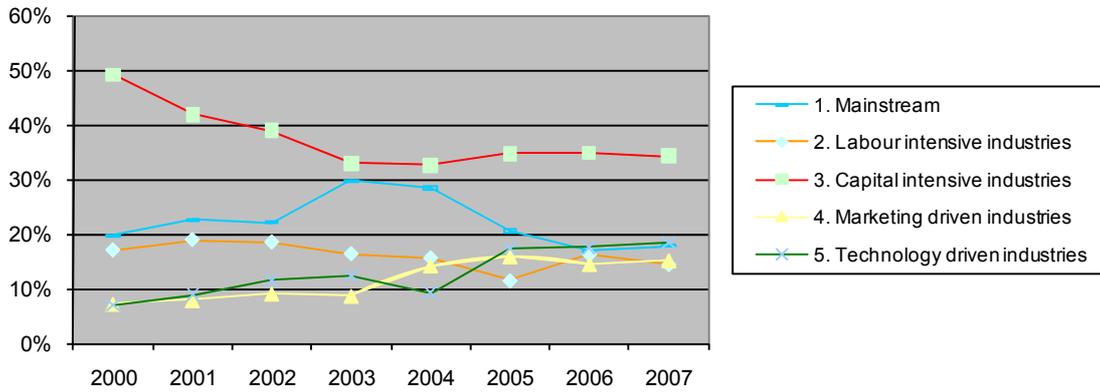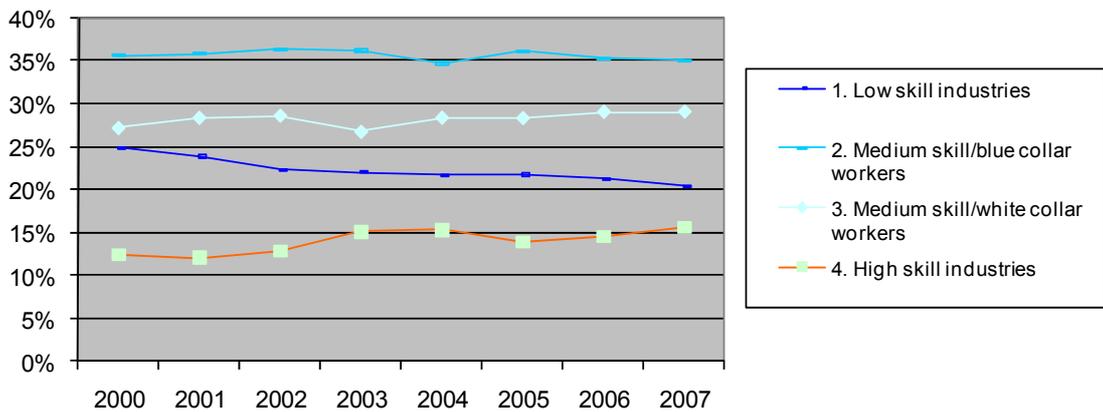*Source:* Eurostat database (COMEXT), own calculations.

Figure 4.26

Intra-EU-15 trade (based on export statistics) by Taxonomy II
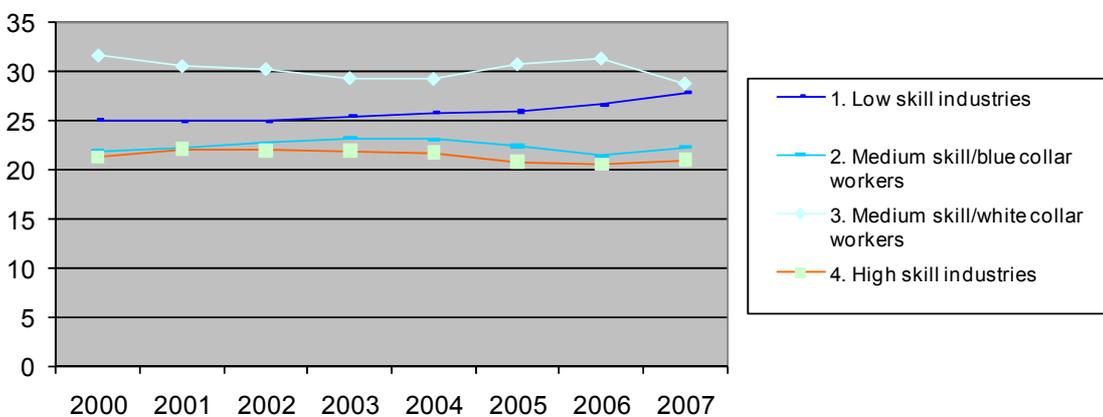
Source: Eurostat database (COMEXT), own calculations.

Figure 4.27

Czech exports to the Visegrad Group by Taxonomy II

Legend:
1. Low skill industries
2. Medium skill/blue collar workers
3. Medium skill/white collar workers
4. High skill industries

Source: Eurostat database (COMEXT), own calculations.

Figure 4.28

Czech exports to the EU-15 by Taxonomy II

Legend:
1. Low skill industries
2. Medium skill/blue collar workers
3. Medium skill/white collar workers
4. High skill industries
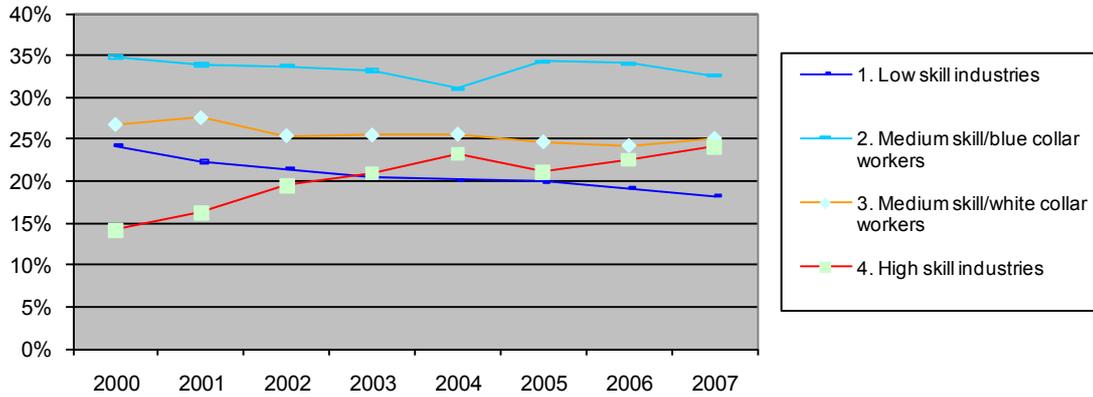
Source: Eurostat database (COMEXT), own calculations.

Figure 4.29

Czech exports to Hungary by Taxonomy II

Legend:
1. Low skill industries
2. Medium skill/blue collar workers
3. Medium skill/white collar workers
4. High skill industries

Source: Eurostat database (COMEXT), own calculations.

Figure 4.30

Czech exports to Poland by Taxonomy II

Source: Eurostat database (COMEXT), own calculations.

Figure 4.31

Czech exports to Slovakia by Taxonomy II
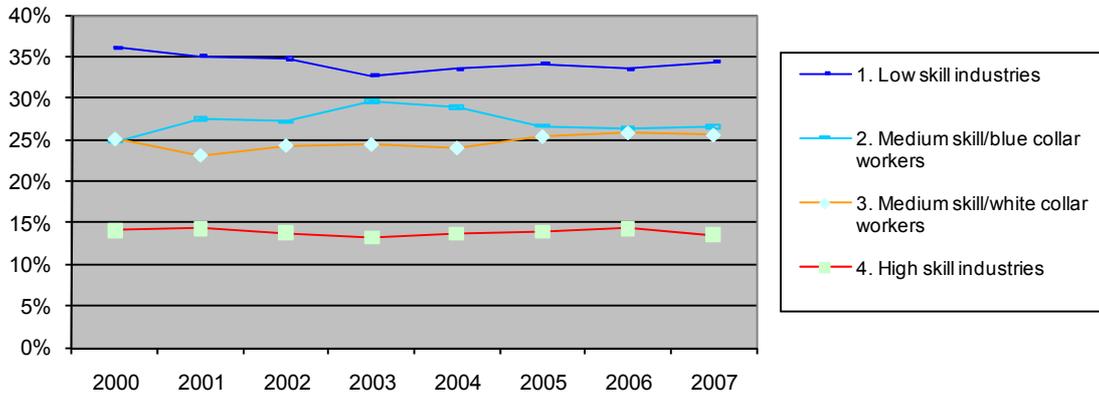
Source: Eurostat database (COMEXT), own calculations.

Figure 4.32

Hungarian exports to the Visegrad Group by Taxonomy II
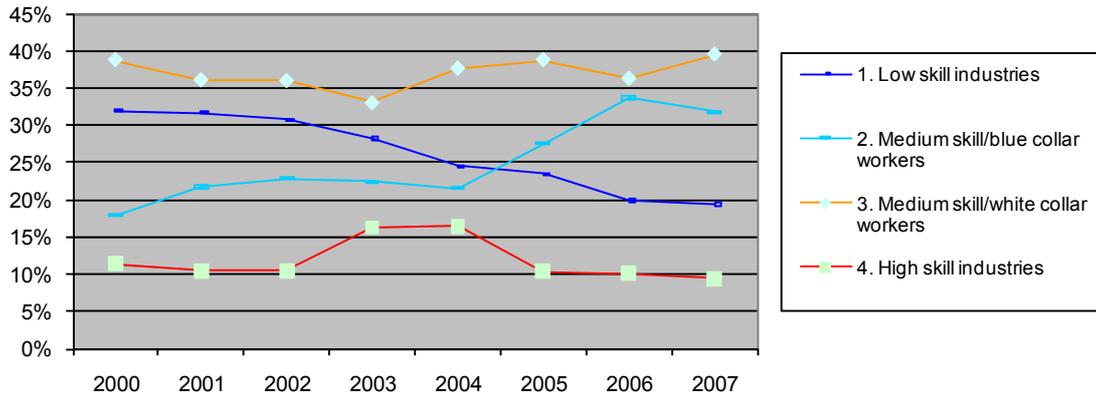
Source: Eurostat database (COMEXT), own calculations.

Figure 4.33

Hungarian exports to the EU-15 by Taxonomy II
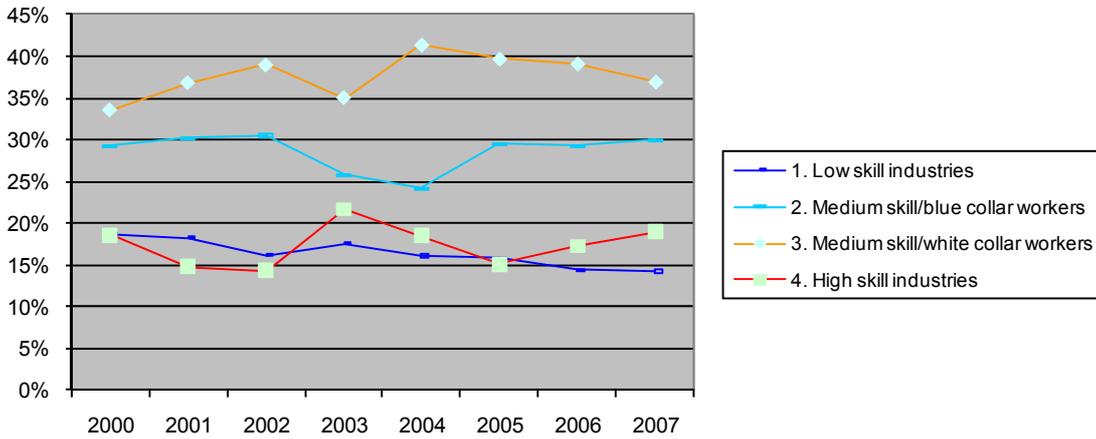
Source: Eurostat database (COMEXT), own calculations.

Figure 4.34

Hungarian exports to the Czech Republic by Taxonomy II
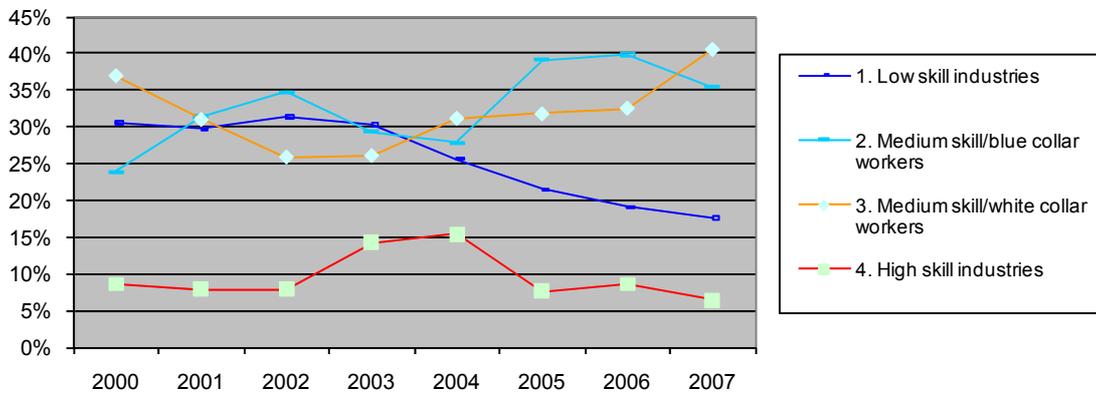
Source: Eurostat database (COMEXT), own calculations.

Figure 4.35

Hungarian exports to Poland by Taxonomy II
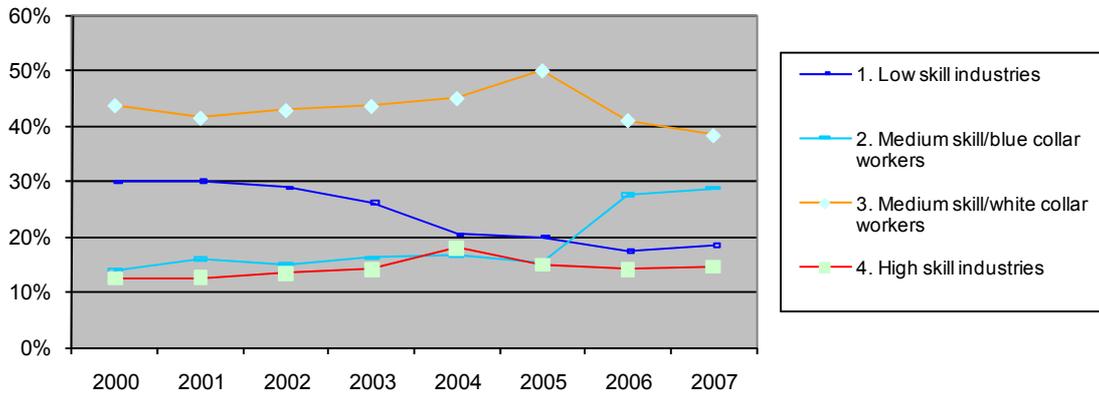
Source: Eurostat database (COMEXT), own calculations.

Figure 4.36

Hungarian exports to Slovakia by Taxonomy II
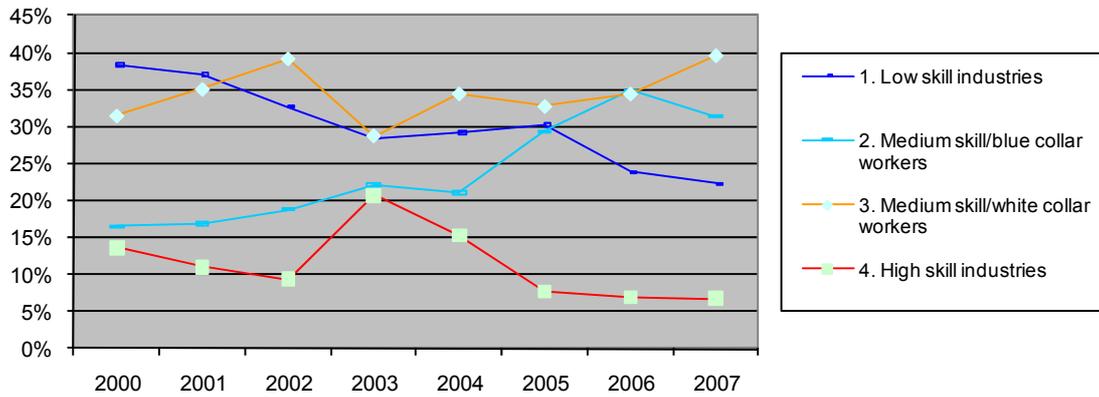
Source: Eurostat database (COMEXT), own calculations.

Figure 4.37

Polish exports to the Visegrad Group by Taxonomy II
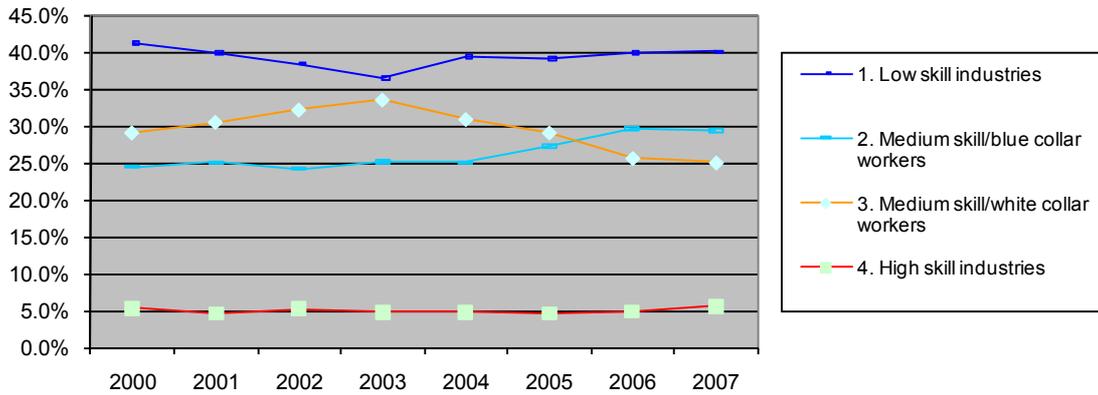
Source: Eurostat database (COMEXT), own calculations.

Figure 4.38

Polish exports to the EU-15 by Taxonomy II
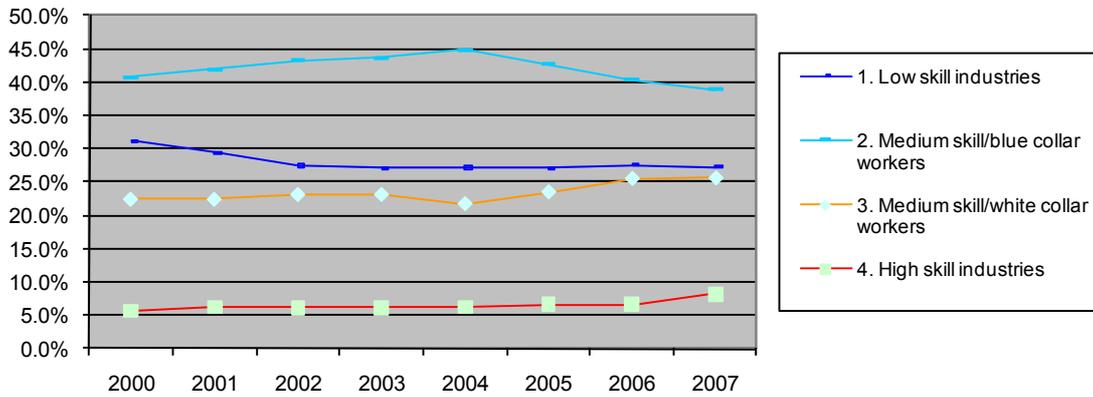
Source: Eurostat database (COMEXT), own calculations.

Figure 4.39

Polish exports to the Czech Republic by Taxonomy II
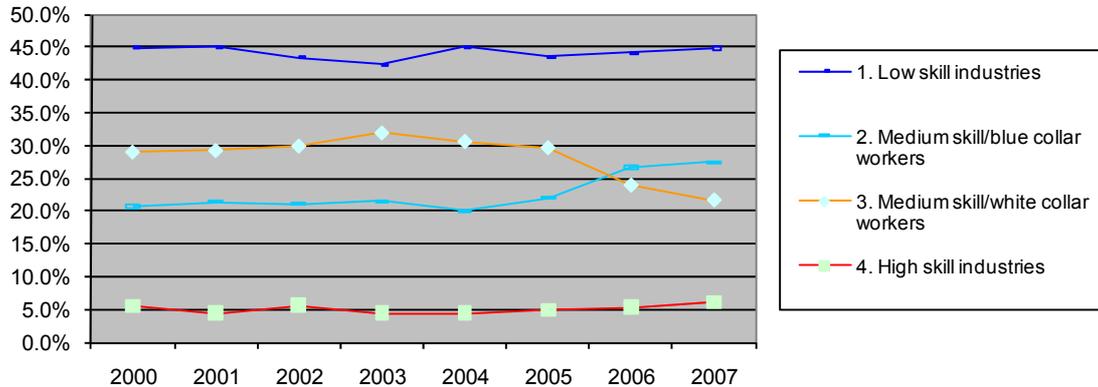
Source: Eurostat database (COMEXT), own calculations.

Figure 4.40

Polish exports to Hungary by Taxonomy II
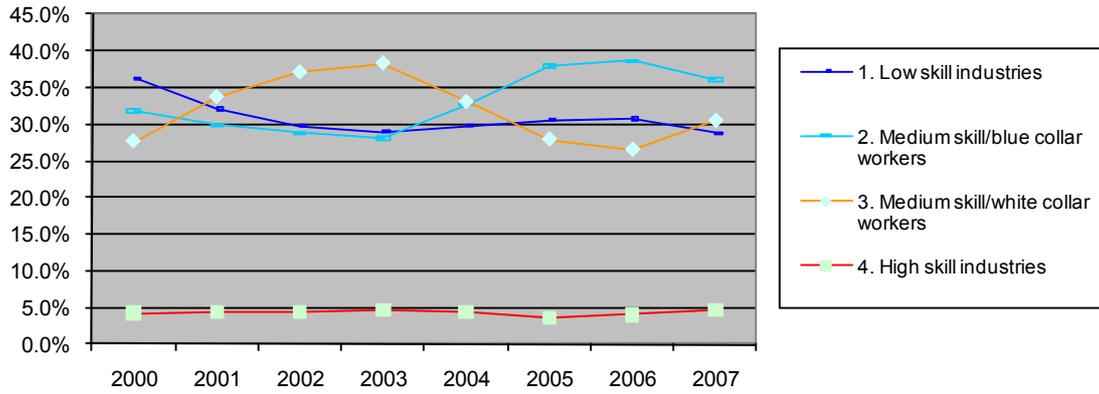
Source: Eurostat database (COMEXT), own calculations.

Figure 4.41

Polish exports to Slovakia by Taxonomy II
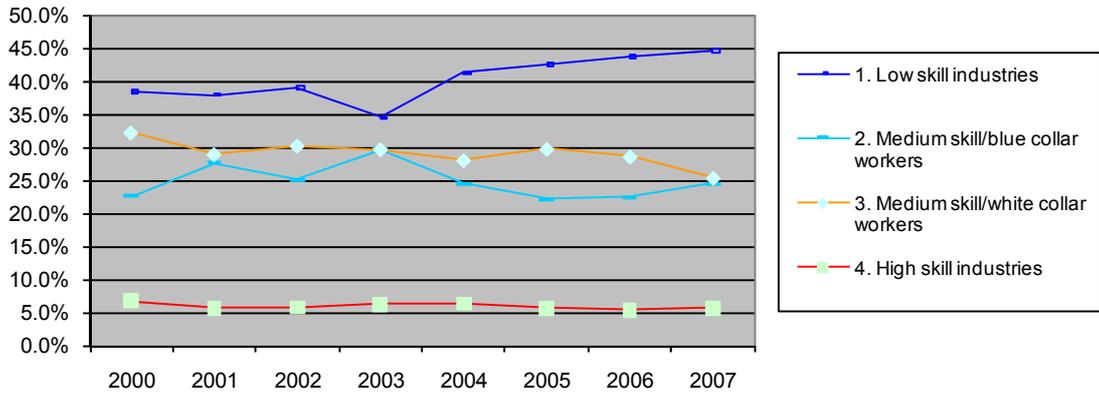
Source: Eurostat database (COMEXT), own calculations.

Figure 4.42

Slovak exports to the Visegrad Group by Taxonomy II
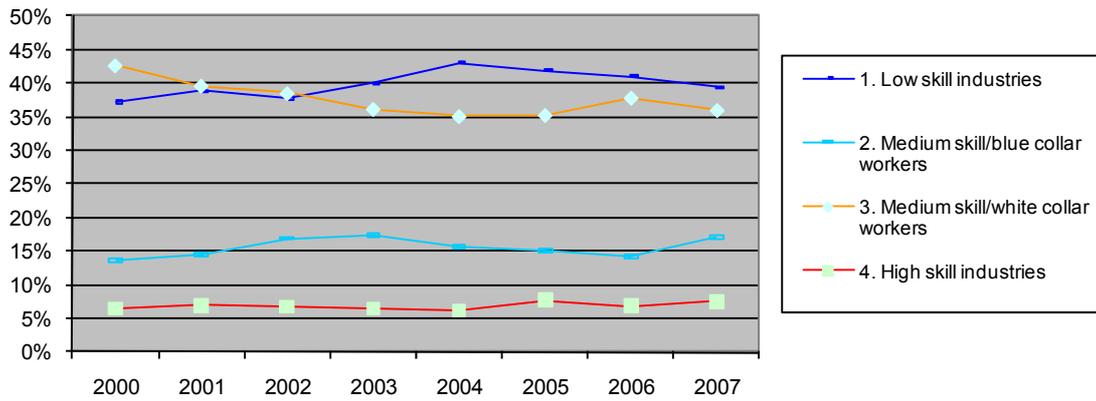
Source: Eurostat database (COMEXT), own calculations.

Figure 4.43

Slovak exports to the EU-15 by Taxonomy II
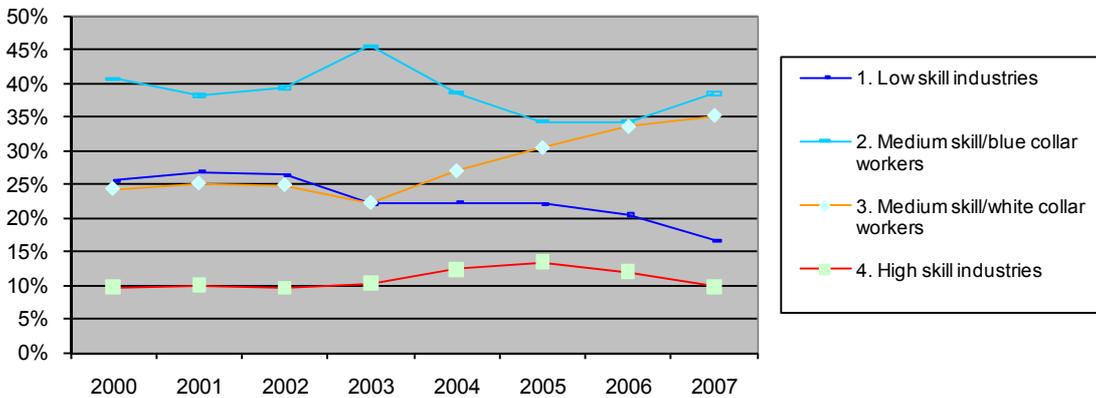
Source: Eurostat database (COMEXT), own calculations.

Figure 4.44

Slovak exports to the Czech Republic by Taxonomy II
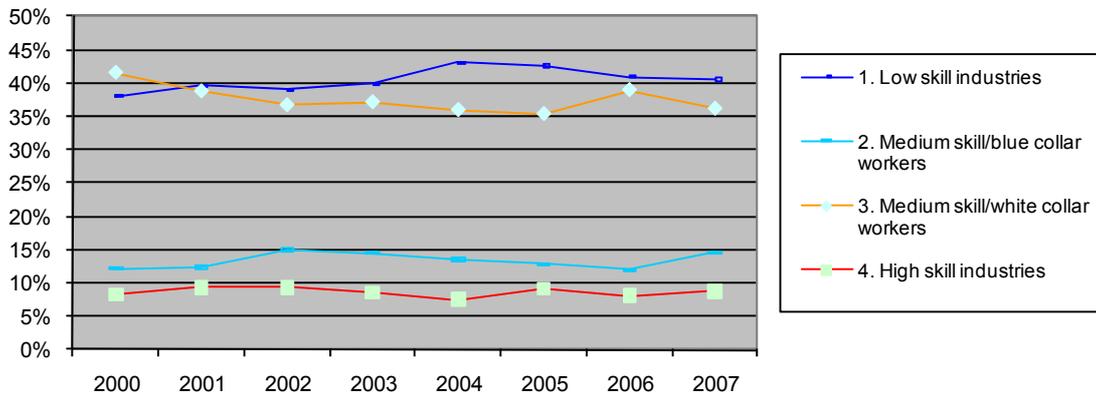
Source: Eurostat database (COMEXT), own calculations.

Figure 4.45

Slovak exports to Hungary by Taxonomy II
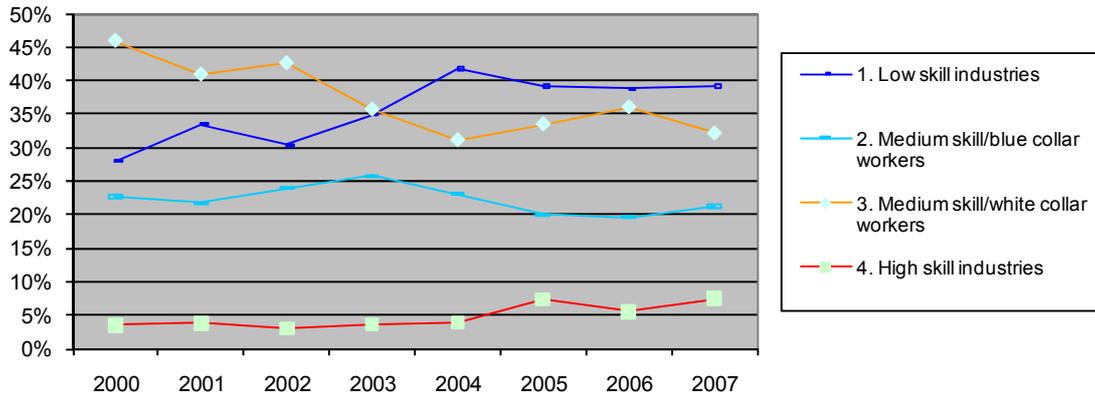
Source: Eurostat database (COMEXT), own calculations.

Figure 4.46

Slovak exports to Poland by Taxonomy II
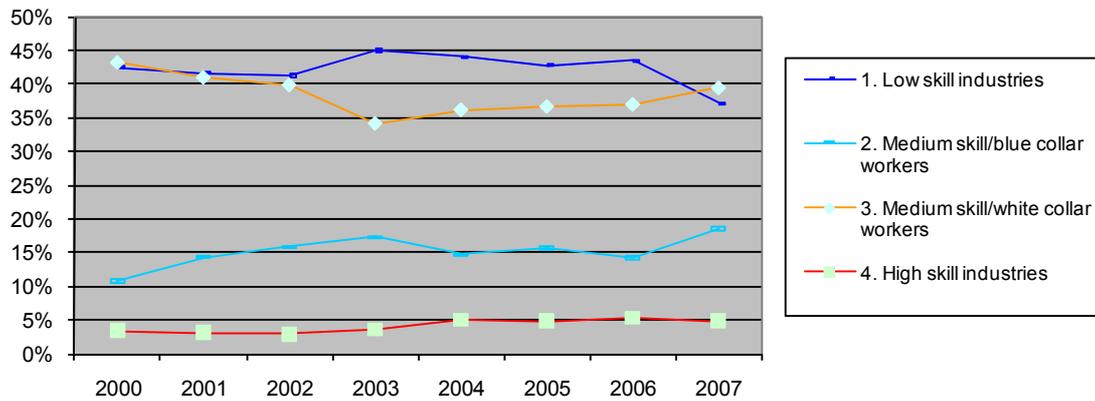
Source: Eurostat database (COMEXT), own calculations.

5. Analysis of trade increment

5.1 Traditional trade structure

The comparison of the composition of increments (based on SITC-1 digit data) in the Visegrad countries' exports in the pre-accession period 2000-2003 and the post-accession period 2004-2007 shows no clear patterns (Figures 5.1 to 5.4). *Machinery and transport equipment* was the key commodity group in the exports increment of the individual Visegrad members both in trade with the other Visegrad countries and the EU-15, likewise before and after these countries' EU accession (Figures 5.5 to 5.8). Specialization in this commodity group was, however, substantially stronger in trade with the EU-15 than in trade with the other Visegrad countries.

The significance of *machinery and transport equipment* in the intra-Visegrad trade in the post-accession years increased in Poland's exports increment but it decreased in the Czech Republic's exports increment, while there was no significant rearrangement observed in the case of Hungary and Slovakia. Altogether, following the accession to the EU, exports increments became more diversified (by commodity groups) in the case of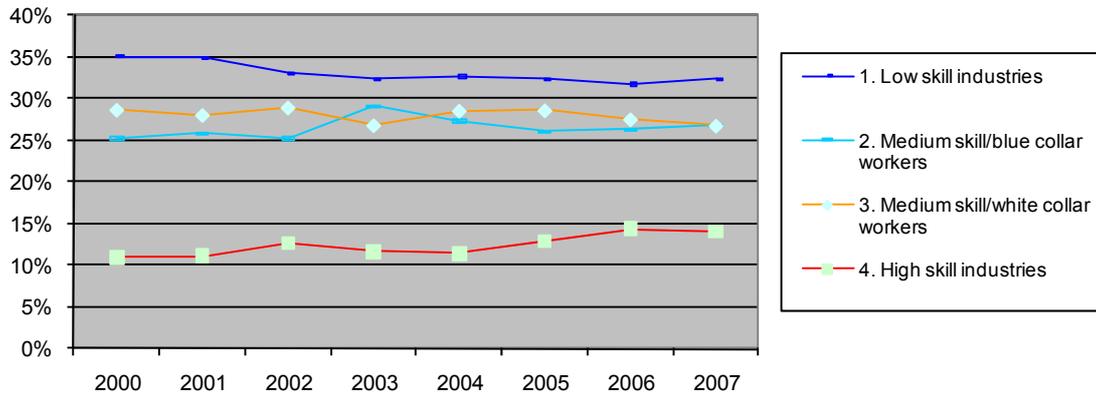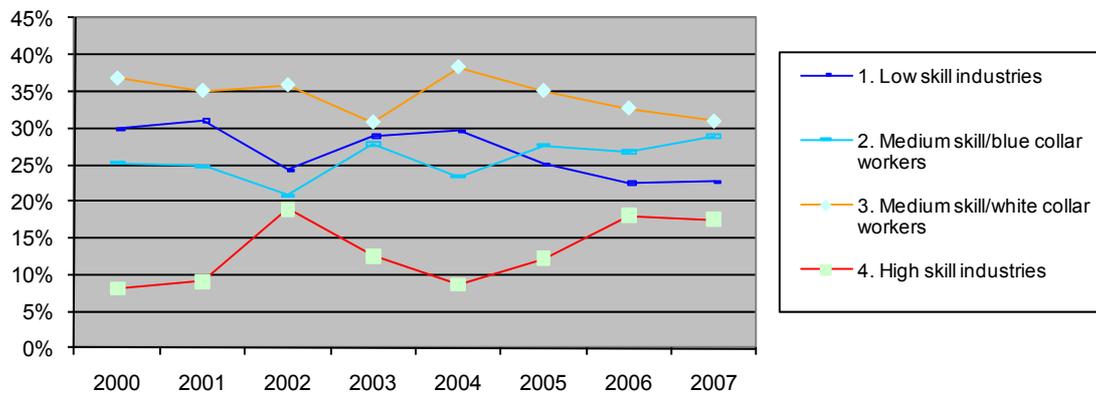 the Czech Republic and Hungary both in trade with other Visegrad countries and the EU-15. For Poland diversification increased after the country's EU accession in the exports increment to the EU-15 while it decreased in the Visegrad relation. The Slovak case shows no clear direction of change.

The second most important commodity group in the intra-Visegrad exports increments is that of *manufactured goods classified chiefly by material* (semi-finished products). The share of this commodity group was significant before the EU accession and preserved its position after the EU accession as well. The commodity group also figured well in exports increments with destination EU-15 (except for Hungary).

Miscellaneous manufactured articles (mainly consumer goods) were typically the third most important commodity group measured by shares in exports increments, in both destinations and both before and after EU accession.

An interesting difference can be observed in the increment structures according destination Visegrad or EU-15, namely *mineral fuels, lubricants and related materials* are present with a non-negligible weight in trade with other Visegrad countries but are nearly non-existent in trade with the EU-15 (except for Hungary).

Figure 5.1

Czech exports to Visegrad
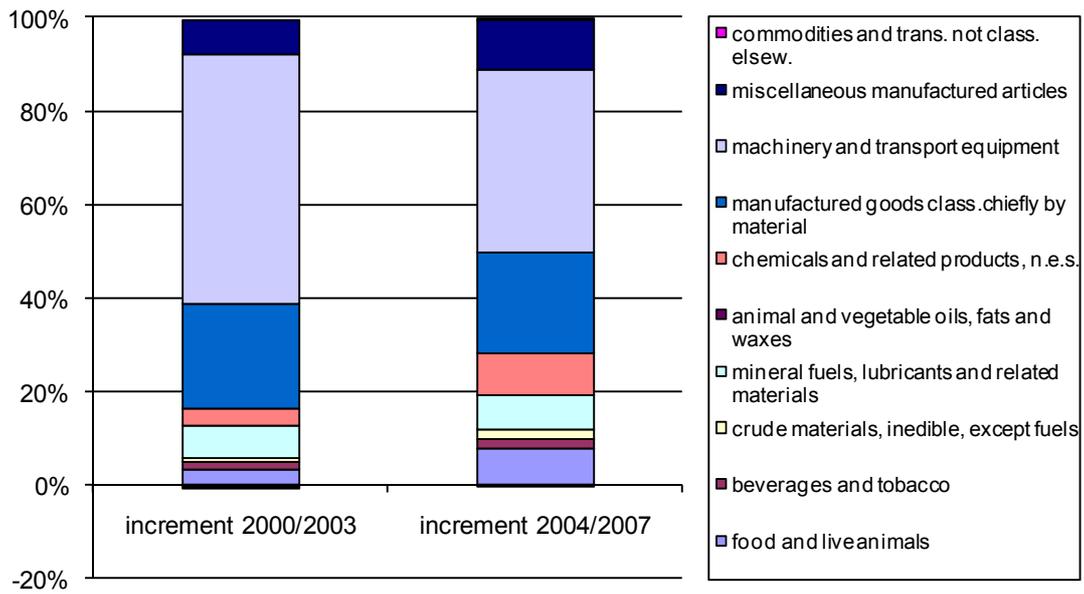
Source: Eurostat database (COMEXT), own calculations.

Figure 5.2

Hungary's exports to Visegrad
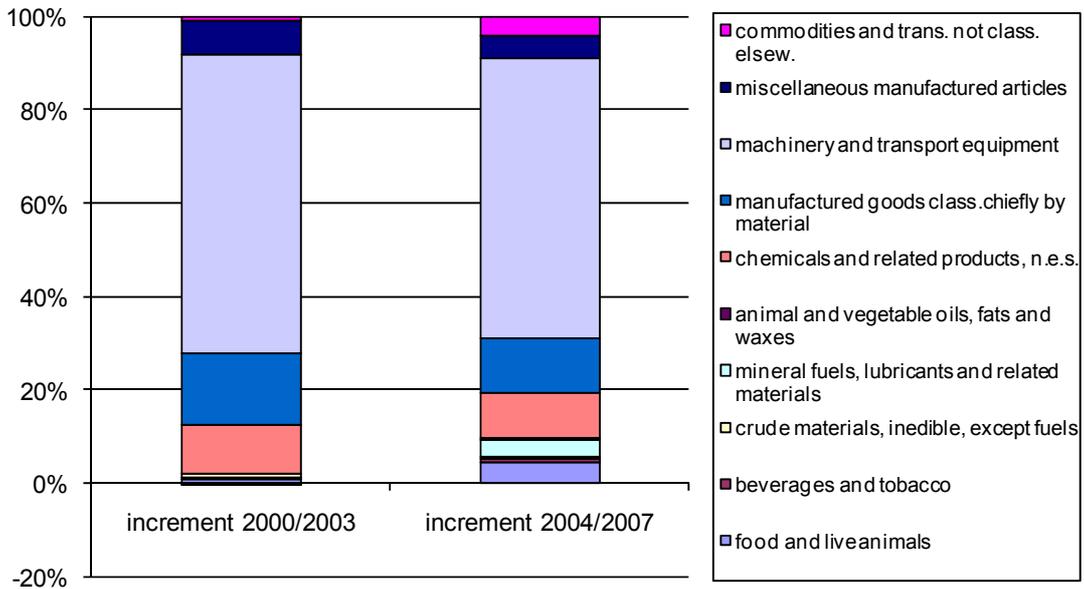
Source: Eurostat database (COMEXT), own calculations.

Figure 5.3

Poland's exports to Visegrad
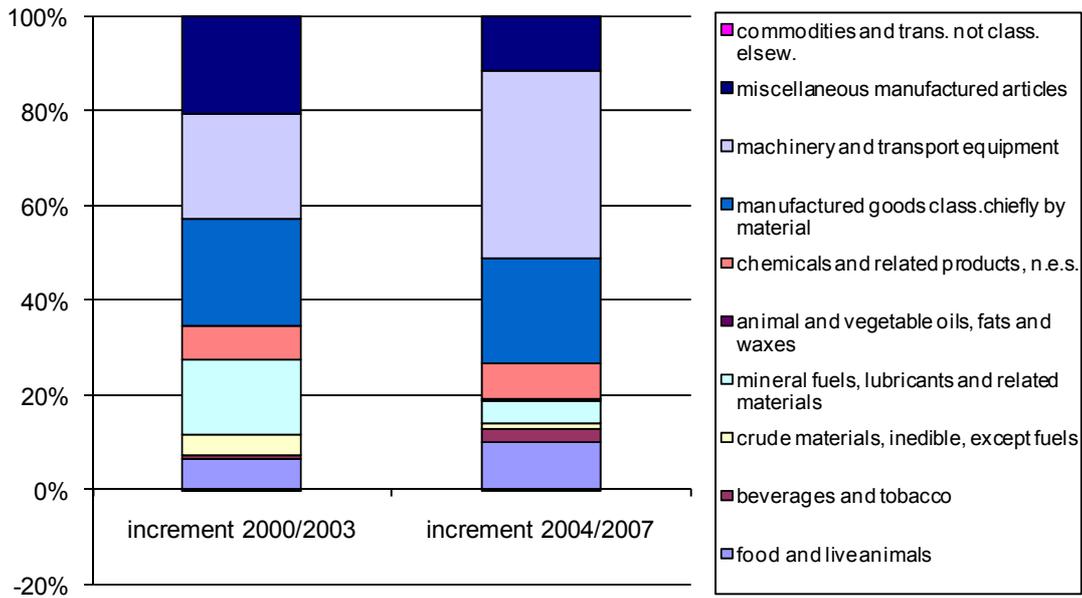
Source: Eurostat database (COMEXT), own calculations.

Figure 5.4

Slovak exports to Visegrad
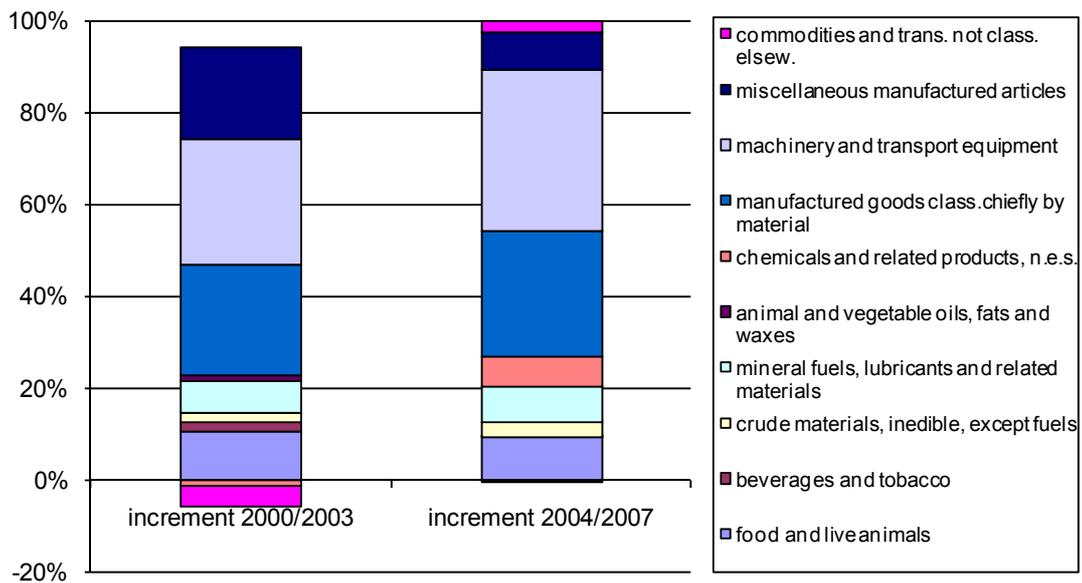
Source: Eurostat database (COMEXT), own calculations.

Figure 5.5

Czech exports to the EU-15

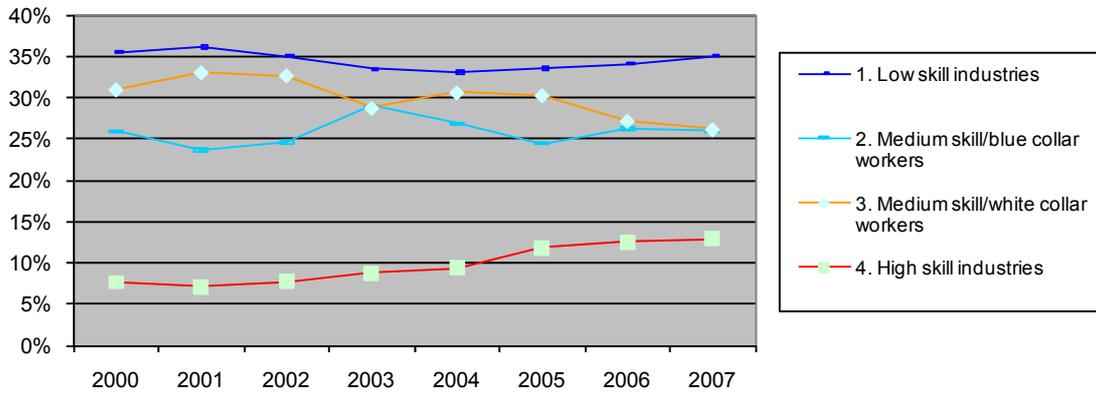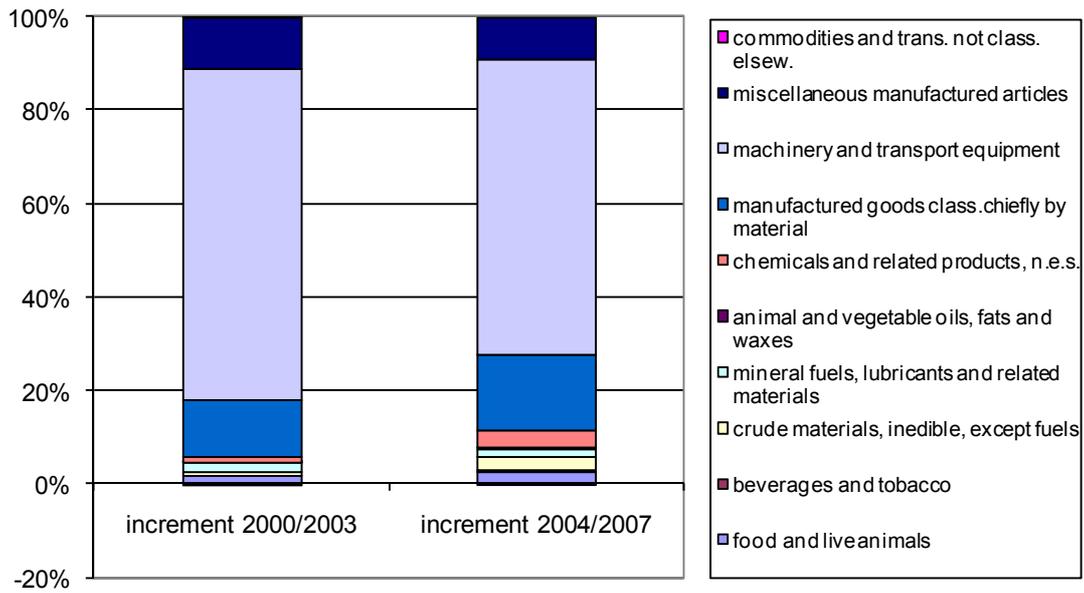*Source:* Eurostat database (COMEXT), own calculations.

Figure 5.6

Hungary's exports to the EU-15
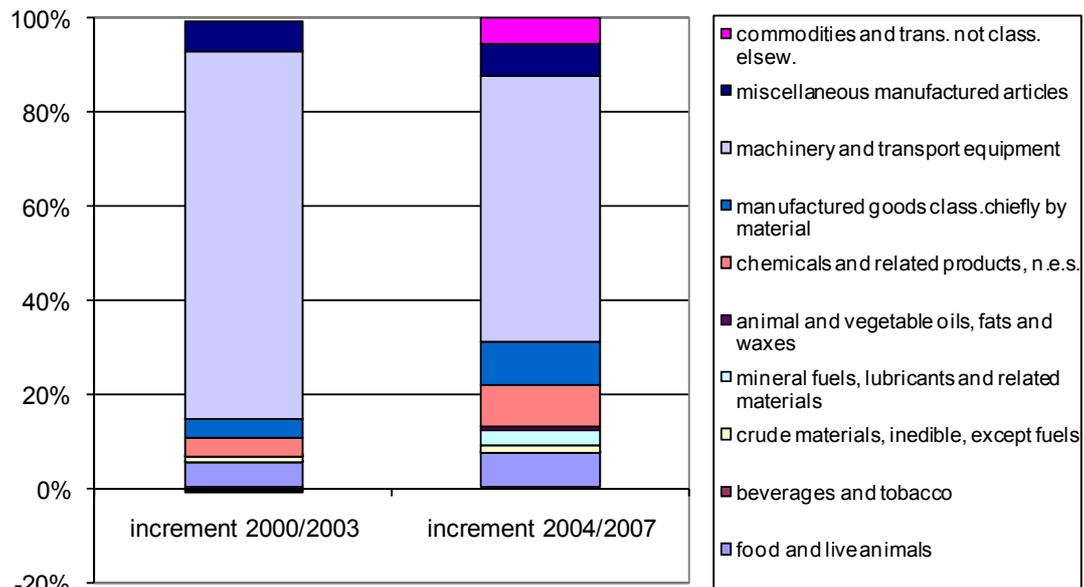
Source: Eurostat database (COMEXT), own calculations.

Figure 5.7

Poland's exports to the EU-15

- commodities and trans. not class. elsew.
- miscellaneous manufactured articles
- machinery and transport equipment
- manufactured goods class.chiefly by material
- chemicals and related products, n.e.s.
- animal and vegetable oils, fats and waxes
- mineral fuels, lubricants and related materials
- crude materials, inedible, except fuels
- beverages and tobacco
- food and live animals
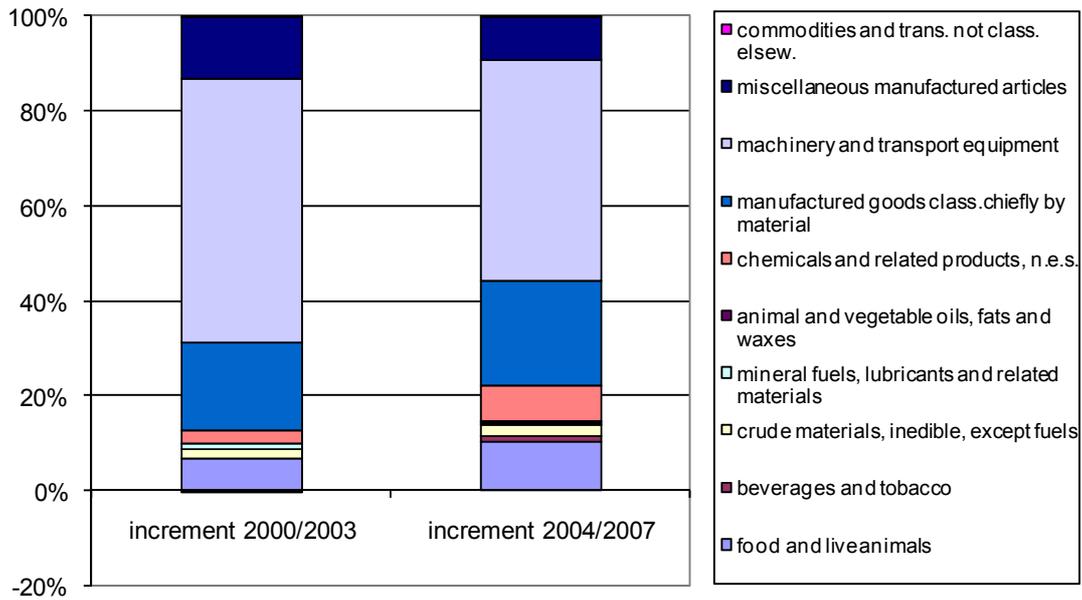
Source: Eurostat database (COMEXT), own calculations.

Figure 5.8

Slovak exports to the EU-15

- commodities and trans. not class. elsew.
- miscellaneous manufactured articles
- machinery and transport equipment
- manufactured goods class.chiefly by material
- chemicals and related products, n.e.s.
- animal and vegetable oils, fats and waxes
- mineral fuels, lubricants and related materials
- crude materials, inedible, except fuels
- beverages and tobacco
- food and live animals
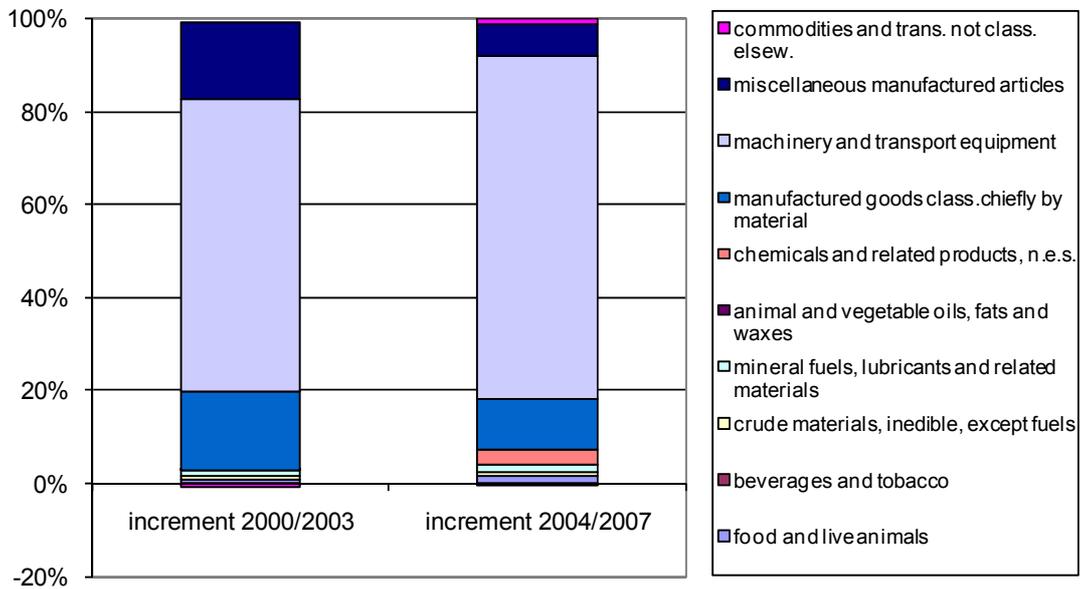
Source: Eurostat database (COMEXT), own calculations

5.2 Marginal intra-industry trade

This chapter is focused on changes in the composition of trade flows before and after EU accession. For a more sophisticated insight than that provided by traditional statistical analyses indicators of marginal intra-industry trade (MIIT) were calculated. If the main issue of the investigation is the change in the composition of trade flows related to an important event, the EU accession of the countries concerned, than MIIT indicators deliver better results than those offered by the static classical intra-industry trade approach with the Grubel-Lloyd index as the most widely employed measure.[18] The Grubel-Lloyd index measures intra-industry trade for one particular time period. Marginal intra-industry trade provides insight in the *structure of the change* in export and import flows. 'In a nutshell, MIIT is about the importance of intra-industry trade in trade changes, and not about the change in intra-industry trade.'[19]

The concept of marginal intra-industry trade was elaborated by Hamilton and Kniest in 1991.[20] Since then several alternative methods for calculating the indicator have been proposed.[21] In this project the version proposed by Brüllhart was applied:[22]

$$MIIT_i = 1 - |\Delta X_i - \Delta M_i| / (|\Delta X_i| + |\Delta M_i|)$$

X_i Exports of sector i (NACE classification)

M_i Imports of sector i (NACE classification)

Δ Difference between two consecutive years

The index ranges from 0 to 1. Its value is equal to 0 if marginal trade is fully *inter-industry* and 1 if it is fully *intra-industry*. Zero value may also mean that in the period concerned either exports or imports or both decreased in the analysed commodity group.

MIIT is envisaged to be summed across industries of the same level of statistical disaggregation by the formula

$$MIIT_{tot} = \sum_{i=1}^{k} w_i \, MIIT_i ,$$

where

$$w_i = |\Delta X_i| + |\Delta M_i| / \sum_{i=1}^{k} |\Delta X_i| + |\Delta M_i|$$

and where $MIIT_{tot}$ is the weighted average of MIIT over all industries of the economy or over all sub-sectors of an industry, denoted by i….k.

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[18]   Grubel and Lloyd (1975)

[19]   Brüllhart (2002) separatum p. 11.

[20]   Hamilton, C. and Kniest, P. (1991)

[21]   Important inputs on the methodology were provided by Greenaway, Hine, Milner and Elliott (1994); and Oliveras and Terra (1997)

[22]   Brüllhart (2002) separatum p. 12. See also Kaitila (2008).

The calculations were confined to manufacturing. NACE 2 data were used including 22 commodity groups. The figures in Table 5.1 display the summary values, $MIIT_{tot}$, for the Visegrad countries' trade increment before the EU accession (2000-2003) and after the EU accession (2004-2007) both in the intra-Visegrad trade and in trade with the EU-15. In in-tra-Visegrad trade $MIIT_{tot}$ levels were typically around 0.7 with one outlier in the post-accession period (the Czech Republic). In the post-accession period compared to the pre-accession period marginal intra-industry trade increased in the case of three of the four countries, the only exception was Hungary. Nevertheless the change was not spectacular, 4 points in the case of Poland and Slovakia, contrary to the Czech Republic where the increment was a remarkable 15 points. In trade with the EU-15 $MIIT_{tot}$ values were first of all somewhat lower, and, second, more diverse than in the intra-Visegrad trade. Concern-ing the latter, the indicators were ranging from 0.57 to 0.79. Again in 3:1 proportion across countries marginal intra-industry trade was higher in the post-accession period (it de-creased only in case of Slovakia). Concluding, we found that the EU accession facilitated intra-industry trade both in the intra-Visegrad relation and in trade with EU-15. Further, intra-industry trade was more significant in trade increments of the countries concerned in their mutual trade than in their trade with the highly developed core of the EU.

Concerning the individual countries, it is remarkable that the Czech Republic achieved altogether the highest values of $MIIT_{tot}$ while there were surprisingly low levels, especially in trade with the EU-15, in the case of Hungary, a country which in many respects had simi-larities to the Czech Republic concerning its trade structure.

Table 5.1

MIIT (tot) index in intra-Visegrad trade and Visegrad countries' trade with the EU-15, before and after EU accession

NACE 2

Reporting country:	Czech Republic		Hungary		Poland		Slovakia	
Period:	pre-accession	post accession	pre-accession	post accession	pre-accession	post accession	pre-accession	post accession
Partners:								
Visegrad	0.71	0.86	0.72	0.66	0.71	0.75	0.68	0.72
EU-15	0.7	0.79	0.57	0.59	0.61	0.75	0.72	0.59

Note: Based on NACE 2 data.

Source: Own calculations based on Comext data.

$MIIT_{tot}$ reflects the weight of individual commodity groups in trade. Table 5.2 displays the change of individual MIIT indices of the 22 NACE industries. Here there is no distinction made by significance of the industries concerned in total trade. The figures display that in intra-Visegrad relations in the case of all the four countries marginal intra-industry trade increased in more cases than it decreased in the period after the EU accession compared

to the period before the accession, however, the difference between the number of industries with increasing and decreasing MIIT, respectively, was marginal except for the Czech Republic. In trade with the EU-15 the number of industries with increasing MIIT surpassed the number of industries with decreasing MIIT in all Visegrad countries but the Czech Republic. Nevertheless the number of non-interpretable cases, with the indicator's value 0.00, was high, as the computational outcome of situations where exports and/or imports of a certain commodity decreased in either of the two periods analysed. Where there is no increment in both exports and imports, marginal intra-industry trade cannot be interpreted and consequently the MIIT index has no value. That makes the appropriate interpretation of the MIIT indicators concerned impossible.

Table 5.2

**Direction of changes in MIIT indices in intra-Visegrad trade
and Visegrad countries' trade with the EU-15, before and after EU accession**

(period 2004-2007 compared to period 2000-2003)

Reporting country:	Czech R.		Hungary		Poland		Slovakia	
Number of industries with:	intra-Visegrad	trade with EU-15	intra-Visegrad	trade with EU-15	intra-Visegrad	trade with EU-15	intra-Visegrad	trade with EU-15
increasing MIIT	17	9	10	8	10	10	11	11
decreasing MIIT	5	9	9	5	9	5	10	9
non-interpretable	0	4	3	9	2	7	1	3
Total	22	22	22	22	21*	22	21	22

Note: Based on NACE 2 data.

* In the case of one industry the MIIT indicator was the same both before and after EU accession.

Source: Own calculations based on Comext data.

Table 5.3

**MIIT indices in the Czech Republic's trade with the Visegrad Group and the EU-15
before and after EU accession**

(NACE 2 manufacturing)

Industries	Visegrad		EU-15	
	2000/2003	2004/2007	2000/2003	2004/2007
food products and beverages	0.93	0.99	0.71	0.67
tobacco products	0.26	0.39	0.00	0.58
textiles	0.58	0.85	0.92	0.80
wearing apparel	0.57	0.70	0.93	0.37
leather and leather products	0.50	0.71	0.00	0.62
wood and products of wood and cork (except furniture)	0.90	0.63	0.54	0.74
pulp, paper and paper products	0.58	0.83	0.70	0.90
printed matter and recorded media	0.70	0.84	0.86	0.52
coke, refined petroleum products and nuclear fuel	0.31	0.69	0.09	0.00
chemicals, chemical products and man-made fibres	0.85	0.90	0.40	0.55
rubber and plastic products	0.88	0.89	0.92	0.96
other non-metallic mineral products	1.00	0.74	0.67	0.98
basic metals	0.99	0.84	0.73	0.72
fabricated metal products, except machinery and equip.	0.70	0.73	0.91	0.86
machinery and equipment n.e.c.	0.72	0.71	0.95	0.88
office machinery and computers	0.48	0.81	0.00	0.99
electrical machinery and apparatus n.e.c.	0.76	0.82	0.79	0.98
radio, television and comm. equip. and app.	0.84	0.95	0.34	0.63
medical, precision and optical instruments, watches	0.42	0.87	0.97	0.78
motor vehicles, trailers and semi-trailers	0.54	0.94	0.84	0.66
other transport equipment	0.95	0.74	0.87	0.74
furniture	0.62	0.95	0.38	0.87
Total	**0.71**	**0.86**	**0.70**	**0.79**

Source: Own calculations based on COMEXT data.

Table 5.4

MIIT indices in Hungary's trade with the Visegrad Group and the EU-15
before and after EU accession

(NACE 2 manufacturing)

Industries	Visegrad		EU-15	
	2000/2003	2004/2007	2000/2003	2004/2007
food products and beverages	0.38	0.85	0.88	0.44
tobacco products	0.93	0.24	0.00	0.83
textiles	0.87	0.00	0.38	0.78
wearing apparel	0.67	0.20	0.76	0.00
leather and leather products	0.90	0.74	0.00	0.00
wood and products of wood and cork (except furniture)	0.08	0.74	0.49	0.00
pulp, paper and paper products	0.86	0.97	0.54	0.72
printed matter and recorded media	0.17	0.10	0.43	0.00
coke, refined petroleum products and nuclear fuel	0.83	0.01	0.87	0.00
chemicals, chemical products and man-made fibres	0.77	0.91	0.61	0.77
rubber and plastic products	0.65	0.85	0.74	0.90
other non-metallic mineral products	0.47	0.78	0.75	0.54
basic metals	0.71	0.77	0.75	0.63
fabricated metal products, except machinery and equip.	0.37	0.70	0.57	0.75
machinery and equipment n.e.c.	0.60	0.70	0.76	0.74
office machinery and computers	0.00	0.83	0.00	0.54
electrical machinery and apparatus n.e.c.	0.77	0.55	0.50	0.63
radio, television and comm. equip. and app.	0.98	0.28	0.16	0.00
medical, precision and optical instruments, watches	0.17	0.05	0.73	0.30
motor vehicles, trailers and semi-trailers	0.95	0.76	0.50	0.78
other transport equipment	0.00	0.57	0.53	0.00
furniture	0.52	0.62	0.70	0.75
Total	**0.72**	**0.66**	**0.57**	**0.59**

Source: Own calculations based on COMEXT data.

Table 5.5

MIIT indices in Poland's trade with the Visegrad Group and the EU-15
before and after EU accession

(NACE 2 manufacturing)

Industries	Visegrad		EU-15	
	2000/2003	2004/2007	2000/2003	2004/2007
food products and beverages	0.83	0.52	0.48	0.82
tobacco products	0.01	0.08	0.62	0.43
textiles	0.91	0.27	0.43	0.69
wearing apparel	0.96	0.85	0.00	0.00
leather and leather products	0.67	0.59	0.65	0.00
wood and products of wood and cork (except furniture)	0.44	0.80	0.57	0.63
pulp, paper and paper products	0.96	0.87	0.94	0.59
printed matter and recorded media	0.00	0.43	0.00	0.64
coke, refined petroleum products and nuclear fuel	0.71	0.71	0.00	0.64
chemicals, chemical products and man-made fibres	0.97	0.89	0.50	0.53
rubber and plastic products	0.67	0.89	0.98	0.97
other non-metallic mineral products	0.15	0.80	0.07	0.91
basic metals	0.91	0.94	0.70	0.81
fabricated metal products, except machinery and equip.	0.63	0.90	0.78	0.97
machinery and equipment n.e.c.	0.75	0.78	0.88	0.79
office machinery and computers	0.40	0.81	0.00	0.51
electrical machinery and apparatus n.e.c.	0.73	0.69	0.36	1.00
radio, television and comm. equip. and app.	0.79	0.69	0.00	0.81
medical, precision and optical instruments, watches	0.27	0.09	1.00	0.38
motor vehicles, trailers and semi-trailers	0.64	0.66	0.71	0.84
other transport equipment	0.00	0.26	0.62	0.00
furniture	0.25	0.55	0.22	0.47
Total	**0.71**	**0.75**	**0.61**	**0.75**

Source: Own calculations based on COMEXT data.

Table 5.6

MIIT indices in Slovakia's trade with the Visegrad Group and the EU-15
before and after EU accession

(NACE 2 manufacturing)

Industries	Visegrad		EU-15	
	2000/2003	2004/2007	2000/2003	2004/2007
food products and beverages	0.80	0.75	0.61	0.85
tobacco products	0.00	0.00	0.81	0.00
textiles	0.73	0.40	0.58	0.15
wearing apparel	0.20	0.96	0.54	0.00
leather and leather products	0.78	0.97	0.51	0.91
wood and products of wood and cork (except furniture)	0.97	0.93	0.82	0.97
pulp, paper and paper products	0.24	0.71	0.93	0.57
printed matter and recorded media	0.76	0.96	0.45	0.36
coke, refined petroleum products and nuclear fuel	0.47	0.75	0.10	0.58
chemicals, chemical products and man-made fibres	0.82	0.61	0.48	0.62
rubber and plastic products	0.69	0.70	0.80	0.71
other non-metallic mineral products	0.91	0.69	0.75	0.92
basic metals	0.68	0.72	0.78	0.76
fabricated metal products, except machinery and equip.	0.80	0.89	0.78	0.84
machinery and equipment n.e.c.	0.57	0.69	0.78	0.92
office machinery and computers	0.35	0.76	0.28	0.53
electrical machinery and apparatus n.e.c.	0.81	0.76	0.78	0.90
radio, television and comm. equip. and app.	0.68	1.00	0.90	0.12
medical, precision and optical instruments, watches	0.73	0.66	0.46	0.19
motor vehicles, trailers and semi-trailers	0.59	0.48	0.82	0.69
other transport equipment	0.98	0.90	0.76	0.53
furniture	0.78	0.59	0.18	0.00
Total	**0.68**	**0.72**	**0.72**	**0.59**

Source: Own calculations based on COMEXT data.

5.2.2   MIIT in the motor vehicle cluster

Following huge FDI projects targeted at car manufacturing in the last one and half decades the *motor vehicle* cluster has become one of the leading exports suppliers in each Visegrad country. It seems expedient to have a closer look at the development of marginal intra-industry trade indicators in this cluster before and after the EU accession of the countries concerned.[23] We chose NACE 3-digit trade data for the analysis, focusing on three commodity groups: NACE 341: *motor vehicles*; NACE 342: *bodies (coachwork) for motor vehicles and their engines*; and, finally, NACE 343: *parts and accessories for motor vehicles and their engines.* The combined exports and imports data, respectively, of the three commodity groups were summarized as exports and imports data of the *motor vehicle* cluster.

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[23]   On intra-industry trade of the Visegrad countries in the motor vehicle cluster see Kawecka-Wyrzykowska (2010).

Were trade data distributed evenly across the 120 individual NACE 3 commodity groups, the *motor vehicle* cluster's share in total trade would be 2.49%. As data in Table 5.7 testify it, the cluster's significance has gone far beyond the proportional share. With regard to the cluster's share in total trade increments, of the 32 cases[24] in 3 it was above 30%; in 10 between 20% and 30% and in 15 between 10% and 20%.

Table 5.7

MIIT in intra-Visegrad trade in the motor vehicle cluster

		Hungary	Czech R.	Poland	Slovakia
			2000/2003		
NACE 341	motor vehicles	0.98	0.50	0.05	0.81
NACE 342	bodies (coachwork) for motor vehicles	0.89	0.00	0.00	0.88
NACE 343	parts and accessories for motor vehicles and their engines	0.88	0.46	0.60	0.19
	memo:				
	share of the three comm. groups in the exports increment	*16.0*	*23.1*	*5.2*	*10.2*
	share of the three comm. groups in the imports increment	*11.8*	*10.5*	*21.4*	*21.1*
			2004/2007		
NACE 341	motor vehicles	0.64	0.65	0.67	0.53
NACE 342	bodies (coachwork) for motor vehicles	0.80	0.91	0.57	0.83
NACE 343	parts and accessories for motor vehicles and their engines	0.87	0.78	0.57	0.40
	memo:				
	share of the three comm. groups in the exports increment	*24.9*	*12.5*	*15.6*	*7.7*
	share of the three comm. groups in the imports increment	*21.0*	*16.2*	*7.5*	*17.8*

Source: Own calculations based on COMEXT data.

Table 5.8

MIIT in trade with the EU-15 in the motor vehicle cluster

		Hungary	Czech R.	Poland	Slovakia
			2000/2003		
NACE 341	motor vehicles	0.00	0.94	0.77	0.88
NACE 342	bodies (coachwork) for motor vehicles	0.00	0.59	0.00	0.00
NACE 343	parts and accessories for motor vehicles and their engines	0.92	0.70	0.73	0.92
	memo:				
	share of the three comm. groups in the exports increment	*4.0*	*18.8*	*27.0*	*37.0*
	share of the three comm. groups in the imports increment	*19.0*	*17.9*	*24.2*	*32.3*
			2004/2007		
NACE 341	motor vehicles	0.55	0.55	0.72	0.36
NACE 342	bodies (coachwork) for motor vehicles	0.94	0.92	0.69	0.24
NACE 343	parts and accessories for motor vehicles and their engines	0.87	0.78	0.94	0.00
	memo:				
	share of the three comm. groups in the exports increment	*30.4*	*20.2*	*21.1*	*25.3*
	share of the three comm. groups in the imports increment	*16.7*	*10.0*	*12.1*	*19.3*

Source: Own calculations based on COMEXT data.

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[24] 4 (countries) X 2 (periods) X 2 (trade destinations) X 2 (trade directions).

In the intra-Visegrad trade it was only Hungary where the cluster's share in total exports and imports increments increased substantially after the country's EU accession, compared to the situation before accession. In the cases of the other three countries the data are inconclusive. In trade with the EU-15 the cluster's share in trade increments decreased after the EU accession, in comparison to the pre-accession years, in the case of Poland and Slovakia. In the case of Hungary the cluster's share in the exports increment was remarkable low, 4%, before the EU accession but it jumped to over 30% in the years after the accession (Table 5.8).

At average the *motor vehicle* cluster's share was higher in the increment of the Visegrad trade with the EU-15 than in the intra-Visegrad trade increment.

The interpretation of marginal intra-industry indicators was made difficult by the several zero values caused by diminishing exports and/or imports in one of the periods concerned. Hungary, where production and exports of *parts and accessories* are more important than those of *ready motor vehicles* maintained very high MIIT in this category in both (Visegrad and EU-15) destinations and in both (before and after EU accession) periods. *Bodies for motor vehicles* show similar picture. *Motor vehicles'* MIIT dropped in trade with the Visegrad countries after the accession. For the Czech Republic *ready-made cars'* MIIT in trade with the Visegrad Group was low before the EU accession but increased somewhat after the EU accession, and the opposite occurred in trade with the EU-15. MIIT in *parts and accessories'* trade increased after the EU accession in both destinations. Poland's MIIT with the Visegrad Group was at moderate level in both periods concerned and attained high level in trade with the EU-15 only in the category *parts and accessories* and only after the EU accession. Slovakia had the lowest MIIT index of the four Visegrad countries in the commodity group *parts and accessories* in intra-Visegrad trade both before and after accession. It is also remarkable, that the MIIT decreased to a considerable extent after the country's EU accession in trade with the EU-15.

Concluding, the MIIT indicator did not help to better understand the changes in the Visegrad trade. As earlier mentioned, the indicator's value cannot be computed if trade (either exports or imports or both decreased in a period). Further, the indicator displays an equal value if there is hardly any change in the trade volume but that is balanced, namely exports and imports of the commodity group increased marginally but to equal proportion. The same indicator may emerge if there is a stormy expansion both in exports and imports, in equal proportions. Simultaneously, a strong increase of either exports or imports so that trade flows in the opposite direction hardly change will lead to a deterioration of the MIIT. So a deteriorating MIIT index may indicate a successful export offensive or successful import substitution by domestic production but also the knock-out of domestic production and perhaps that of exports trough a flood of imports of the commodity group concerned. In this respect the evaluation of changes in the MIIT indicators seems highly problematic.

An illustration is provided in Table 5.9. The Hungarian oil company MOL bought the Slovak refinery Slovnaft in several steps by 2004. As the figures in the table show, due to an emerging intra-company but cross country division of labour Hungary's imports suddenly rocketed from 2005 on. The Gruber-Lloyd index for intra-industry trade indicated a sharp drop in intra-industry trade, the MIIT index, where no comparison was possible with the pre-accession years due to a drop in trade value, displays a disappointing low marginal intra-industry trade. How could the MIIT indicator be evaluated in this case?

Table 5.9

Hungary's trade with Slovakia in coke, refined petroleum products and nuclear fuel

	2000	2001	2002	2003	2004	2005	2006	2007
Exports (EUR mn)	15	33	44	31	76	32	59	51
Imports (EUR mn)	115	91	89	64	71	182	236	232
Grubel-Lloyd index (between 0 and 1)	0.23	0.53	0.66	0.65	0.97	0.30	0.40	0.36

	2000/2003	2004/2007
MIIT	0.00	0.22

Source: Eurostat database (COMEXT), own calculations.

6. Analysis by revealed comparative advantage (RCA)

6.1 RCA by NACE 2 industries

The revealed comparative advantage indicators were calculated according to the Balassa formula:[25]

$$RCA_{ci} = 100 \cdot \ln \left(\frac{\dfrac{X_{ci}}{M_{ci}}}{\dfrac{\sum_i X_{ci}}{\sum_i M_{ci}}} \right)$$

where:

        X (M) are exports (imports);

        c denotes a partner country;

        i denotes the respective industry grouping

Positive (negative) RCA values indicate a comparative (dis-) advantage.

Tables 6.1 to 6.8 display the RCA indicators of the individual Visegrad countries' trade with the other member of the Visegrad Group and the EU-15, respectively, both in the years before and after these countries' accession to the EU. The indicators show a continuous

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[25]   Balassa (1965), pp. 99-123.

rearrangement over the years. Nevertheless only some of these changes were related in one or another way with the EU accession. Table 6.9 and 6.10 provide an overview of these changes. In these tables only those commodity groups have a place in whose RCA indictor a clearly visible change, in any direction, took place either in 2004 or in 2005, and where the general picture about the RCA values was, to a considerable extent, different from that before the EU accession. Six type of RCA changes were distinguished, in two different sub-groups. In the first, 'positive' sub-group the initially revealed comparative dis-advantage turned into revealed comparative advantage after the accession or, an initially positive RCA indicator improved further or, finally, an originally negative RCA indicator re-mained negative, yet got better. In the second, 'negative' sub-group the initially positive RCA indicator turned to negative, or it remained positive but deteriorated, or it was already initially negative and deteriorated further after the EU accession.

Table 6.1

**RCA indicators in the Czech Republic's trade with the Visegrad countries
before and after EU accession**

	2000	2001	2002	2003	2004	2005	2006	2007
food products and beverages	4	1	-7	-12	-16	-13	-12	-9
tobacco products	107	105	119	69	110	173	-26	92
textiles	118	111	110	110	83	53	40	40
wearing apparel	-71	-86	-83	-86	-67	-43	-10	-5
leather and leather products	-59	-69	-101	-78	-41	-20	-6	-4
wood and products of wood and cork (except furniture)	-28	-18	-22	-35	-19	-16	12	15
pulp, paper and paper products	1	10	6	9	9	0	12	19
printed matter and recorded media	23	9	7	15	-14	-16	-21	21
coke, refined petroleum products and nuclear fuel	-182	-141	-161	-172	-158	-122	-106	-126
chemicals, chemical products and man-made fibres	4	1	-4	-6	-2	-3	2	4
rubber and plastic products	-7	-3	-5	-7	7	-1	7	6
other non-metallic mineral products	35	25	12	10	23	16	22	27
basic metals	-69	-52	-53	-46	-50	-51	-49	-44
fabricated metal prod. except machinery and equipment	48	43	32	37	41	49	43	43
machinery and equipment n.e.c.	47	44	35	43	52	63	62	48
office machinery and computers	101	80	151	96	43	58	66	36
electrical machinery and apparatus n.e.c.	26	14	27	22	12	4	10	25
radio, television and comm. equipment and apparatus	-30	-54	37	-22	55	54	2	-21
medical, precision and optical instruments, watches	120	136	112	101	75	59	54	47
motor vehicles, trailers and semi-trailers	76	62	54	75	57	29	18	14
other transport equipment	79	121	66	38	4	48	33	42
furniture	-45	-52	-58	-69	-61	-51	-36	-36

Source: Own calculations based on the COMEXT database.

Table 6.2

RCA indicators in the Czech Republic's trade with the EU-15 before and after EU accession

	2000	2001	2002	2003	2004	2005	2006	2007
food products and beverages	-73	-68	-83	-89	-71	-72	-74	-79
tobacco products	48	40	22	-43	-120	-215	-114	-84
textiles	-2	4	-12	-10	-10	-10	-13	-12
wearing apparel	132	127	115	112	31	23	16	-7
leather and leather products	-4	-8	-28	-38	-53	-70	-71	-58
wood and products of wood and cork (except furniture)	125	115	95	88	92	85	87	75
pulp, paper and paper products	-42	-56	-65	-71	-64	-57	-55	-50
printed matter and recorded media	-1	-2	-4	6	5	3	-9	45
coke, refined petroleum products and nuclear fuel	-43	-53	-4	-10	-53	-58	-77	-116
chemicals, chemical products and man-made fibres	-88	-99	-122	-121	-114	-107	-110	-109
rubber and plastic products	-31	-32	-29	-36	-32	-32	-32	-24
other non-metallic mineral products	72	52	26	20	25	27	29	18
basic metals	-18	-25	-31	-33	-23	-35	-42	-50
fabricated metal prod. except machinery and equipment	41	37	21	21	31	33	29	25
machinery and equipment n.e.c.	-22	-25	-24	-19	-3	3	6	1
office machinery and computers	-21	43	141	171	40	29	18	34
electrical machinery and apparatus n.e.c.	20	14	20	20	28	25	24	9
radio, television and comm. equipment and apparatus	-52	-15	4	13	-1	-22	-5	44
medical, precision and optical instruments, watches	-65	-58	-63	-46	-34	-43	-47	-45
motor vehicles, trailers and semi-trailers	49	40	32	29	33	53	54	48
other transport equipment	73	65	40	37	3	-51	3	-15
furniture	93	103	97	91	83	82	65	62

Source: Own calculations based on the COMEXT database.

Table 6.3

**RCA indicators in Hungary's trade with the Visegrad countries
before and after EU accession**

	2000	2001	2002	2003	2004	2005	2006	2007
food products and beverages	74	43	41	28	-18	-37	-41	-32
tobacco products	201	-32	-87	310	-274	365	-250	-206
textiles	19	84	46	29	1	-28	-41	-88
wearing apparel	75	95	116	23	-11	24	-25	-93
leather and leather products	90	96	132	43	87	111	46	21
wood and products of wood and cork (except furniture)	-169	-150	-189	-180	-109	-111	-137	-93
pulp, paper and paper products	-40	-24	2	-8	-37	-25	-24	-34
printed matter and recorded media	-74	-5	-65	-130	-136	-180	-178	-202
coke, refined petroleum products and nuclear fuel	-47	-45	-77	-39	-11	-158	-161	-154
chemicals, chemical products and man-made fibres	69	64	68	63	59	37	16	12
rubber and plastic products	22	5	-2	-12	-19	-11	-7	-10
other non-metallic mineral products	-70	-74	-67	-74	-81	-88	-89	-86
basic metals	-80	-56	-47	-58	-53	-12	-61	-75
fabricated metal prod. except machinery and equipment	-13	-31	-56	-60	-62	-62	-63	-31
machinery and equipment n.e.c.	1	1	-1	62	64	31	31	34
office machinery and computers	-10	-108	-142	-57	37	14	52	3
electrical machinery and apparatus n.e.c.	-62	-52	-56	-37	6	50	29	17
radio, television and comm. equipment and apparatus	81	-1	29	19	48	100	65	112
medical, precision and optical instruments, watches	55	14	-10	-115	-168	-115	87	115
motor vehicles, trailers and semi-trailers	-14	31	33	18	2	4	43	21
other transport equipment	21	-39	-82	-61	-15	-116	-25	11
furniture	-49	-60	-86	-83	-87	-58	-77	-106

Source: Own calculations based on the COMEXT database.

Table 6.4

RCA indicators in Hungary's trade with the EU-15 before and after EU accession

	2000	2001	2002	2003	2004	2005	2006	2007
food products and beverages	61	57	36	43	8	-15	-22	-21
tobacco products	-647	-505	-635	-315	-328	162	-109	-73
textiles	-88	-84	-89	-65	-67	-58	-82	-90
wearing apparel	118	129	129	138	113	84	50	31
leather and leather products	2	-10	-22	-14	-43	-44	-37	-38
wood and products of wood and cork (except furniture)	63	43	25	22	11	12	5	-11
pulp, paper and paper products	-125	-121	-135	-120	-136	-123	-130	-109
printed matter and recorded media	-117	-148	-132	-136	-111	-99	-75	-71
coke, refined petroleum products and nuclear fuel	59	73	41	23	5	-62	-78	-170
chemicals, chemical products and man-made fibres	-114	-121	-127	-112	-103	-101	-94	-83
rubber and plastic products	-90	-88	-95	-83	-70	-55	-59	-59
other non-metallic mineral products	-53	-64	-84	-53	-71	-46	-52	-20
basic metals	-11	-21	-37	-30	-24	-22	-39	-53
fabricated metal prod. except machinery and equipment	-72	-66	-83	-77	-69	-67	-63	-66
machinery and equipment n.e.c.	-74	-67	-74	-24	-3	-31	-5	-5
office machinery and computers	84	73	82	137	76	63	52	32
electrical machinery and apparatus n.e.c.	29	35	38	55	30	27	36	0
radio, television and comm. equipment and apparatus	28	36	75	54	60	57	49	109
medical, precision and optical instruments, watches	-53	-23	-16	-7	8	-65	55	58
motor vehicles, trailers and semi-trailers	32	32	19	1	-5	25	24	21
other transport equipment	2	38	41	74	89	33	-91	-46
furniture	56	61	102	54	41	39	46	46

Source: Own calculations based on the COMEXT database.

Table 6.5

**RCA indicators in Poland's trade with the Visegrad countries
before and after EU accession**

	2000	2001	2002	2003	2004	2005	2006	2007
food products and beverages	31	31	25	35	54	68	71	64
tobacco products	409	457	474	486	508	184	205	318
textiles	-73	-75	-77	-62	-51	-22	-21	0
wearing apparel	101	75	21	62	77	60	65	29
leather and leather products	193	128	111	119	92	49	29	4
wood and products of wood and cork (except furniture)	68	59	68	86	53	20	1	10
pulp, paper and paper products	0	-8	-18	-10	7	-7	-12	-12
printed matter and recorded media	-3	-5	33	65	84	102	80	74
coke, refined petroleum products and nuclear fuel	-8	-15	32	48	59	9	0	-17
chemicals, chemical products and man-made fibres	-34	-41	-41	-38	-41	-40	-41	-44
rubber and plastic products	20	26	26	28	8	12	6	12
other non-metallic mineral products	-72	-42	-29	-12	-4	-3	6	5
basic metals	30	21	18	-1	1	-22	-7	-5
fabricated metal prod. except machinery and equipment	-25	-1	18	23	14	-1	-7	-14
machinery and equipment n.e.c.	-43	-49	-43	-53	-55	-71	-69	-61
office machinery and computers	-54	-150	-161	-105	-65	-32	-7	-64
electrical machinery and apparatus n.e.c.	31	34	21	35	7	26	31	39
radio, television and comm. equipment and apparatus	-70	1	-22	-39	-80	-83	-92	-68
medical, precision and optical instruments, watches	-112	-126	-43	72	83	43	10	-54
motor vehicles, trailers and semi-trailers	4	-8	-34	-62	-36	29	15	22
other transport equipment	-102	-115	-115	-73	-128	-204	-153	-150
furniture	149	157	168	172	147	124	128	114

Source: Own calculations based on the COMEXT database.

Table 6.6

RCA indicators in Poland's trade with the EU-15 before and after EU accession

	2000	2001	2002	2003	2004	2005	2006	2007
food products and beverages	26	21	17	37	43	46	49	48
tobacco products	51	102	-94	-76	28	-1	67	137
textiles	-62	-66	-60	-56	-61	-62	-67	-52
wearing apparel	245	228	217	219	151	118	85	65
leather and leather products	4	-7	-15	-20	-49	-55	-75	-79
wood and products of wood and cork (except furniture)	174	153	145	146	141	134	127	124
pulp, paper and paper products	-65	-53	-47	-50	-54	-59	-63	-55
printed matter and recorded media	-42	-63	-36	-12	8	19	45	36
coke, refined petroleum products and nuclear fuel	41	88	81	64	84	44	10	-24
chemicals, chemical products and man-made fibres	-110	-132	-134	-129	-131	-128	-113	-106
rubber and plastic products	-65	-55	-46	-44	-35	-28	-22	-16
other non-metallic mineral products	-20	-13	-16	-4	5	16	23	14
basic metals	42	20	8	-5	5	-10	-8	-15
fabricated metal prod. except machinery and equipment	25	28	23	18	22	23	19	22
machinery and equipment n.e.c.	-92	-86	-77	-72	-64	-52	-48	-46
office machinery and computers	-193	-180	-134	-129	-199	-223	-213	-94
electrical machinery and apparatus n.e.c.	35	37	47	50	38	35	34	33
radio, television and comm. equipment and apparatus	-26	-14	7	16	-14	-18	-6	40
medical, precision and optical instruments, watches	-110	-111	-98	-78	-95	-88	-86	-107
motor vehicles, trailers and semi-trailers	33	29	25	21	38	51	46	37
other transport equipment	103	155	100	113	38	100	173	90
furniture	153	155	159	156	159	155	154	150

Source: Own calculations based on the COMEXT database.

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Table 6.7

RCA indicators in Slovakia's trade with the Visegrad countries
before and after EU accession

	2000	2001	2002	2003	2004	2005	2006	2007
food products and beverages	-68	-41	-34	-20	-13	-19	-15	-19
tobacco products	-161	-177	-173	-118	-176	-515	-389	-422
textiles	-121	-61	-71	-31	-58	-88	-60	-48
wearing apparel	2	20	38	61	31	19	5	33
leather and leather products	-92	-54	-42	-42	-43	-21	3	3
wood and products of wood and cork (except furniture)	42	40	31	29	61	61	64	42
pulp, paper and paper products	26	10	8	0	1	0	-4	-4
printed matter and recorded media	-21	-13	-6	9	29	29	40	30
coke, refined petroleum products and nuclear fuel	229	181	145	153	123	129	94	105
chemicals, chemical products and man-made fibres	-4	13	14	13	4	-21	-15	-20
rubber and plastic products	-20	-27	-17	-23	-15	-3	-6	-25
other non-metallic mineral products	7	4	11	9	5	11	1	-5
basic metals	70	62	55	71	79	84	88	82
fabricated metal prod. except machinery and equipment	-41	-44	-33	-31	-26	-24	-14	-6
machinery and equipment n.e.c.	-29	-37	-31	-27	-34	-44	-47	-28
office machinery and computers	-144	-124	-82	-82	-57	-3	-8	-34
electrical machinery and apparatus n.e.c.	-51	-48	-36	-34	-39	-46	-23	-23
radio, television and comm. equipment and apparatus	5	22	16	-15	-37	-25	11	17
medical, precision and optical instruments, watches	-68	-78	-69	-47	-97	-69	-47	-42
motor vehicles, trailers and semi-trailers	-73	-89	-71	-90	-120	-101	-120	-86
other transport equipment	-23	-21	-13	-17	13	14	18	25
furniture	-136	-97	-66	-65	-58	-61	-94	-58

Source: Own calculations based on the COMEXT database.

Table 6.8

RCA indicators in Slovakia's trade with the EU-15 before and after EU accession

	2000	2001	2002	2003	2004	2005	2006	2007
food products and beverages	-160	-137	-146	-141	-92	-58	-74	-91
tobacco products	93	54	20	-8	-129	-254	-176	-249
textiles	-98	-102	-86	-100	-97	-82	-85	-77
wearing apparel	180	180	170	161	124	102	92	59
leather and leather products	69	77	78	68	59	50	41	36
wood and products of wood and cork (except furniture)	92	85	90	68	74	69	61	16
pulp, paper and paper products	15	29	19	6	19	23	29	20
printed matter and recorded media	23	39	35	36	44	43	54	-19
coke, refined petroleum products and nuclear fuel	119	103	86	86	111	43	76	67
chemicals, chemical products and man-made fibres	-78	-86	-92	-109	-96	-101	-94	-114
rubber and plastic products	-78	-48	-44	-60	-46	-31	-36	-34
other non-metallic mineral products	32	36	25	2	16	31	9	-19
basic metals	71	75	63	51	42	24	21	-23
fabricated metal prod. except machinery and equipment	-16	-12	-24	-40	-26	-11	-11	-18
machinery and equipment n.e.c.	-64	-58	-46	-36	-23	-17	-32	-30
office machinery and computers	-9	-53	-54	62	48	39	22	-45
electrical machinery and apparatus n.e.c.	-6	3	18	5	12	19	5	-6
radio, television and comm. equipment and apparatus	-45	-20	-30	-29	0	36	95	158
medical, precision and optical instruments, watches	-190	-167	-167	-161	-171	-201	-227	-224
motor vehicles, trailers and semi-trailers	55	40	31	33	20	20	20	29
other transport equipment	67	81	52	46	29	46	26	18
furniture	54	70	120	147	100	89	24	52

Source: Own calculations based on the COMEXT database.

In trade of individual Visegrad members with other Visegrad countries of the 22 manufacturing industries 4 to 8 were involved in RCA changes related to the EU accession. The respective figures were 4 to 6 industries in the Visegrad countries' trade with the EU-15 (see Table 6.9 and 6.10).

It is interesting that *food products and beverages*, the only commodity group where quantitative restrictions were in place in the intra-Visegrad (then also intra-CEFTA) trade up till the EU accession, appear only in the case of Hungary as an area where the EU accession turned revealed comparative advantage of the country before accession into revealed comparative disadvantage after the accession. Similar restrictions were still valid in the Visegrad countries' trade with the EU-15 up till the EU enlargement. Here the accession had the same above mentioned impact in the case of Hungary but the liberalization of trade in this commodity group had the opposite impact on Poland's and Slovakia's food trade, their RCA indicators indicated a considerable improvement after the EU accession.

It is remarkable that the Czech Republic, the country with the oldest industrial tradition in the region concerned, had unfavourable RCA indicators in industries *office machinery and computers* and *motor vehicles*, while an improvement of RCA values were recorded for Hungary and Slovakia in the commodity group *office machinery and computers* and in the commodity group *motor vehicles* for Poland.

In trade with the EU-15 the most spectacular feature was the unfavourable proportion of commodities with improving RCA to commodities with deteriorating RCA indicators. In the case of the Czech Republic it was 1:3; Hungary 2:4; Poland 2:5 and Slovakia 2:4. Here the Czech Republic managed to turn the RCA indicators from negative to positive in the commodity group *machinery and equipment n.e.c.*, but the opposite occurred in another engineering field, *other transport equipment.*

Commodity group *printed matter and recorded media* figured with improving RCA both in Hungarian and Polish trade with EU-15, and, as mentioned already above, *food industry products'* RCA improved both for Poland and Slovakia. The other side of the coin shows that *wearing apparel* and *leather and leather products* were losers in terms of RCA in nearly all Visegrad countries' trade. It is also interesting that in the case of Hungary and Poland no technically sophisticated commodities appear in the table in either direction of RCA change.

Table 6.9

EU accession-related changes in RCA in individual Visegrad countries' trade with the Visegrad Group

Type of change in RCA	Czech Republic	Hungary	Poland	Slovakia
turning from negative to positive	wood and products of wood and cork (e.f.)	office machinery and computers electrical machinery and apparatus n.e.c.	motor vehicles, trailers and semi-trailers	leather and leather products printed matter and recorded media other transport equipment
positive and improving		machinery and equipment n.e.c.		wood and products of wood and cork (e.f.)
negative but improving	wearing apparel leather and leather products coke, refined petroleum prod. and nucl. f.			office machinery and computers
turning from positive to negative		food products and beverages textiles wearing apparel		chemicals, chemical prod. and m. m. fibres
positive but deteriorating	textiles office machinery and computers motor vehicles, trailers and semi-trailers	chemicals, chemical prod. and m. m. fibres	rubber and plastic products	
negative and deteriorating		coke, refined petroleum prod. and nucl. f.	radio, television and comm. equip. & app. other transport equipment	tobacco products

Source: Own calculations based on the COMEXT database.

Table 6.10

EU accession-related changes in RCA in individual Visegrad countries' trade with the EU-15

Type of change in RCA	Czech Republic	Hungary	Poland	Slovakia
turning from negative to positive	machinery and equipment n.e.c.			radio, television and comm. equip. & app.
positive and improving			food products and beverages printed matter and recorded media	
negative but improving		printed matter and recorded media rubber and plastic products		food products and beverages
turning from positive to negative	tobacco products wearing apparel other transport equipment	food products and beverages leather and leather products coke, refined petroleum products and nuclear fuel	coke, refined petroleum prod. and nucl. f.	tobacco products
positive but deteriorating		wearing apparel	wearing apparel	wearing apparel leather and leather products
negative and deteriorating			leather and leather products	medical, precision and optical instr., w.

Source: Own calculations based on the COMEXT database.

### 6.2 RCA by factor intensity (Taxonomy I)

6.2.1 Intra-Visegrad trade

Figures 6.1 to 6.4 display changes in revealed comparative advantages in the individual Visegrad countries' trade with the other three members of the group by factor intensity. It is remarkable that changes in the RCA values were typically 'smooth' and relatively few abrupt changes took place in the accession year 2004 or in any other years of the period concerned. Of the few relatively remarkable changes it is worth mentioning Hungary's RCA improvement in *technology-intensive industries* and the deterioration of RCA in *capital-intensive industries* from 2004 onwards. In the case of Poland a strong process of RCA improvement in *labour-intensive industries* suddenly stopped and turned flat after the EU accession, and in *technology-intensive industries* a strong deterioration was halted and turned into a strong (but short-lived) improvement in the year of Poland's EU accession.

Other interesting features, not related directly to the EU accession, are the permanent positive RCA indicators in *technology-intensive industries* in the case of the Czech Republic and Hungary, and the negative RCA values for this segment in the case of Poland and Slovakia. In *labour-intensive industries* Hungary had strongly negative, while Poland significantly positive RCA indicators in the period concerned, as quasi mirror images of the RCA indicators in *technology-intensive industries*. This quasi mirror image is not discernible in the case of the Czech Republic, where the values of RCA in *labour-intensive industries* were oscillating around zero and for Slovakia, where the RCA indicator switched over from mildly negative to mildly positive in the years between 2000 and 2009.

Another interesting feature is that the RCA indicators for *capital-intensive industries* were deeply negative in the case of the Czech Republic at the beginning of the period concerned, then continuously improved. Exactly the opposite occurred in the case of Slovakia, RCA indicators in capital-intensive industries were extreme positive initially but later dropped though remained positive. All in all, it seems that the recent industrial modernization surge in Hungary and Slovakia manifested in the intra-Visegrad trade; this is proved by the highly positive and improving RCA indicators for *technology-intensive industries* in the case of Hungary and the negative but spectacularly improving RCA indicators in the same commodity group for Slovakia.

Figure 6.1

RCA in the Czech Republic's trade with the Visegrad countries, Taxonomy I
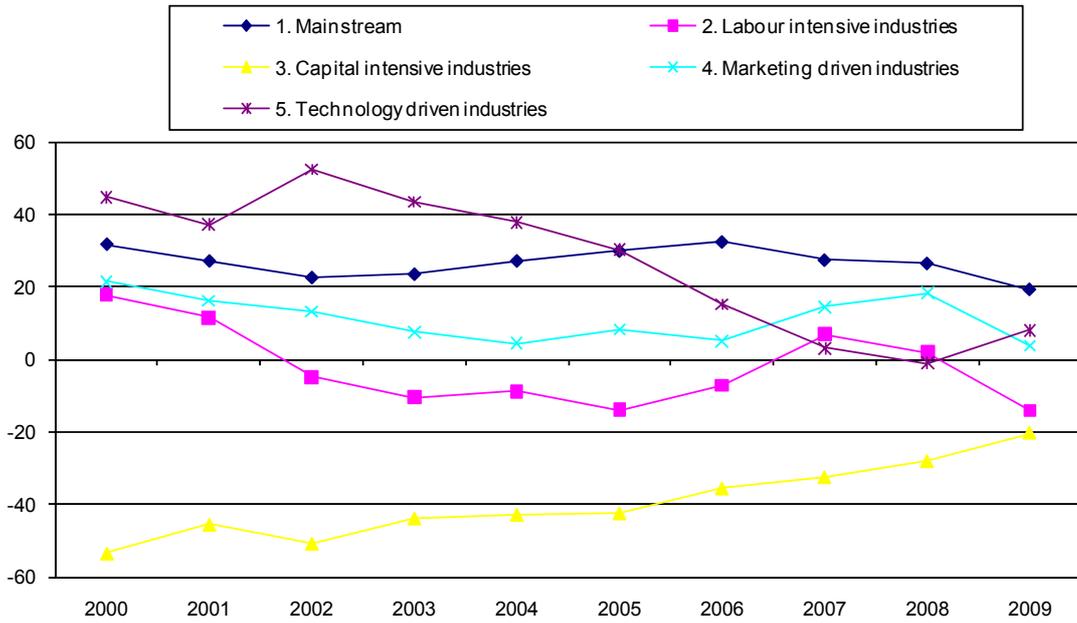
Source: Eurostat database (COMEXT), own calculations.

Figure 6.2

RCA in Hungary's trade with the Visegrad countries, Taxonomy I

Source: Eurostat database (COMEXT), own calculations.

Figure 6.3

RCA in Poland's trade with the Visegrad countries, Taxonomy I

Source: Eurostat database (COMEXT), own calculations.

Figure 6.4
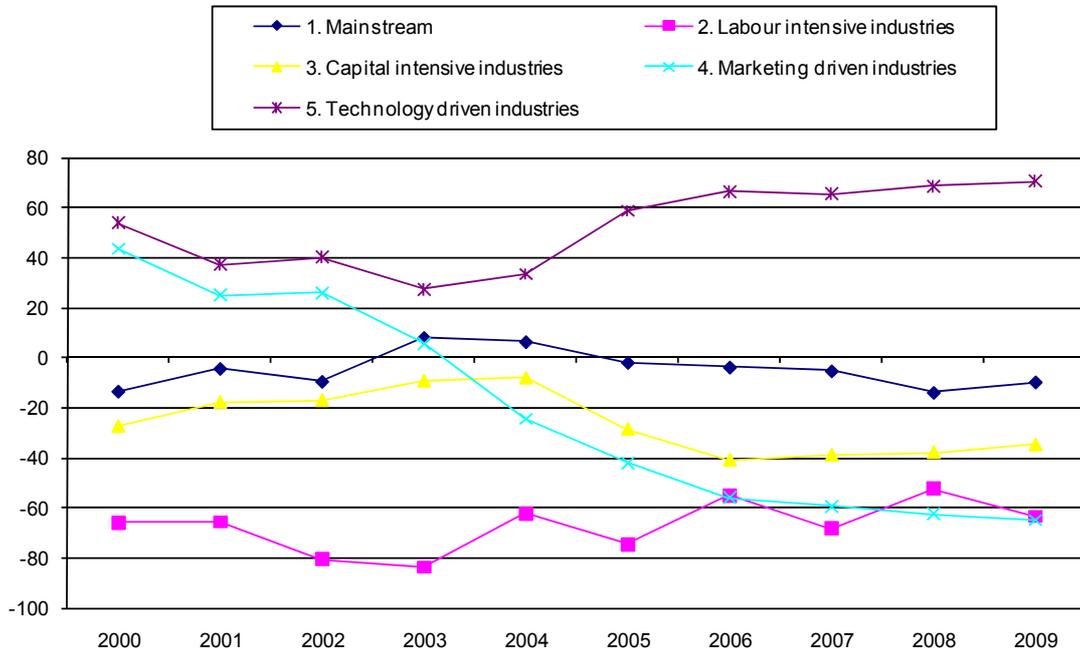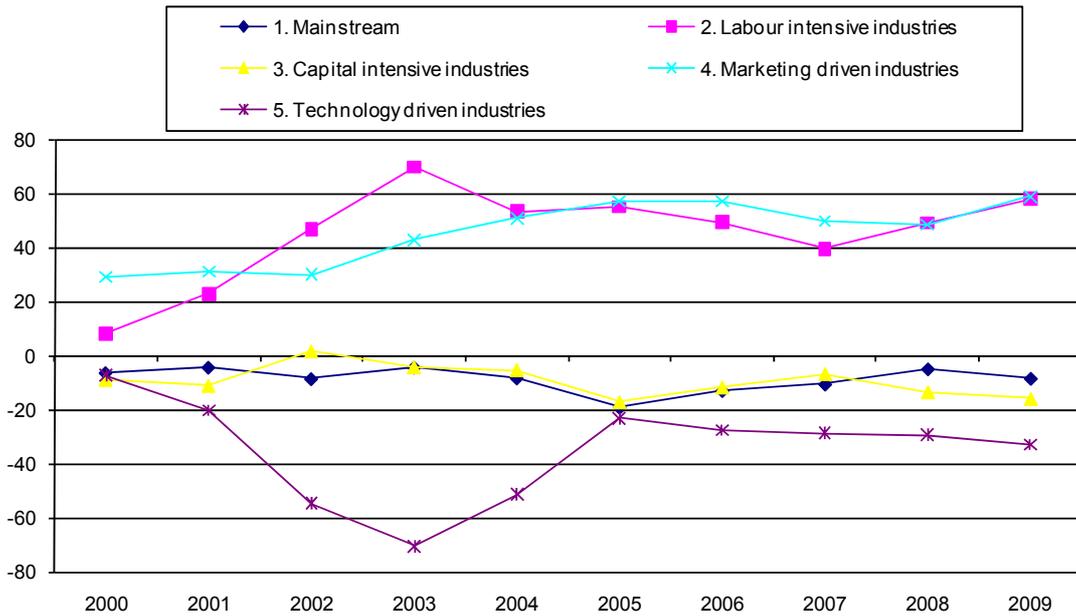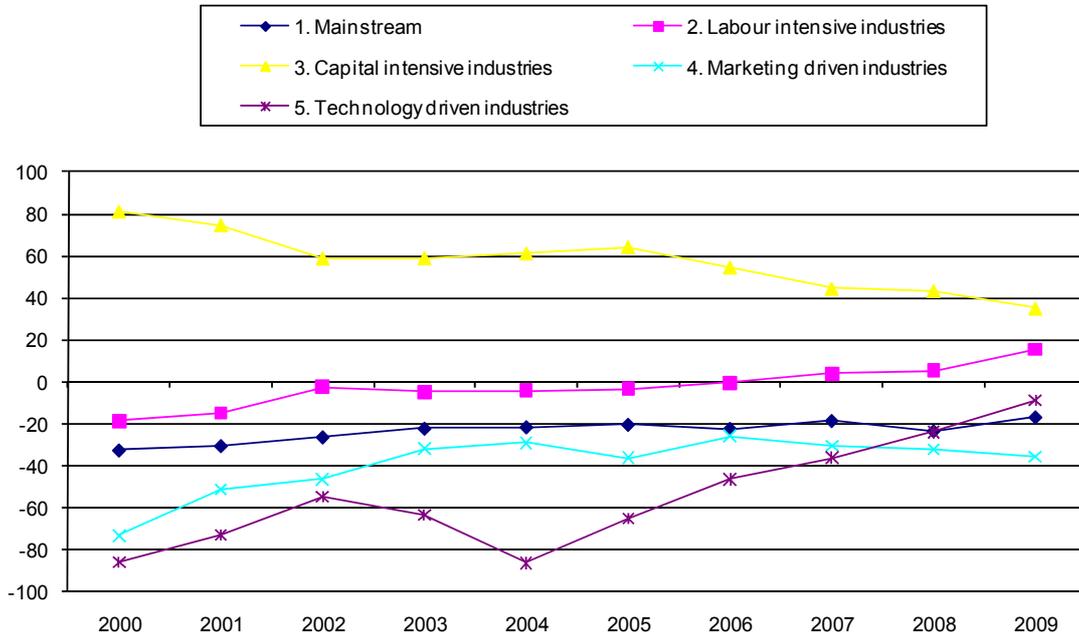
RCA in Slovakia's trade with the Visegrad countries, Taxonomy I

Source: Eurostat database (COMEXT), own calculations.

6.2.2   Trade with the EU-15

EU accession did not bring about any abrupt changes in the Visegrad countries' trade with the EU-15 either. The two exceptions are *technology-intensive industries* in the cases of the Czech Republic and Slovakia (see Figures 6.5 to 6.8). In the Czech case the EU accession seemingly stopped a continuous improvement of the RCA indicator (which then continued from 2006 on), in the Slovak case a continuous deterioration of the RCA indicator turned into continuous improvement.

The Visegrad countries' highly positive RCA values in *labour-intensive industries* play an extremely important role in counterbalancing the negative positions in other industries. The only exception is Hungary where *technology-intensive industries* had substantially higher positive RCA values than in the other Visegrad countries. From 2006 onwards Slovakia seemed to follow the Hungarian pattern and had a more impressive composition of RCA indicators than its 'big brother', the Czech Republic.

Figure 6.5

RCA in the Czech Republic's trade with the EU-15, Taxonomy I

Source: Eurostat database (COMEXT), own calculations.

Figure 6.6

RCA in Hungary's trade with the EU-15, Taxonomy I

Source: Eurostat database (COMEXT), own calculations.

Figure 6.7

RCA in Poland's trade with the EU-15, Taxonomy I

Source: Eurostat database (COMEXT), own calculations.

Figure 6.8

RCA in Slovakia's trade with the EU-15, Taxonomy I
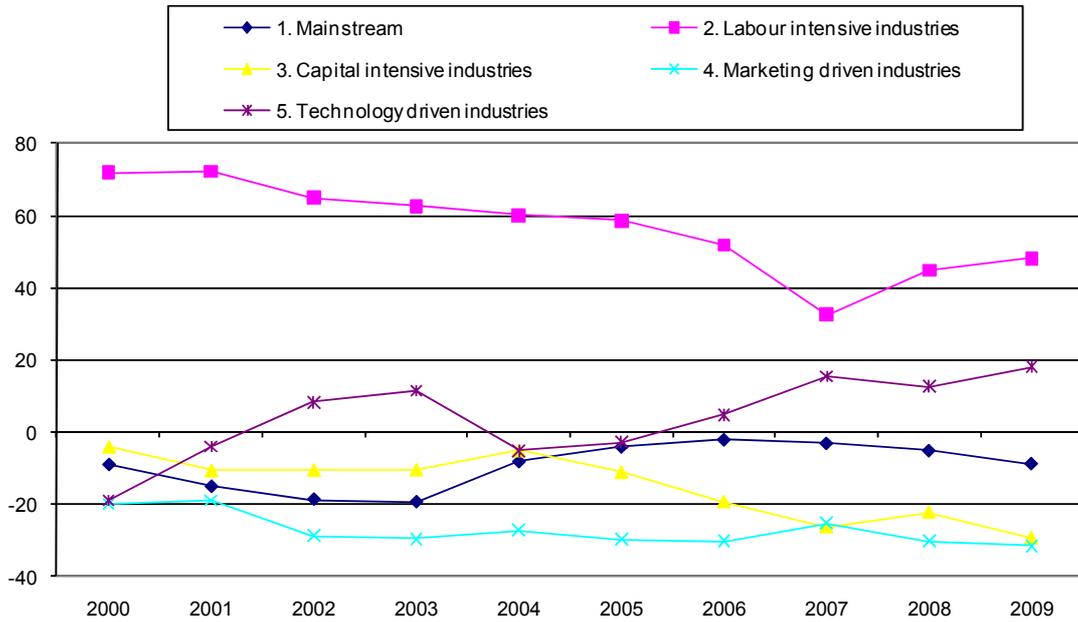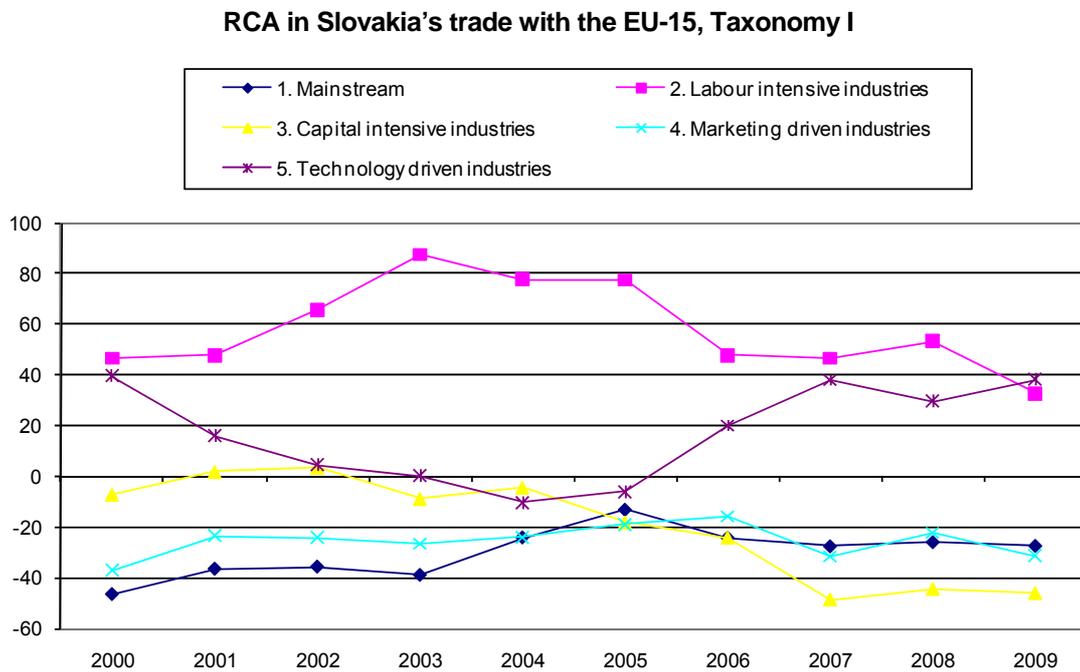

Source: Eurostat database (COMEXT), own calculations.

6.3 RCA by skill (Taxonomy II)

6.3.1 Intra-Visegrad trade

Analysed the revealed comparative advantage by skill, the EU accession did not produce remarkable changes either in the RCA values in intra-Visegrad trade (see Figures 6.9 to 6.12). The only exception was *high skill industries* in the Czech Republic's trade where the RCA indicator improved remarkably after the EU accession but then fell back to near pre-accession levels in two years. Otherwise the characteristics of the division of labour did not change too much in the period concerned. Hungary and the Czech Republic remained in the terrain of highly positive RCA in *high skill industries*, and as a mirror image, Poland and Slovakia remained in the extreme negative area in this segment. The opposite was the case with *low skill industries*, where Poland and Slovakia had revealed comparative advantage and the Czech Republic but even more Hungary displayed strong revealed comparative disadvantage. It is worth mentioning that the industries *medium skill/white collar workers* and *medium skill/blue collar workers* had a mirror image in the initial years of the period investigated in the Czech Republic and Slovakia. In the former country *white collar workers'* industries had deeply negative, *blue collar workers'* industries highly positive RCA. In Slovakia it was just the opposite case. However, the development diverged in the two countries. In the case of the Czech Republic both groups of industries achieved a balanced position with close to zero RCA indicators by the end of the period, while in Slovakia the two curves got closer to each other but the distance remained considerable.
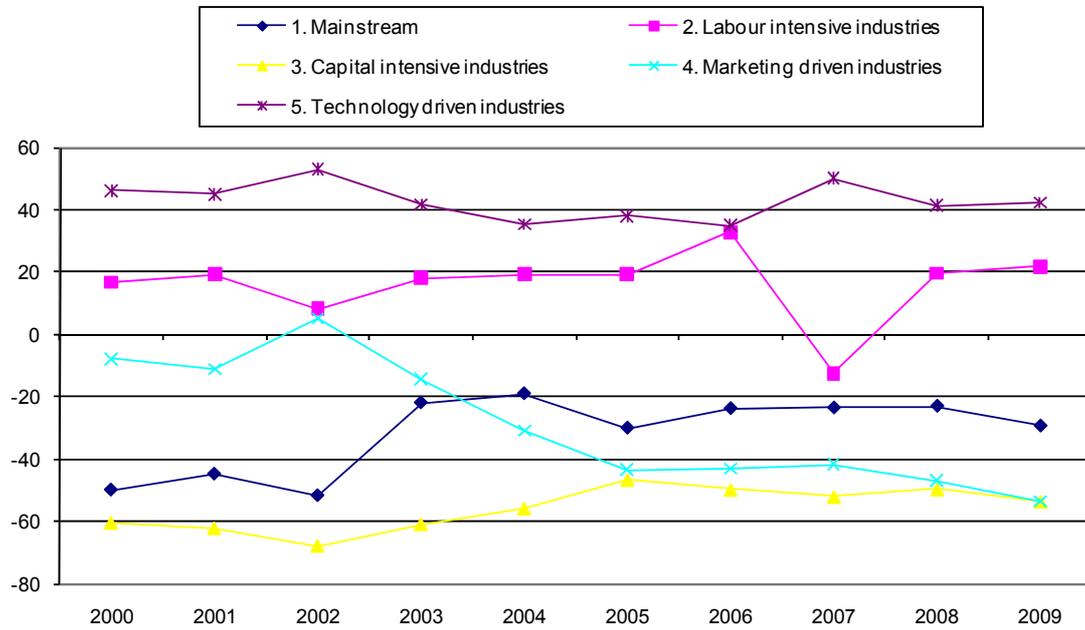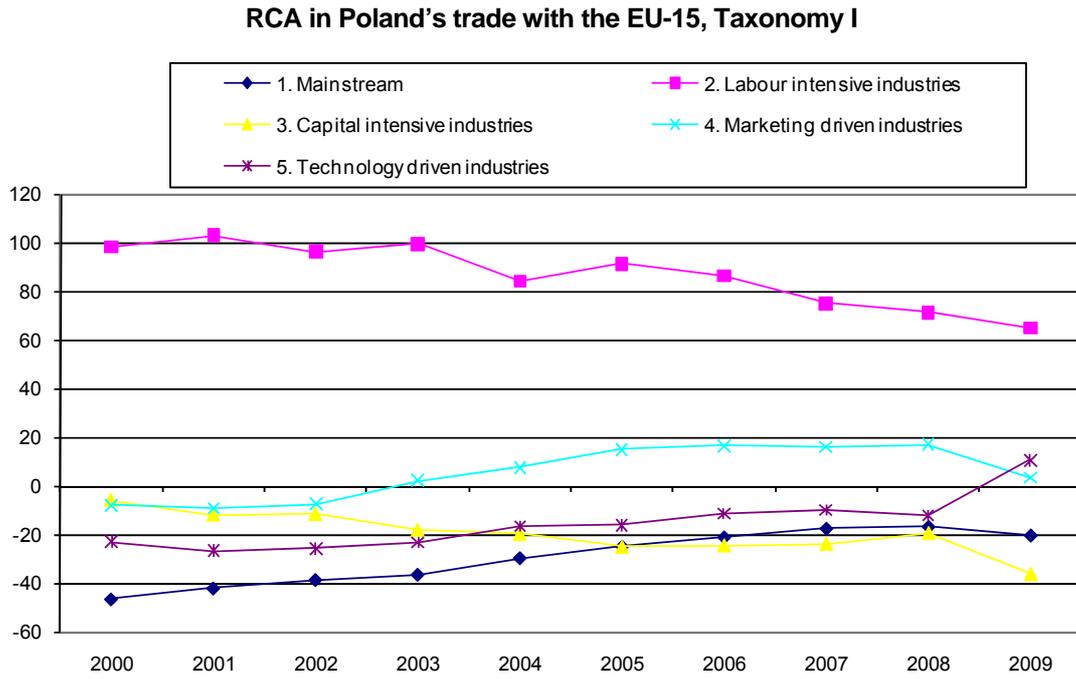
Figure 6.9

RCA in the Czech Republic's trade with the Visegrad countries, Taxonomy II
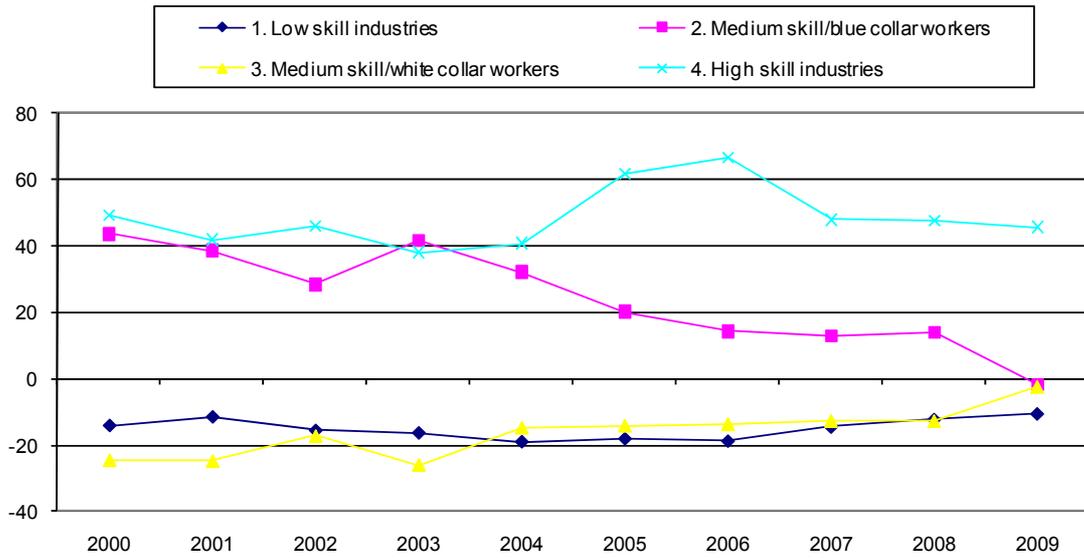
Source: Eurostat database (COMEXT), own calculations.

Figure 6.10

RCA in Hungary's trade with the Visegrad countries, Taxonomy II

Source: Eurostat database (COMEXT), own calculations.

Figure 6.11

RCA in Poland's trade with the Visegrad countries, Taxonomy II

| | 1. Low skill industries | | 2. Medium skill/blue collar workers |
| 3. Medium skill/white collar workers | | 4. High skill industries |

Source: Eurostat database (COMEXT), own calculations.

Figure 6.12

RCA in Slovakia's trade with the Visegrad countries, Taxonomy II

| | 1. Low skill industries | | 2. Medium skill/blue collar workers |
| 3. Medium skill/white collar workers | | 4. High skill industries |

Source: Eurostat database (COMEXT), own calculations.

6.3.2 Trade with the EU-15

In the Visegrad countries' trade with the EU-15 significant rearrangement took place in two cases at the time of the EU accession (See Figures 6.13 to 6.16). In the case of Hungary the declining trend of RCA in the *medium skill/blue collar workers'* industries stopped in 2004 and turned into an improving trend thereafter. The opposite change of trend, from improving to deteriorating, was observed in Poland's trade with the EU-15 in the case of *high skill industries*.

The technology gap of the Visegrad countries vis-à-vis the EU-15 is clearly visible from the deeply negative RCA indicators for *high skill industries*, except for the Czech Republic. A good marker for the characteristic division of labour between the Visegrad countries with the EU-15 is the curve of the *medium skill/blue collar workers'* industries. This segment had highly positive RCA over the whole period for all the four Visegrad countries' trade with the EU-15 (except for Hungary in 2003 and 2004). It is also remarkable (and positive) that *low skill industries* had a growing revealed comparative *disadvantage* in the case of all the four countries. In the case of Poland the RCA indicators were very similar in the trade with other Visegrad countries and the EU-15, respectively. In the case of the other three countries the picture concerning RCA indicators was quite different in the two trade relations.
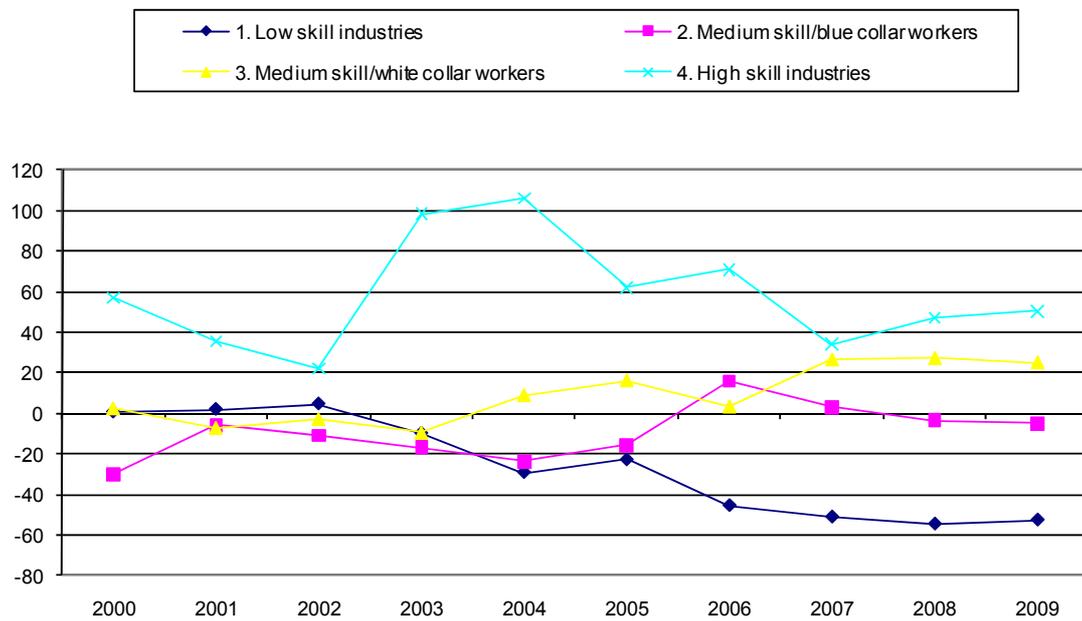
Figure 6.13

RCA in the Czech Republic's trade with the EU-15, Taxonomy II

Source: Eurostat database (COMEXT), own calculations.

Figure 6.14

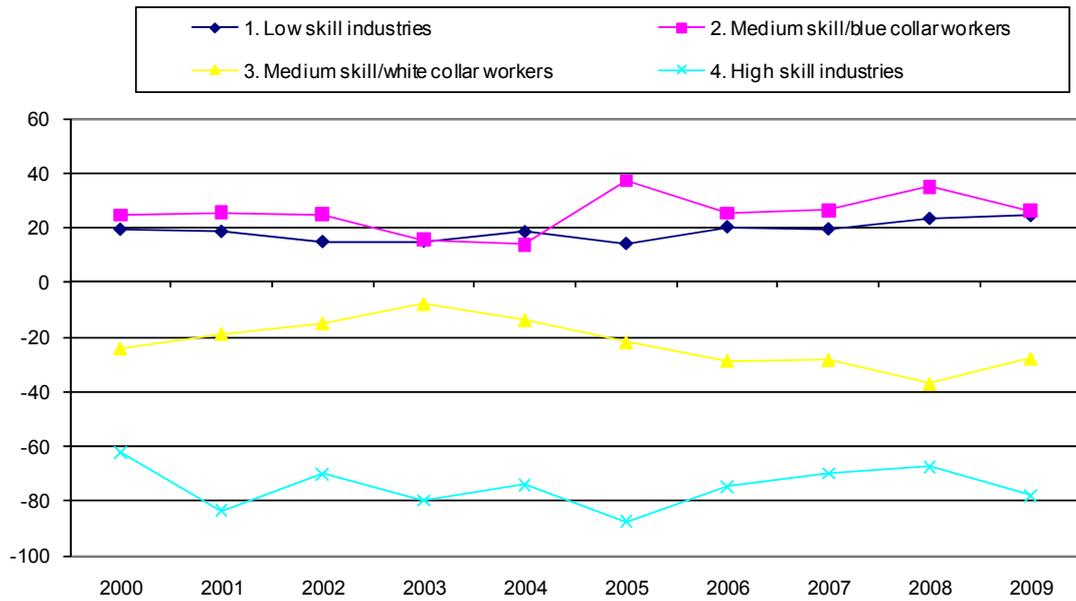**RCA in Hungary's trade with the EU-15, Taxonomy II**

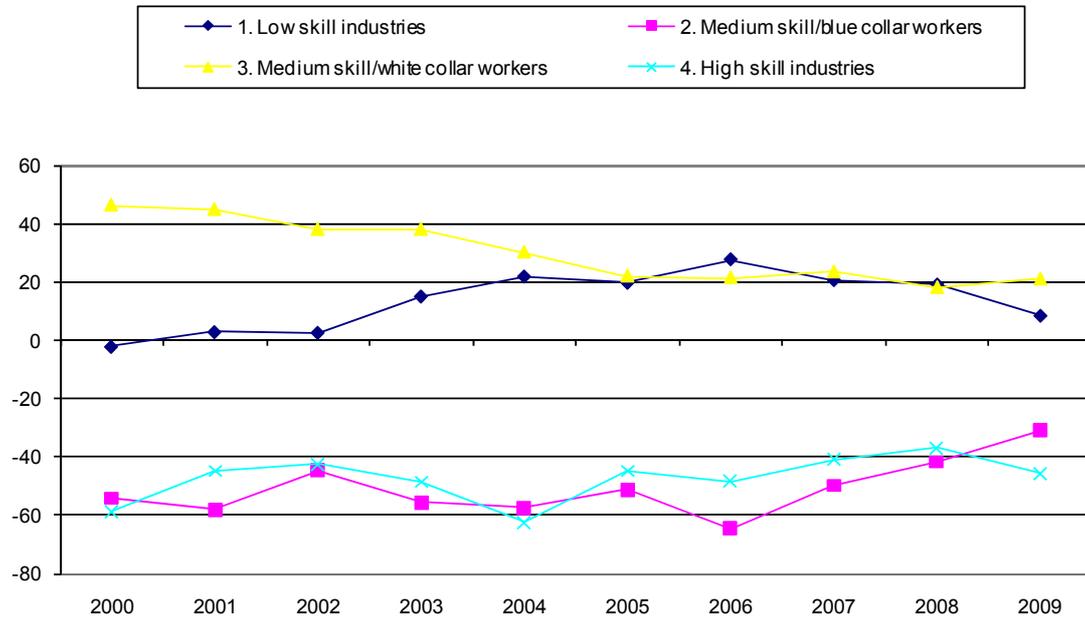*Source:* Eurostat database (COMEXT), own calculations.

Figure 6.15

RCA in Poland's trade with the EU-15, Taxonomy II

Source: Eurostat database (COMEXT), own calculations.

Figure 6.16

RCA in Slovakia's trade with the EU-15, Taxonomy II
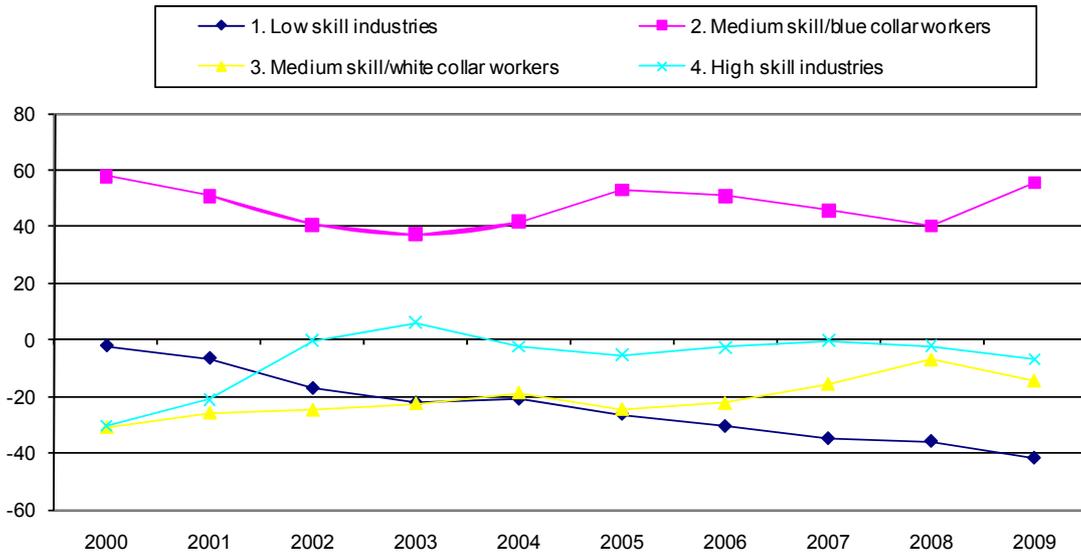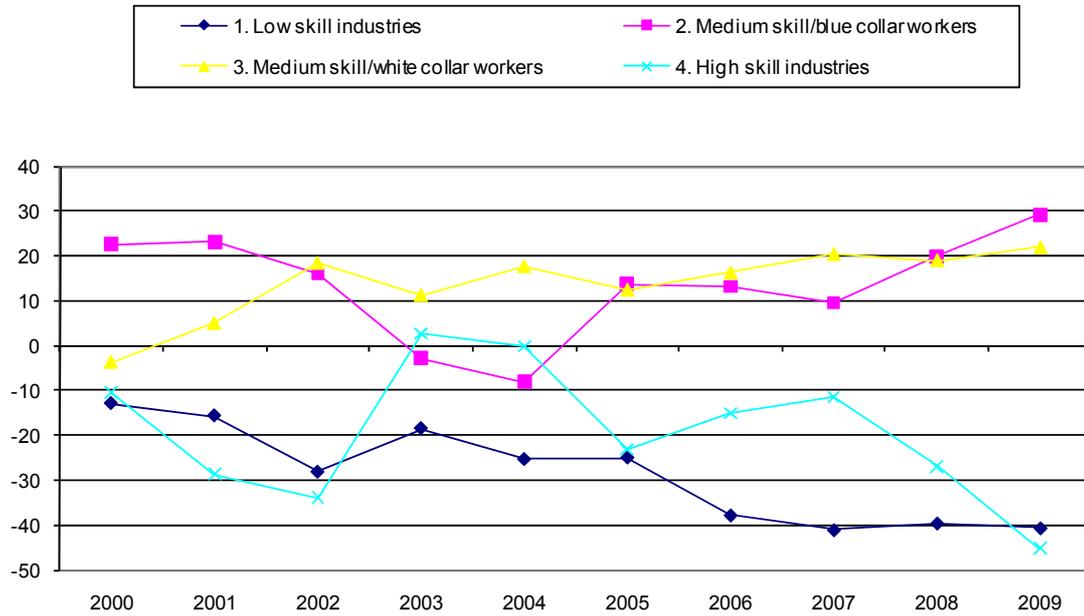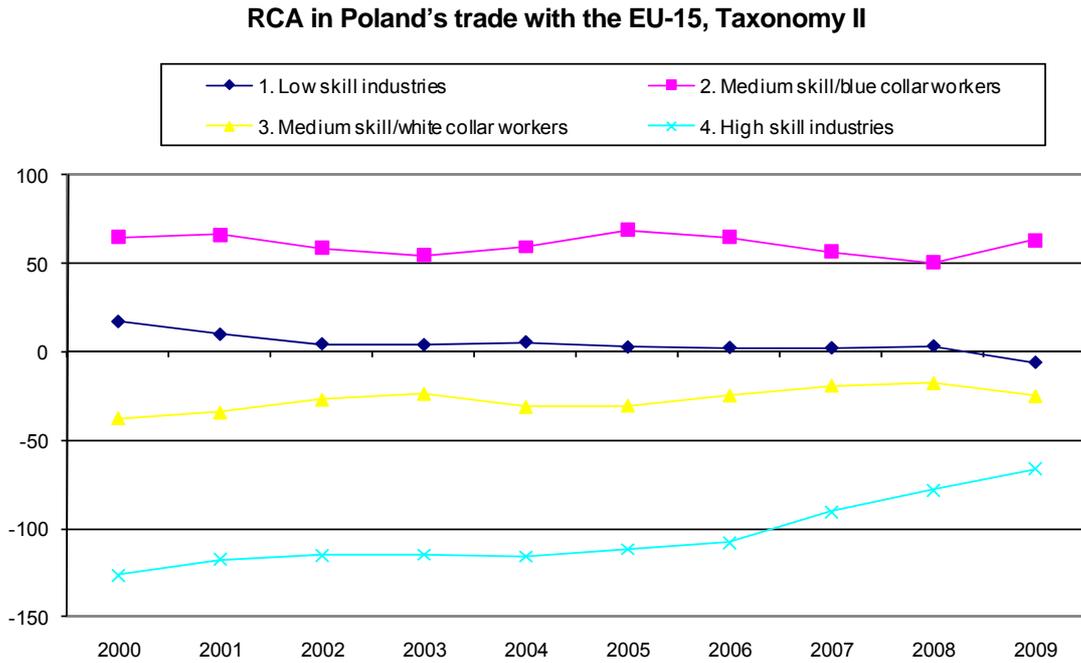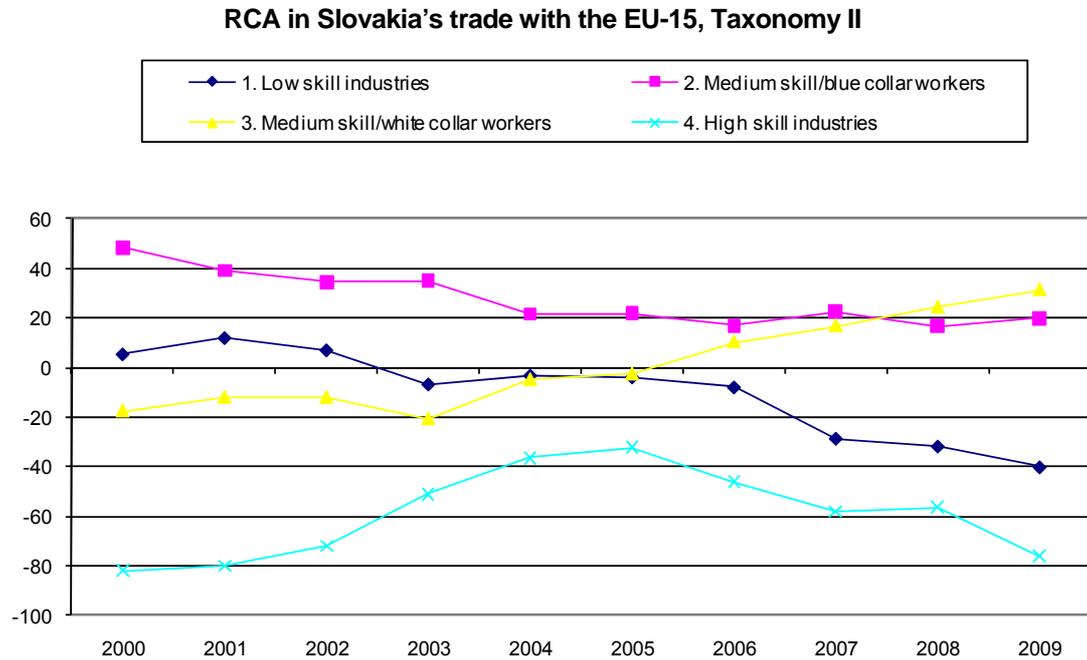

Source: Eurostat database (COMEXT), own calculations.

7. Summary and conclusions

(a) Intra-Visegrad trade expanded to different extents before and after the EU accession of the countries concerned. Although bilateral trade flows expanded very rapidly in both periods (1999-2003 and 2003-2007, respectively), even in the bilateral relation with less spectacular trade expansion (Poland's exports to Hungary) the growth differential was over 32 percentage points in favour of the post-accession period. Nevertheless, in 5 out of the 12 observations (bilateral relations) the growth differential was over 100 percentage points.

(b) Concerning the composition of trade, individual bilateral relations in intra-Visegrad trade were of diverging character despite the similarly rapid expansion. One extreme was Hungary's excessive specialization in transport equipment and components in exports to the other three Visegrad countries. The other extreme was Slovakia, where the initial proportions across main commodity groups had hardly changed in the period of rapid extension of trade volumes. This suggests that both options were successful to achieve a rapid expansion of exports to other Visegrad countries. The case of the Czech intra-Visegrad export goes even further, indicating that even for a single country strong specialization (in trade with Hungary) on the one hand and, at the same time, the preservation of a diversified spectrum of commodities traded (in trade with Slovakia), on the other hand, constitute a feasible way for rapid intra-Visegrad trade expansion.

(c) The division of the period 2000-2007 into a pre-accession and a post-accession segment did not reveal any outstanding changes in the composition of trade by *factor inputs*. Though *technology-driven* industries gained substantially in importance over the whole period concerned, the process was gradual, with no significant change in the speed of the rearrangement after the EU accession. A less spectacular yet remarkable change (a drop) occurred in the weight of *capital-intensive* industries, but the date of EU accession seems to play no role in the process either.

In the Visegrad countries' exports to the EU-15 a change related to the EU accession was recorded only in one case, namely that of the *labour-intensive* industries. The shrinkage of the latter's share in total trade unambiguously accelerated in the post-accession years.

The most important difference between the export destinations *Visegrad* and *EU-15* was that *technology-driven* industries figured as the dominant group in exports to the EU-15 in the whole period concerned, while, though spectacularly gaining in significance over the period, they were substantially less important in intra-Visegrad trade. The emerging picture probably reflects the change in attitude of export-oriented and engineering sector-based multinationals operating in the Visegrad region. Earlier exports (often intra-firm deliveries) represented predominantly deliveries from a production site in one of the Visegrad countries to the mother company in one of the EU-15 countries or to other markets in the EU-15 and to a much smaller extent to other Visegrad countries. This attitude is assumed to have

started to change with the spectacularly growing deliveries of the same circle of exporters to affiliates and/or markets in other Visegrad countries.

Hungarian export data suggest that this country has been the main driving force behind the expansion of *technology-driven* industries in the intra-Visegrad trade. While in Hungary's EU-15 exports half of the turnover fell on this group over the whole period, in deliveries to the other three Visegrad countries the share of *technology-driven* industries nearly doubled and, by the end of the period, it also made up close to half of the deliveries. It is remarkable, too, that in Hungary's case the stormy expansion in this group's exports took place predominantly after the country's EU accession.

(d) In the case of exports decomposed by *skill intensity* the date of accession seems to be of no particular significance; trends already present before the EU accession were carried on without any substantial changes.

The shifts in the composition of intra-Visegrad exports reflect an upgrade of the export structure by skill. The share of *low skill* industries shrank over the period concerned. Nevertheless, in intra-Visegrad trade *low skill* industries still amounted to more than a third of the total turnover, substantially above the respective share in the Visegrad exports to the EU-15. On the other extreme of the scale, *high skill* industries were significantly more relevant in exports to the EU-15 than to the other Visegrad countries, and the shift in favour of this segment's share in total trade was more formidable in the case of EU-15 destinations than in the case of other Visegrad countries destinations.

All in all, the message conveyed by the indicators is that the Visegrad countries' exports to the EU-15 reflect a *more advanced economy* (in terms of skills) than the intra-Visegrad trade.

A comparison of intra-Visegrad and intra-EU-15 trade flows in terms of composition by skill intensity revealed two striking differences. First, the weight of *high skill* industries is twice as high in intra-EU-15 trade (21-22%) than in intra-Visegrad trade (9-10%). Second, *low skill* industries make up one third of the intra-Visegrad and only one fifth of the intra-EU 15 trade flows.

(e) Comparing trade increments in the pre-accession and the post-accession periods, the data reveal that *machinery and transport equipment* was the key commodity group in the export increment of the individual Visegrad members both in trade with the other Visegrad countries and with the EU-15, likewise before and after these countries' EU accession. Specialization in this commodity group was, however, substantially stronger in trade increments with the EU-15 than with the other Visegrad countries.

Marginal intra-industry trade indicators (MIIT$_{tot}$) show the relevance of intra-industry trade in trade changes (increments). In intra-Visegrad trade the indicators point to higher levels of marginal intra-industry trade in the period after the EU accession than before in three of the four bilateral relations (one Visegrad country's trade with the rest of the Visegrad countries). MIIT$_{tot}$ values in the Visegrad members' trade with the EU-15 were first of all somewhat lower and, second, more diverse than in the intra-Visegrad trade. Again, in 3:1 proportion across countries, marginal intra-industry trade was higher in the post-accession than in the pre-accession period. Concluding, we found that the EU accession facilitated marginal intra-industry trade both in the intra-Visegrad trade flows and in the Visegrad members' trade with the EU-15.

MIIT indices were calculated for the motor vehicle cluster (NACE 341; 342; and 343) in intra-Visegrad trade and also for the Visegrad countries' trade with the EU-15. This cluster has gained in importance in the industrial output and exports of all four Visegrad countries since the mid-1990s and turned into one of the most important drivers of modernization in the region's economies. Regretfully the results were not conclusive, and the methodological problems inherently related to this indicator have clearly shown the constraints of its application.

(f) Finally, indicators of revealed comparative advantage (RCA) were calculated for the period 2000-2007. The RCA indicators for NACE 2 manufacturing industries show continuous rearrangement over the years but only some of these changes were related to the EU accession. In the individual Visegrad countries' trade with the other three members of the Visegrad Group, the RCA indicators of a minimum 4 industries (in Poland) to a maximum 8 industries (in Hungary) of the altogether 22 industries were seemingly influenced by the EU accession. It is remarkable that the Czech Republic, the country with the oldest industrial tradition in the Visegrad region, experienced an unfavourable change in RCA indicators in the *office machinery and computers* and the *motor vehicles* industries, while an improvement of RCA values was recorded for Hungary and Slovakia in the former, and for Poland in the latter industries. It is interesting that *food products and beverages*, the only industry where quantitative restrictions had been in place in the intra-Visegrad trade up till the EU's eastern enlargement, appear only in the case of Hungary as an area where the EU accession turned the revealed comparative advantage of the country observed before accession into a revealed comparative disadvantage registered after the accession. Similar restrictions were still valid in the Visegrad countries' trade with the EU-15 up till the EU enlargement. Here the accession had the same above-mentioned impact on Hungary, but accession-related trade liberalization in this commodity group had the opposite impact on Poland's and Slovakia's food trade: their RCA indicators displayed a considerable improvement after the EU accession.

(g) RCA indicators calculated for industries by *factor intensity* reveal that few significant changes occurred in individual Visegrad members' trade with the other members around the date of EU accession. It is worth mentioning Hungary's RCA improvement in *technology-intensive industries* and the deterioration of RCA values in *capital-intensive industries* from 2004 onwards. In the case of Poland a strong RCA improvement in *labour-intensive industries* suddenly stopped and turned flat after the EU accession, and in *technology-intensive industries* a strong deterioration was halted and turned into a strong (but short-lived) improvement in the year of Poland's EU accession.

Other interesting features, not directly related to the EU accession, were the permanent positive RCA indicators in *technology-intensive industries* in the case of the Czech Republic and Hungary, and the negative RCA values for this segment in the case of Poland and Slovakia. In *labour-intensive industries* Hungary had strongly negative, while Poland significantly positive RCA indicators in the period concerned, as quasi mirror images of the RCA indicators in *technology-intensive industries*.

The recent industrial modernization surge in Hungary and Slovakia manifested itself in the intra-Visegrad trade, as illustrated by the highly positive and improving RCA indicators for *technology-intensive industries* in the case of Hungary and the negative but spectacularly improving RCA indicators in the same group for Slovakia.

In trade with the EU-15 the Visegrad countries had highly positive RCA values in *labour-intensive industries* which play an extremely important role in counterbalancing the negative RCA positions in other industries. The only exception is Hungary where *technology-intensive industries* had substantially higher positive RCA values than the other Visegrad countries. From 2006 onwards Slovakia seemed to follow the Hungarian pattern and had a more impressive composition of RCA indicators than its 'big brother', the Czech Republic.

(h) Investigating the changes in RCA indicators in intra-Visegrad trade by *skill intensity*, the results did not display any remarkable shifts related to the EU accession. Hungary and the Czech Republic remained in the terrain of substantially positive RCA in *high skill industries*, and as a mirror image, Poland and Slovakia remained in the extremely negative area in this segment. The opposite was the case with *low skill industries*, where Poland and Slovakia had revealed comparative advantage and the Czech Republic but even more so Hungary displayed a strong revealed comparative disadvantage.

Concerning trade with the EU-15, the technology gap of the Visegrad countries vis-à-vis the EU-15 is clearly visible from the deeply negative RCA indicators for *high skill industries*, except for the Czech Republic. A good marker for the characteristic division of labour of the Visegrad countries with the EU-15 is the curve of the *medium skill/blue collar workers'* industries. This segment had highly positive RCA over the whole period for all four Visegrad

countries' trade with the EU-15. It is also remarkable (and positive) that *low skill industries* had a growing revealed comparative *disadvantage* in the case of all four countries.

(i) Finally, the question should be raised what more do we know now, after concluding the research, about the reasons for the exceptional acceleration of intra-Visegrad trade after the EU accession. Though invisible administrative barriers may have been removed upon EU accession, this process must have taken place in trade with the EU-15 as well – but the Visegrad members' export expansion to the EU-15 lagged to a considerable extent behind that of the intra-Visegrad trade.

A sudden upgrading of the transport infrastructure for intra-Visegrad deliveries, another possible factor in the upturn of mutual trade after EU accession, was not registered either. The Czech–Slovak connection had already been sufficiently developed before the EU accession as inherited from the recent common statehood up to 1993. The North-South corridor Poland – Slovakia – Hungary and the North-Southwest corridor Poland – Czech Republic did not undergo any major extensions either.

The indicators calculated in the framework of this research show that the EU accession has not brought about any abrupt changes in the commodity patterns and revealed comparative advantages. In the bilateral trade relations, apart from some exceptions, the changes observed were typically *continuous* and *gradual*, overarching the whole period 2000-2007. This is, however, no reason to claim that the EU accession had a minor role in the upturn of the mutual trade in the region concerned. Rather, the effect is not focused on the year of accession and +/– one year. Despite the clearly hesitant attitude of the incumbent EU members towards Eastern enlargement in the 1990s and the lack of final commitment to it up until 2002, when the year of accession (2004) was approaching it became more and more obvious that the accession would take place indeed. In this gradual process of self-conviction, and 'discounting' of the emerging new conditions for trade, important stakeholders of the intra-Visegrad trade gradually elaborated their new, more offensive strategy concerning future export destinations for their products.

Consequently, the most likely explanation for the rapid and, after the accession, accelerating intra-Visegrad trade expansion is that in the strategic concepts of the main exporting firms (mostly multinationals) located in the individual Visegrad countries the Visegrad region itself was upgraded: both as a target for sales and as a host of potential co-operation partners for production. In the latter case intra-firm trade must have played an important role but this proposition needs to be underpinned yet, an ambitious task for further research.

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ANNEX

Taxonomies	NACE rev. 1	*Taxonomy I* factor inputs	*Taxonomy II* labour skills
Meat products	151	4	1
Fish and fish products	152	4	1
Fruits and vegetables	153	4	1
Vegetable and animal oils and fats	154	4	1
Dairy products; ice cream	155	4	1
Grain mill products and starches	156	4	1
Prepared animal feeds	157	4	1
Other food products	158	4	1
Beverages	159	4	1
Tobacco products	160	4	1
Textile fibres	171	3	1
Textile weaving	172	2	1
Made-up textile articles	174	2	1
Other textiles	175	1	1
Knitted and crocheted fabrics	176	1	1
Knitted and crocheted articles	177	1	1
Leather clothes	181	2	1
Other wearing apparel and accessories	182	2	1
Dressing and dyeing of fur; articles of fur	183	2	1
Tanning and dressing of leather	191	4	1
Luggage, handbags, saddlery and harness	192	4	1
Footwear	193	4	1
Sawmilling, planing and impregnation of wood	201	2	2
Panels and boards of wood	202	2	2
Builders' carpentry and joinery	203	2	2
Wooden containers	204	2	2
Other products of wood; articles of cork, etc.	205	2	2
Pulp, paper and paperboard	211	3	3
Articles of paper and paperboard	212	1	3
Publishing	221	4	3
Printing	222	4	3
Coke oven products	231		
Refined petroleum and nuclear fuel	232	3	3
Nuclear fuel	233		
Basic chemicals	241	3	3
Pesticides, other agro-chemical products	242	5	3
Paints, coatings, printing ink	243	1	3
Pharmaceuticals	244	5	4
Detergents, cleaning and polishing, perfumes	245	4	3
Other chemical products	246	5	3
Man-made fibres	247	3	3
Rubber products	251	1	1
Plastic products	252	1	1
Glass and glass products	261	1	1
Ceramic goods	262	2	1
Ceramic tiles and flags	263	3	1
Bricks, tiles and construction products	264	2	1
Cement, lime and plaster	265	3	1
Articles of concrete, plaster and cement	266	1	1
Cutting, shaping, finishing of stone	267	2	1
Other non-metallic mineral products	268	1	1
Basic iron and steel, ferro-alloys (ECSC)	271	3	1

Taxonomies	NACE rev.1	*Taxonomy I* factor inputs	*Taxonomy II* labour skills
Tubes	272	1	1
Other first processing of iron and steel	273	3	1
Basic precious and non-ferrous metals	274	3	1
Structural metal products	281	2	2
Tanks, reservoirs, central heating radiators and boilers	282	4	2
Steam generators	283	2	2
Cutlery, tools and general hardware	286	4	2
Other fabricated metal products	287	1	2
Machinery for production, use of mech. power	291	1	4
Other general purpose machinery	292	1	4
Agricultural and forestry machinery	293	1	4
Machine-tools	294	2	4
Other special purpose machinery	295	1	4
Weapons and ammunition	296	1	4
Domestic appliances n. e. c.	297	1	3
Office machinery and computers	300	5	4
Electric motors, generators and transformers	311	1	3
Electricity distribution and control apparatus	312	5	3
Isolated wire and cable	313	1	3
Accumulators, primary cells and primary batteries	314	1	3
Lighting equipment and electric lamps	315	1	3
Electrical equipment n. e. c.	316	2	3
Electronic valves and tubes, other electronic comp.	321	5	3
TV, and radio transmitters, apparatus for line telephony	322	5	3
TV, radio and recording apparatus	323	5	3
Medical equipment	331	5	3
Instruments for measuring, checking, testing, navigating	332	5	3
Optical instruments and photographic equipment	334	5	3
Watches and clocks	335	4	3
Motor vehicles	341	5	2
Bodies for motor vehicles, trailers	342	2	2
Parts and accessories for motor vehicles	343	3	2
Ships and boats	351	2	2
Railway locomotives and rolling stock	352	2	2
Aircraft and spacecraft	353	5	4
Motorcycles and bicycles	354	1	2
Other transport equipment n. e. c.	355	1	2
Furniture	361	2	2
Jewellery and related articles	362	2	2
Musical instruments	363	4	2
Sports goods	364	4	2
Games and toys	365	4	2
Miscellaneous manufacturing n. e. c.	366	4	2

1. Mainstream	**1. Low skill industries**
2. Labour-intensive industries	**2. Medium skill/blue collar workers**
3. Capital-intensive industries	**3. Medium skill/white collar workers**
4. Marketing-driven industries	**4. High skill industries**
5. Technology-driven industries	

Source: M. Peneder (2001), *Entrepreneurial Competition and Industrial Location*, Edward Elgar, Cheltenham, UK.

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