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# The Visegrad Group Countries – changes in intra-industry competitiveness of their economies during the world financial and economic crisis

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## Abstract

This article contributes to the discussion on changes in intra-industry competitiveness of the economies of the Visegrad Group countries during the crisis. It attempts to prove the thesis that in the case of the analyzed countries their intra-industry trade was relatively more resilient to negative consequences of the crisis than their global turnovers. The article presents the most important results of analyses of the trade flows which the countries under research had in the initial years after the accession and during the crisis. Particular attention is paid to identification of the most significant tendencies shaping these countries' intra-industry trade with the New Member States (EU-10) and with the EU-15 countries.

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*Keywords:* Visegrad Group Countries; foreign trade of Poland; intra-industry trade of Poland; EU candidate countries; enlargement of the EU.

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## 1. Introduction

The Visegrad Group countries (V-4) followed a path of gradual trade liberalization and economic integration at the global and regional level, opening up their economies from the beginning of the transformation process in the 90's of the 20th century. Analyses of intra-industry trade intensity of these countries included in numerous research

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works have confirmed that since the beginning of political and economic changes in 1989, their competitiveness, measured, inter alia, by an intra-industry labour division, has systematically increased (Compare: Caetano & Galego, 2006; Czarny & Śledziewska, 2012; Firdmuc & Djablik, 2003; Gabrisch & Segnana, 2002, 2003; Gabrisch, 2006; Kandogan, 2003; Kamiński, 2001; Ferto & Soos, 2006; Wysokińska, 1995; Pluciński, 2004, 2005; Misala & Pluciński, 2000; only about the Baltic countries: Tiits & Jüriado, 2006; Bernatonytė & Juškienė, 2008; Fainštein & Netšunajev, 2009; only about the CEFTA group: Cernosa, 2007; Molendowski, 2007; about Hungary: Gacs, 1994; about Poland: Bijak & Kaszuba, 2003; Ciešlik, 2003; Czarny & Śledziewska, 2009; Klimek, 2006; Kawecka-Wyrzykowska, 2009; Michałek & Śledziewska-Kołodziejka, 2000; Molendowski, 2012).

Those tendencies strengthened in the years preceding the accession and in the initial years of their membership in the European Union. There was a significant increase in their intra-industry trade share in the turnover with the EU-15 countries and with the New Member States (EU-10), as well as a dynamic development of export and import. Dismantling barriers which hindered their mutual trade after their accession to the EU had a significant impact on shaping intra-industry trade among these countries (Molendowski & Polan, 2009).

The global financial crisis, whose first symptoms appeared as early as in the year 2007 and which unfolded in the subsequent year, was felt in a relatively swift way in all the countries of Central and Eastern Europe, including the Visegrad Group countries. (The financial and economic crisis which began in the USA in August 2007, and subsequently spread onto the whole world economy has been already widely described and commented on, by both publicists and experts. To learn more about it see: edition by Antkiewicz & Pronobis, 2009; European Economy Report, 2009; Krugman, 2009; Kacprzyk, 2009; Kasperkiewicz, 2009; Kosztowniak, 2010a; Kosztowniak, 2010b; Kotyński, 2009; Małecki & Stanek, 2009; Miklaszewski, 2010; Misala, 2009; Michalski, 2009; Molendowski, 2011; Molendowski & Stanek, 2012; Osiatyński, 2009; Orłowski, 2008; Prusek, 2011; Rosati, 2009; Rynarzewski, 2010; Sporek, 2010; Żyżyński, 2009).

It was reflected by deterioration in the main business activity indicators, such as a GDP growth pace, an unemployment rate, an inflation rate and a budget deficit (Molendowski & Polan, 2010). It also seems that the crisis appeared in these countries' economies in the most unexpected moment. Therefore, it is crucial to examine the changes in intra-industry competitiveness of the economies of the Visegrad Group countries during the crisis and the degree of impediment of positive adaptive processes taking place in the structures of their economies before and after the accession to the EU, which reflected the extent of their preparations for the full integration with the single EU market.

The article mainly deals with a presentation of the most important results of the analysis of changes in trade flows of the V4 countries in the initial years after the accession (2003–2008) and during the crisis (2009–2012). It especially focuses on presenting the main tendencies in intra-industry trade development of the analyzed countries with relation to the EU-15 and EU-10 countries, and the main changes in a vertical and horizontal intra-industry specialization.

The development of intra-industry trade flows in the analyzed period was calculated on the basis of Grubel and Lloyd's index. The method is described in details in paragraph 2.1.

## 2. The fundamental tendencies in intra-industry trade development of the Visegrad Group countries

### 2.1. Methodology of the analysis

The analysis of intra-industry trade intensity was conducted on the basis of the aggregated, multilateral Grubel and Lloyd's index (Grubel & Lloyd, 1975), calculated at 6-digit CN codes level (Ciešlik, 2003) pursuant to the following formula:

$$IIT = \frac{\sum_i (\sum_j X_{ij} + \sum_j M_{ij}) - \sum_i \left| \sum_j X_{ij} - \sum_j M_{ij} \right|}{\sum_i (\sum_j X_{ij} + \sum_j M_{ij})} \quad (1)$$

where:  $X_{ij}$  and  $M_{ij}$  are respectively the values of export and import for the industry  $i$  in the trade with the country  $j$ .

This index allows calculating a country's share of intra-industry trade of all products not only with a chosen trade partner, but also in relation to its whole foreign trade or to a certain group of countries. The indicator is a relative measure and receives values from the interval  $[0,1]$ . If  $IIT_j = 1$ , it is assumed then that the whole trade has an intra-industry character, i.e.  $X = M$ . However, if  $IIT = 0$ , export and import do not overlap each other within the industry, which means that intra-industry trade do not occur (Molendowski, 2007; Molendowski & Polan, 2009).

## 2.2. Changes in intensity of intra-industry trade

Values of multilateral indexes of intra-industry trade calculated for the total trade of Poland and particular countries of the Visegrad Group (V-4) with the "old" European Union countries (EU-15) and the new member states (EU-10) during the initial years after the accession and the crisis (the years 2003–2008) and during the crisis (the years 2009–2012) are shown in Table 1, Fig. 1 and Fig. 2.

Table 1. The V-4 countries intra-industry trade with the EU-15 and EU-10 countries in the years 2003–2012

Countries	2003	2004	2008	2009	2012	Dynamics 2012/2003	Average annual changes			
							2004– 2012	2004– 2008	2009– 2012	
Trade with EU-15	Czech Republic	38.2	41.4	40.0	38.8	38.1	99.8	0.1	0.9	-1.2
	<b>Poland</b>	<b>26.4</b>	<b>29.3</b>	<b>32.3</b>	<b>32.8</b>	<b>33.8</b>	<b>127.9</b>	<b>2.8</b>	<b>4.1</b>	<b>1.1</b>
	Slovakia	23.1	25.1	26.1	26.4	26.9	116.5	1.7	2.4	0.8
	Hungary	24.3	29.1	32.4	31.7	32.5	133.7	3.3	5.9	0.1
	<b>V-4</b>	<b>28.9</b>	<b>32.5</b>	<b>33.7</b>	<b>33.6</b>	<b>33.9</b>	<b>117.3</b>	<b>2.3</b>	<b>2.8</b>	<b>1.3</b>
Trade with EU-10	Czech Republic	28.5	31.9	37.7	37.4	39.8	139.3	3.8	5.7	1.4
	<b>Poland</b>	<b>22.5</b>	<b>23.7</b>	<b>27.6</b>	<b>27.2</b>	<b>26.9</b>	<b>119.5</b>	<b>2.0</b>	<b>4.2</b>	<b>-0.7</b>
	Slovakia	27.4	29.5	35.8	37.4	36.7	133.9	3.3	5.5	0.6
	Hungary	20.1	23.6	27.1	28.4	35.0	174.3	6.4	6.2	6.5
	<b>V-4</b>	<b>25.0</b>	<b>27.6</b>	<b>32.5</b>	<b>34.8</b>	<b>34.8</b>	<b>139.2</b>	<b>3.4</b>	<b>3.8</b>	<b>2.7</b>

Source: The years 2003–2007: Comext DVD: Intra- and extra- EU trade data. Annual data – Supplement 2/2008, Eurostat, 2009. The years 2008–2012: Comext DVD: Intra- and extra- EU trade data. Annual data – Supplement 2/2013, Eurostat, 2013. Own calculations.

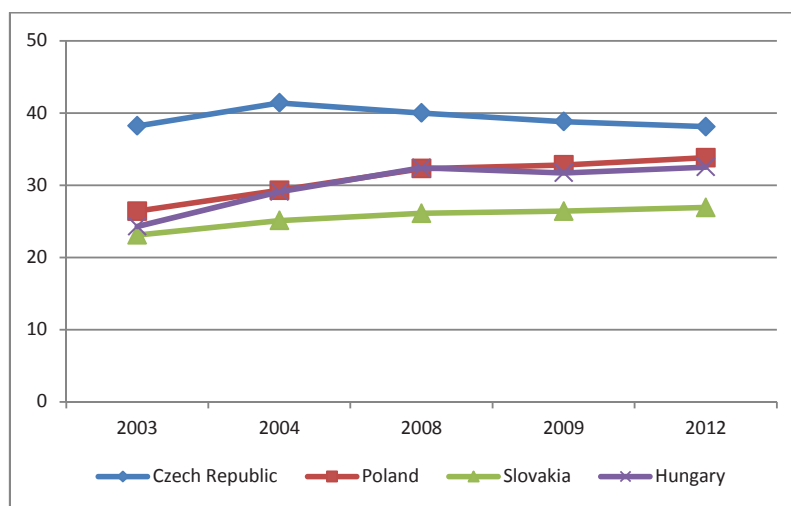


Fig. 1. Intra-industry trade index (G-L) in the trade of Poland with EU-15 countries during 2000–2010

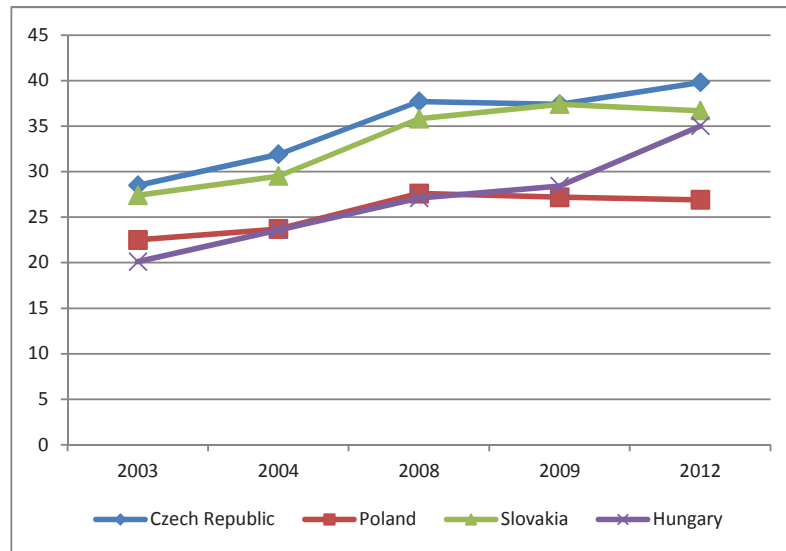


Fig. 2. Intra-industry trade index (G-L) in the trade of Poland with the EU-10 countries during 2000–2010  
 Source: Author's calculations based on: Comext DVD: Intra- and extra- EU trade data. Annual data – Supplement 2/2008, Eurostat, 2009; Comext DVD: Intra- and extra- EU trade data. Annual data – Supplement 2/2013, Eurostat, 2013.)

Parallel import and export of products within the same industries carried out by particular V4 countries with the EU-15 and EU-10 countries remained at a relatively low level during the whole examined period. In 2012, the Czech Republic had the highest level of IIT indexes of the intra-industry exchange share which almost amounted to 40% (38.1% with the EU-15 countries and 39.8% with the EU-10 countries).

In the case of Poland, Slovakia and Hungary the index was at a much lower level in 2012 than for the Czech Republic, and ranged from 26.9% (Slovakia) to 33.8% (Poland) in the trade with the EU-15 countries, and from 26.9% (Poland) to 36.7% (Slovakia) in the trade with the EU-10 countries.

Poland is currently (2012) characterized by one of the highest (among the V4 countries) IIT indexes of the trade with the EU-15 countries and simultaneously one of the lowest indexes of the trade with the EU-10 countries.

An analysis of values of intra-industry trade indexes concerning the trade with the EU-15 countries and EU-10 countries compiled in Table 1 confirms that during the whole analyzed period, the indexes rose significantly both in the case of the whole V4 group and all four countries under research.

The Czech Republic is the only exception – as its share of the trade with the EU-15 countries did not undergo significant changes (in 2003 it amounted to 38.2%, and in 2004 it reached its highest level of 41.4%). However, it rose significantly (from 28.5% in 2003 to 39.8% in 2012) in the trade with the EU-10 countries. As a result, a significant difference in the index level concerning both relations, which occurred at the beginning of the analyzed period (2003), was almost eliminated in 2012. It was a consequence of much more significant changes in trade with the EU-10 countries than with the EU-15 countries.

An analysis of Poland and the V4 countries' trade exchange structure with the EU-15 countries reveals that the Czech Republic had the biggest share of intra-industry trade (about 38–40%) in the years 2004–2012, since its index remained at the almost same level during the whole analyzed period, and even lowered insignificantly (from 38.8% to 38.1%) in the years 2009–2012. The most significant changes in the level of intra-industry trade intensity took place in the case of Hungary, as its share rose from 24.3% in 2003 to 32.5% in 2012 (a rise of 33.7%). A similarly significant increase in an intra-industry trade share occurred in the case of Poland, as its share rose from the level of 26.4% to 33.8% (in 2012 the index was higher of almost 28% than in 2003). It is worth to emphasize that the highest index increase for Poland took place in the initial years after the accession (2004–2008), and its slight revival also occurred during the crisis (2009–2012).

In the 2003–2012 period a significant increase in the intra-industry trade share in the turnover of Hungary, Poland and Slovakia with the EU-15 countries took place. However, an analysis of the obtained results confirms that independently of a clear tendency towards an increase in intensity of intra-industry trade, inter-industry trade was still a significant form of Poland and other V4 countries' exchange with the EU-15 countries.

It is worth noting while conducting an analysis of how intra-industry trade share indexes in the turnover of Poland and other V4 countries with the EU-10 countries shaped in the years 2004–2012, that Hungary (by 74.3%), the Czech Republic (39.3%) and Slovakia (36.7%) had the highest dynamics of an increase in the IIT indexes values. Poland witnessed the lowest growth in the index value with its dynamics at the level of 19.5%. Summing up, significant growth of the inter-industry trade share in the V4 countries' trade with the EU-10 countries was discernible in the years 2004–2012 (except for Poland).

It is worth to emphasize the fact that in the years 2000–2012 the dynamics of the intra-industry trade share in the turnover with the EU-10 countries turned out to be much greater than the dynamics of these indexes concerning the turnover with the EU-15 countries (the dynamics of IIT indexes growth of the V4 countries' trade with the EU-10 countries equaled to 39.2% in comparison with 17.3% of the exchange with the EU-15 countries). It is worth noting here that in the years 2004–2012 Poland witnessed higher growth of IIT indexes in the trade with the EU-15 countries than with the EU-10 countries (such tendencies had a disparate character in the case of the Czech Republic, Slovakia and Hungary).

In order to examine whether the global crisis, as well as its consequence in the form of a drop in the analyzed countries trade exchange have had an impact on changes in intra-industry competitiveness of the V4 countries' economies, average annual changes in values of intra-industry trade indexes of the trade with the EU-15 countries and with the EU-10 countries in the years 2009–2012 (Table 1) have been compared with indexes of an average annual pace of growth of export and import during this period (Table 2).

Table 2. Average annual changes in export and import of the V4 countries with the EU-15 and EU-10 countries (%)

Countries	Export			Import			
	2012/2004	2008/2004	2012/2009	2012/2004	2008/2004	2012/2009	
Trade with EU-15	Czech Republic	10.5	16.0	4.1	9.4	16.3	1.4
	<b>Poland</b>	<b>11.1</b>	<b>16.9</b>	<b>4.3</b>	<b>9.8</b>	<b>18.9</b>	<b>-0.6</b>
	Slovakia	11.8	17.5	5.0	10.4	14.9	5.0
	Hungary	4.9	8.6	0.5	5.8	11.3	-0.6
	V-4	9.6	14.6	3.6	8.9	16.1	0.6
Trade with EU-10	Czech Republic	14.0	23.4	3.1	15.6	23.7	6.2
	<b>Poland</b>	<b>15.9</b>	<b>24.9</b>	<b>5.6</b>	<b>14.0</b>	<b>22.6</b>	<b>4.0</b>
	Slovakia	17.9	25.4	9.1	17.8	28.8	5.4
	Hungary	18.3	30.9	4.2	14.5	22.2	5.4
	V-4	16.2	25.7	5.4	15.5	24.4	5.3

Source: Comext DVD: Intra- and extra-EU trade data. Annual data – Supplement 2/2012, Eurostat, 2012; Eurostat, <http://epp.eurostat.ec.europa.eu/newxtweb> [downloaded on 25.08.2013]. Own calculations.

The results obtained for the whole V4 group allow to draw a conclusion that within an exchange with the EU-10 countries, changes in export and import values triggered by the crisis did not significantly affect trends of intra-industry trade development shaped during the initial years after the accession. The average annual growth rate of the IIT index concerning the V4 countries calculated for the years 2009–2012 amounted to 2.7% and was lower than the one noted in the years 2004–2008 (3.8%). However, the IIT indexes for the year 2012 were higher than for the year

2008, and in the case of Hungary – even much higher (35.0% and 27.1% respectively). Only Poland's IIT index was slightly lower in 2012 than in 2008 (26.9% and 27.6%).

It ought to be emphasized while analyzing the obtained results concerning a relation with the EU-15 countries, that in the case of the whole V4 group, the changes in a trade structure triggered by the crisis were reflected by a decreased pace of intra-industry trade growth in relation to the initial years after the accession – a drop in an average annual growth rate of the IIT indexes in the years 2009–2012 in comparison with the 2004–2008 period. Only in the case of the Czech Republic, the level of intra-industry trade was lower in 2012 than in 2008. Slovakia and Hungary had the same or a slightly higher level of these indexes, whereas Poland even witnessed its growth (from 32.3% to 33.8%).

An analysis of the intra-industry trade share indexes allows to come to a conclusion that the world economic crisis has not affected the trade level, both with relation to EU-15 and EU-10. The average annual growth rate of the IIT index for the V4 countries calculated for the years 2009–2012 amounted to 1.3% with relation to the EU-15 countries and 2.7% with relation to the EU-10 countries. Therefore, indexes of the dynamics were lower than the ones noted in the years 2004–2008 (by 1.5 pp with relation to the EU-15 countries and by 1.1 pp with relation to the EU-10 countries). In 2012, the intensity level of intra-industry trade was for both relations higher than in 2008 for all the analyzed countries.

### 3. Conclusions

It ought to be noted that the following tendencies were predominant within the intra-industry trade of Poland and the V4 countries with the EU-10 countries and EU-15 countries in the years 2004–2012:

- Intra-industry trade dominated trade links of the V4 countries during the analyzed period. In the case of the Czech Republic, intra-industry trade reached its highest level in 2012, both with relation to the EU-15 countries (39.8%) and to the EU-10 countries (38.1%). In the case of Poland such trade had a share of about 30% with regard to both relations. Hungary had a much higher level of this share with regard to both relations, and Slovakia with relation to the EU-15 countries;
- The 2004–2012 period witnessed a significant increase in an intra-industry trade share of all the V4 countries (except for the Czech Republic) both with the EU-15 countries and the EU-10 countries, but the dynamics of share indicators of this trade was higher in regard to the EU-10 countries than to the EU-15 countries. Only Poland had higher growth of intra-industry trade indexes with the EU-15 countries than with the EU-10 countries during this period;
- During the global economic crisis indexes of intra-industry trade dynamics with regard to the EU-10 countries were only slightly lower than during the period before the crisis (in the case of Hungary this index even increased). Relatively deeper dives of this index dynamics occurred in regard to the EU-15 countries, but in spite of this fact, the intra-industry trade share for all the analyzed countries was higher in 2012 than in 2008;
- The world economic crisis has had more adverse effects on the dynamics of intra-industry trade development of the analyzed countries with regard to EU-15 than to the EU-10 countries;
- The research on the dynamics of changes in intra-industry trade shares in the total turnover of the V4 countries during the period after the occurrence of the global economic crisis (2009–2012) in comparison with the initial years after the accession (2004–2008) has proved the thesis that during the global crisis the positive adaptive processes which took place in structures of the V4 economies after the accession to the EU, and which reflected the extent of their preparations for the full integration with the single EU market, were disrupted. It is worth noting that the intra-industry trade turnover turned out to be more resilient to adverse events occurring in the outer surroundings of the analyzed countries.

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