

Effects of the international crisis – development of four Central European countries' trade with Asia

Abstract

The paper analyses trade between the Czech Republic, Poland, Hungary and Slovakia (Visegrad countries), with five Asian regions between 2000 and 2012. These small open economies are formally linked to the European Union. But, as a consequence of weakening demand from the Eurozone, Central European firms and policy makers have been inspired to look for new export markets outside the EU. The paper demonstrates that indeed, rising trade with Asia (notably exports) in this period proved to be more dynamic than with the EU. The data reveal a high geographic and product concentration toward certain countries and products, pointing to increased Visegrad country specialisation. Regarding the product structure of trade, similarity indices illustrate considerable changes during the observed period. Revealed comparative advantage (RCA) indices and high technology-intensity have also been calculated to assess the changing product specialisation of Visegrad countries vis-a-vis the Asian states. It is well known that the Visegrad countries have been integrated into the global value chains (GVCs) of multinational companies. Our paper illustrates that this is also apparent in their trade with Asia. There are however differences regarding the degree of GVC integration across the Visegrad countries. For some countries, the share of electronic, telecommunication and automotive product exports to Asia is overwhelming. The trade effects of the international crisis are apparent in the international production network, via the affiliates of multinational firms, but small and medium-sized enterprises have however been affected as well. As far as we know, this paper is the first detailed analysis of trade between Central Europe and Asia.

Introduction

The liberalisation of the Visegrad economies in the 1990's induced a considerable inflow of foreign direct investment and trade expansion with the Western European countries. As a result, before these countries joined the European Union (EU), they had already been integrated into the European market through foreign trade. From 2004 onwards, the EU membership brought a new wave of trade intensification for the Visegrad countries, mainly among each other. The international crisis which has been ongoing since 2008 caused severe recession and decrease of internal demand in the EU area, therefore several European companies searched for new markets outside the EU. A hypothesis of this article is that the international crisis, can be another impetus for an increase of foreign trade in the Visegrad countries, but this time to non-European areas. In spite of the large distance Asia can be one of the regions aimed by exporters. Our article is the first one to analyse thoroughly the development and characteristics of trade between Visegrad countries and Asia.

Asia is a big continent and is formed by very heterogeneous countries; therefore, it is worth making country groups. We formed five groups of Asian countries: West Asia, Southern Asia, the Commonwealth of Independent States (CIS), Southeast Asia and Northeast Asia¹. We analysed the period between 2000 and 2012 based on Eurostat data. Apart from the data we rely on four working papers as country studies: Kříž(2013), Gradziuk-Toporowski(2013), Éltető-Völgyi (2013), Frank (2013)².

The first part of the article describes the theoretical background of trade analysis, the second part describes developments and trends of trade with Asian countries. Further on the comparative advantages of Visegrad countries are analysed in detail. We also examine the share of high-tech products in trade with the main important partners of each Asian region. Next, the effects of crisis is summarised and finally we draw conclusions from the analyses.

Theoretical background

Parallel with the growing economic role of Asia there has been an increasing number of works dealing with the trade of EU with these countries. (For 2011 China became as important trade partner for the EU as the United States (Galar, 2012) and in 2012 EU import from China was higher than from the USA). Perhaps the most thorough analysis of EU15-Asian trade is given by Gaulier et al. (2012).

As the Central and Eastern European countries applied for EU membership and became members their trade patterns have been analysed by severals focusing mainly on their relations with the EU.

In the meantime an increasing part of trade literature has been dealing with the definition and role of Global Value Chains (GVCs), or with their more or less synonyms (vertical specialisation, fragmentation of production, etc.). Fragmentation of production indeed has increased to a considerable extent in the last decade, especially in the electronic, clothing and

¹ The countries that belong to the groups are enumerated later.

² These working papers were prepared in the framework of the research no 11220101 financed by the International Visegrad Fund Small Grant.

automotive industry (Lall et al., 2004, Kimura et al, 2005, Srholec, 2006, Vogiatzoglou, 2012). What is more, international trade in global production networks has risen much faster than “normal” trade. According to the recent report of UNCTAD (2013) 80 per cent of global trade (gross exports) is linked to the production network of multinational companies. The intensity of production fragmentation depends on certain factors like technically separable stages, factor intensity, the technological complexity of production and the weight of the product (transportable to large distances). These factors especially facilitate the production segmentation in electronics (Lall et al, 2004).

Baldwin (2012) analyses the development and role of GVCs in world trade in detail. The development of ICT technologies from the second half of the 80 years made it possible to coordinate production from a long distance and wage differences between developed and developing countries made outsourcing of production profitable for companies. Thus the second global unbundling of production took place.³. According to Baldwin (2012) GVCs were formed in big regional blocs with “headquarter” and “factory” economies. In the export of the latter the share of parts and intermediate products is significant. In several cases it is easier for developing countries to join to GVCs than develop an own industrial basis. For today developing countries seek to join GVCs to assemble goods or make specialised inputs. This is easier and faster than build own supply chains but “less meaningful” (Gereffi 2013). Simply participating in GVCs does not necessarily develop domestic innovation, institutions, linkages, labour conditions. The challenge is upgrading in a beneficial way within the supply chains.

Mere producers add less and less to the final value of the product, which is shown by the “smile curve”. This shows the share of certain production phases in value added of the product. Value added is much higher at the two ends of the curve, at innovative, knowledge based services (product design, development, marketing, after sales services). The role of production (in the middle of the curve) has decreased in the value added of the product during the recent decades.⁴

Asian developing countries especially participate in GVCs with China at the front. The trade of the EU with Asia and the specialisation patterns are also determined by GVCs. Cross-border movement of parts and products within the same production network increases the trade of these developing (Asian) countries, “artificially” generating international trade with each crossing (Athukorala, et al, 2006, Mani, 2000). As a consequence, the competitiveness of countries can be overestimated based on gross export data and on indices (such as revealed comparative advantage) calculated from gross exports. This is especially true for open countries that rely heavily on imported intermediates.

Beltramello et al. (2012) also show that the dominant role of GVCs questions export based competition indices, because export specialisation (for example to higher technology goods) is often based on high import content. Therefore real technological development, innovative activity behind the export of high-tech products is questionable or non existent. Countries with low R&D activities also show high shares of high-tech products in their exports and this

³ The first unbundling took place after industrial revolution and railway network creation in late 1800 years.

⁴ Regarding the fragmentation of production, according to the opinion of Baldwin (2012) and Jensen-Barfield (2012) traditional trade policy measures (antidumping duties for base materials) does not have sense anymore and instead of the aimed country can hit other countries.

is characteristic for several low income Asian countries (Srholec, 2005).⁵ The import content of Chinese high-tech exports increased radically (IMF, 2012). China itself became in the meantime an assembly country too. (The increasing role of China in the global network of information, communication and technology industry is proven by Amighimi (2005)).

It has been widely discussed in the past that FDI and multinational companies played a main role in integrating Central and Eastern European countries in the world trade and in the EU even before formal adhesion.

Damijan et al. (2013) also concludes that inflow of FDI contributed significantly to the export restructuring of Central and Eastern European countries, but there are differences among countries. The „core” (Visegrad) countries increased high-tech exports while the export of other countries is of lower technology level.⁶ An explanation for this can be the different degree of integration into the GVCs. Based on world input-output table data, Timmer et al. (2012) show that the use of imported intermediate inputs and the inclusion in global value chains has increased radically between 1995 and 2008 in the case of the Visegrad countries. Foster et al. (2013) calculate that the domestic share of value added is relatively low in the Czech Republic and Hungary and the degree of vertical specialisation is high in these countries and Slovakia too.

The question is what happened after 2008, what were the effects of international crisis on trade and on GVCs? The trade collapse in 2009 was bigger and deeper than ever before and was made even worse by the general credit crunch. Global value chains are a channel for the rapid transmission of both real and financial shocks. Demand drop for final goods can immediately affect flows of intermediates, especially when supplier contracts are short-term. Credit market problems can have a negative international chain effect through global value chains. (Milberg, Winkler, 2010). But as an opposite opinion Altomonte and Ottaviano (2009) point out that supply chains could have been a factor of resilience in the crisis, as existing supply chains are difficult and undesirable to sever because of contractual arrangements and high initial sunk costs.

In the following part we are looking for answers to the following questions: what are the characteristics of Visegrad-Asia trade? In what way the trade evolved since the beginning of the 22. century? Were there structural changes as a consequence of the crisis? Later on we analyse specialisation patterns; high-tech intensity of trade and comparative advantages too.

Development of trade, features, rising concentration

The European Union has a decisive role in Visegrad countries' trade (Table 1). Asian countries certainly do not have a big share in foreign trade but their role has increased during the past years. The weight of the Asian region is generally much more significant in Visegrad (V4) imports than in exports.

⁵ Participation in these global production networks means producing the labour intensive phases of high-tech intensive production (Srholec, 2005). As a consequence of the increased fragmentation of production the assembly of an electronic product or a part can be similarly intensive in cheap labour as the assembly of any other machine.

⁶ Our results show that even Visegrad countries are different in this respect.

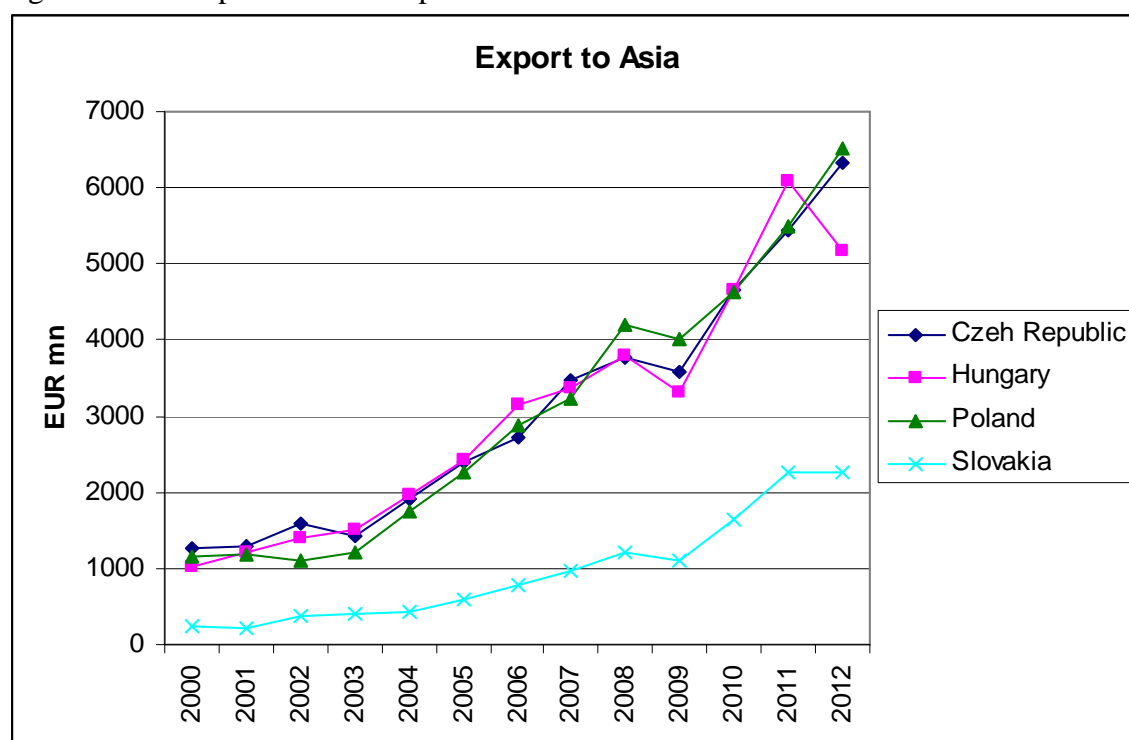
Table 1: Percentage share of EU and Asia in export and import of V4 countries, 2012

2012	EU 27				Asia			
	Export		Import		Export		Import	
	2000	2012	2000	2012	2000	2012	2000	2012
Czech Republic	85.9	80.8	75.2	75.1	4.0	5.2	8.2	14.7
Hungary	83.6	75.8	66.1	70.2	3.4	6.4	16.8	13.7
Poland	81.2	75.7	69.0	67.2	3.4	4.6	10.5	10.3
Slovakia	89.8	83.9	70.2	73.9	1.8	3.6	5.7	12.7

Source: calculations from Eurostat data.

There has been little information so far on trade relations between Asian countries and Central and Eastern European countries⁷. Data of Eurostat show that during the decade after 2000 a considerable increase of export to Asia can also be observed in all V4 countries, with a special impetus from 2003, the eve of EU-accession. This trend is broken in 2009 because of the general trade collapse caused by the international crisis. Afterwards, however, the increase is remarkable again (see Figure 1).

Figure 1: Development of V4 export to Asia



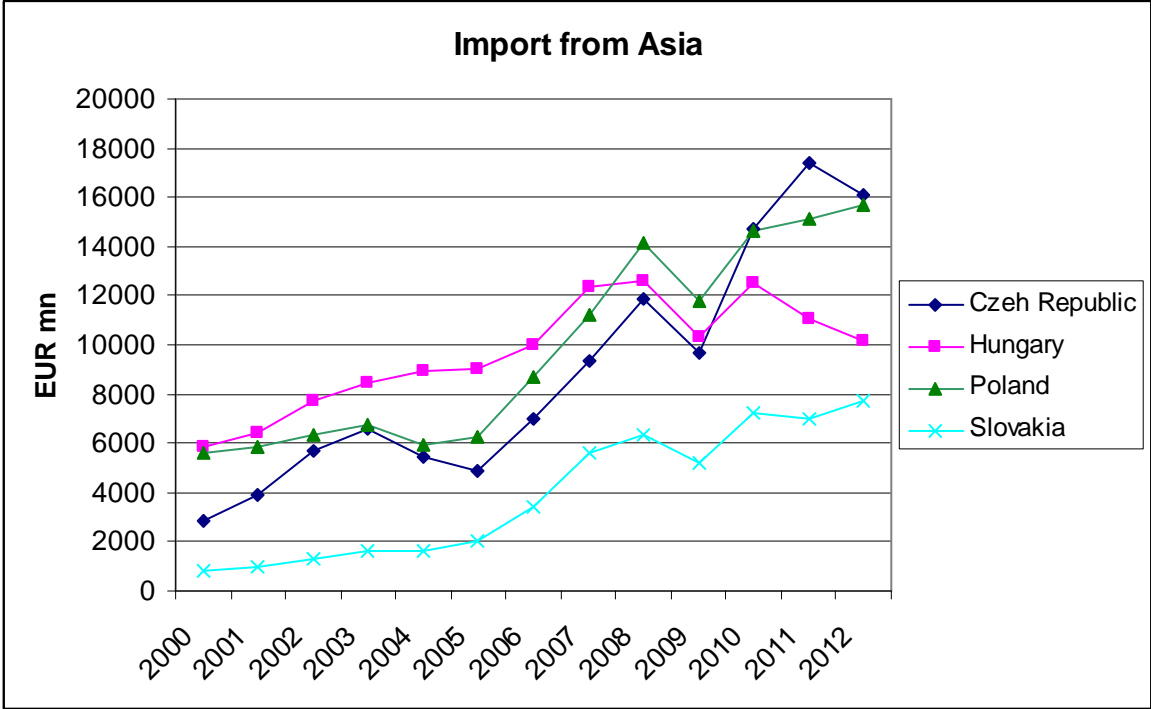
Source: Eurostat

⁷ Regarding China, Chen (2012) states that after these countries joined the EU, bilateral trade with China increased. Until 2007 Hungary was China's biggest partner in the region, and then it was replaced by Poland. In the past ten years the four Visegrad countries were clearly the most important trade partners among the Central European countries for China.

As seen, the development of exports to Asia has been almost identical for the Czech Republic, Hungary and Poland, either in volume or in dynamics (except for the Hungarian export drop in 2012).⁸ Slovakian exports have been smaller and less dynamic.

Regarding the import from Asia, trends are a bit more dispersed. The sharp increase of Polish and Czech imports are apparent (see Figure 2) and the lower levels of Slovakia too.

Figure 2: Development of V4 import from Asia



Source: Eurostat

If we compare this picture to the general trade patterns of Visegrad countries, we can see that trade increase towards Asia has been more dynamic than towards the EU or towards non-EU regions (Table 2).

This trend is interesting, as the Visegrad countries are often a destination of investors from the EU as parts of supply chains in manufactured goods. Intuitively, because the increasing part of traded products within these chains are intermediary ones (as the consequence of the production fragmentation) and because of the proximity and broader ongoing integration of the EU, the general trade should increase rather with the EU, than with Asia. The data, however do not prove this supposition. Or, better to say, this happened probably already before the EU accession of V4 countries, at the end of the nineties. It seems that after 2000 GVCs brought trade intensification between Visegrad countries and Asia.

⁸ The reason for this drop is discussed later.

Table 2: Increase of exports to EU, non-EU areas and to Asia (2000=1)

Czech Republic	2000	2004	2007	2008	2009	2010	2012
extra-EU	1	1.61	2.96	3.39	2.78	3.62	5.27
intra-EU	1	1.79	2.82	3.13	2.54	3.11	3.64
to Asia	1	1.50	2.73	2.98	2.82	3.67	4.98
Hungary	2000	2004	2007	2008	2009	2010	2012
extra-EU	1	1.51	2.93	3.22	2.53	3.29	3.92
intra-EU	1	1.45	2.15	2.26	1.84	2.18	2.40
to Asia	1	1.90	3.25	3.67	3.21	4.50	4.99
Poland	2000	2004	2007	2008	2009	2010	2012
extra-EU	1	1.84	3.34	3.98	3.09	3.90	5.36
intra-EU	1	1.74	2.89	3.23	2.79	3.41	3.87
to Asia	1	1.50	2.76	3.60	3.44	3.97	5.57
Slovakia	2000	2004	2007	2008	2009	2010	2012
extra-EU	1	2.26	4.29	5.40	4.33	5.82	7.77
intra-EU	1	1.68	3.22	3.59	3.00	3.58	4.62
to Asia	1	1.85	4.14	5.17	4.70	6.98	9.67

Note: Extra-EU includes Asia too.

Source: own calculations based on Eurostat data

Asia is big and heterogeneous continent, so we get a more detailed picture if we observe the export increase to the five Asian regions we created⁹:

1. *Commonwealth of Independent States (CIS)*: Armenia, Azerbaijan, Georgia, Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan
2. *West Asia*: Bahrain, Iraq, Israel, Jordan, Kuwait, Lebanon, Oman, Qatar, Saudi Arabia, Syria, United Arab Emirates, Yemen
3. *South Asia*: Afghanistan, Bangladesh, Bhutan, India, Iran, Maldives, Nepal, Pakistan, Sri Lanka
4. *Southeast Asia*: Brunei, Cambodia, Indonesia, Laos, Malaysia, Myanmar (Burma), Philippines, Singapore, Thailand, Timor-Leste, Vietnam
5. *Northeast Asia*: Hong Kong, China, Japan, North Korea, South Korea, Macao, Mongolia, Taiwan

Regarding these regions the highest trade increase took place with Northeast Asia (mainly China) regarding all V4 countries. (In the case of Poland, Hungary and the Czech Republic exports have grown towards West Asia too.) As a result, for today the share of Northeast Asia is dominant, above 70% in imports and 45% in exports (for Slovakia 80%, where trade is heavily concentrated on China).

A common feature of V4 trade with Asia is the considerable deficit throughout the observed period. This deficit is caused in every country by the highly uneven trade with Northeast Asia

⁹ We omitted Turkey and Russia for being transcontinental countries and we considered Georgia and Azerbaijan as Asian countries.

(China). Another similarity is the trade surplus of Visegrad countries with West Asia (caused by exports to the United Arab Emirates and Israel). This surplus is too small to compensate for the deficit with China but it is increasing.

An important characteristic of the V4 trade with Asia is concentration, of two types. One is strong *geographical concentration*. In each Asian region there are 1-3 countries (in certain cases only one) providing almost all volume of trade. Regarding Northeast Asia, during the recent years China has become the most important country of the region by far.¹⁰ Japan, South Korea and Hong Kong are also relatively important partners. Trade with South Asia is also concentrated to around 80% to India. In the CIS region Kazakhstan is the main partner, but there is trade with Azerbaijan, Uzbekistan and Georgia too. In West Asia the United Arab Emirates, Israel and Saudi Arabia, in Southeast Asia Singapore, Malaysia and Thailand are the main partner countries.

Another kind of concentration is apparent in the *product structure*. In 2012 all Visegrad countries exported mainly machinery and transport equipment (SITC 7) to all Asian regions.¹¹ In the case of the smaller V4 countries (Hungary, Slovakia, Czech Republic) the machinery and transport export is above 70% within total export while in Polish exports the weight of this group is smaller, around 25-50% and there is a considerable share of other manufactured goods and food and live animals.

High concentration is more obvious if we apply a more detailed, SITC 3 digit level data¹². In order to measure the degree of concentration of V4 trade we calculated the Herfindahl-Hirschman index¹³ for exports and imports:

$$HHI = (\sum_i s_i)^{1/2} \quad (1)$$

where s_i is the share of the product group in total exports. If the index is 1, it means full concentration, lower values of the index point at diversification.

Calculated concentration indices for the trade flows between Visegrad countries and their main Asian partners in 2000 and 2012 are given in the Annex tables.

We can observe that concentration is generally high. There are extreme figures above 0.8 like Slovakian export to China or Hungarian export to United Arab Emirates but even in other cases the value of indices are much higher than in the case of Visegrad trade with EU countries (around 0.11-0.15 in general). However, there are differences in degree of trade concentration among Visegrad countries: Slovakian trade seems to be the most concentrated

¹⁰ China's share is generally among 50-65% in exports and imports with this Asian region. Only Slovakian trade pattern differs a bit: here the share of China is 86% in exports and 35% in imports from Northeast Asia. The share of Japan declined radically and continuously during the period.

¹¹ It should be noted that the only exception is Hungarian export to the CIS region, here chemicals and medicines represent 60%.

¹² List of 3 digit products are here:

http://unctadstat.unctad.org/UnctadStatMetadata/Classifications/UnctadStat.SitcRev3Products.Official.Classification_En.pdf

¹³ See, for example, Hirschman, Albert O. (1945), appendix.

<http://www.google.hu/books?id=BezqxPq50dwC&printsec=frontcover&hl=hu#v=onepage&q&f=false>.

and Polish trade relatively the less. Concentration varies according to Asian regions too; imports from the CIS countries for example are highly concentrated.

For Hungary, with the increase in volume, also trade concentration had increased between 2000 and 2012 in the big majority of bilateral trade relations with main Asian partners. In the case of other V4 countries concentration decreased, increased or had not change during the period depending on what Asian partner we observe.

Not only the degree of concentration changed over time. Already the observations of broad product structure (SITC 1 digit level) showed that considerable structural changes took place during the past decade, and this is reaffirmed if we apply a more detailed product classification (3 digit level). We calculated Finger-Kreinin similarity index¹⁴ for bilateral exports and imports for the year 2000 and 2012, given with the following formula:

$$F = \sum_i \min\{X_{it1}, X_{it2}\} * 100 \quad (2),$$

where X_{it1} and X_{it2} are the shares of the commodity i in total exports in year $t1$ and $t2$ or in country $t1$ and $t2$. Figures are given in the Annex. Indeed, in most cases considerable changes took place.

It is an interesting question whether the international crisis changed V4 trade structure or something else. Therefore we calculated similarity indices for two sub-periods. The results showed that in almost all cases main changes happened *before* the crisis, export structure of 2000 and 2007 are much less similar than export structure of 2007 – 2012. This means that between the V4 countries and Asian partners the present trade structure more or less had been developed before 2007.

As it was mentioned, the integration of Visegrad countries in the supply chains of multinational firms is a fact for today. Regarding their trade with Asia the main traded product groups tell us the same story and also reflect differences among V4 countries.

Specialisation (high tech products and comparative advantages)

We know that the share of high-tech products increased considerably in the exports of the Visegrad countries during the last decades. We presumed that trade with Asia is also intensive in high-tech products. The list of high-technology products is given by the Eurostat¹⁵ based on the OECD definition. Table 3 shows that high-tech trade balance with Asia is strongly negative for all V4 countries, caused by the import from Northeast Asia.

¹⁴ Finger, J.M.,–Kreinin, M.E (1979): A measure of ‘export similarity’ and its possible uses. **The Economic Journal**, vol. 89, no. 356 (December 1979): 905-912.

¹⁵ http://epp.eurostat.ec.europa.eu/cache/ITY_SDDS/Annexes/htec_esms_an5.pdf.

Table 3: Share of high-tech products in Visegrad-Asia trade and in extra-intra-EU trade 2012

ASIA	Export		Import	
	Million euro	%	Million euro	%
Czech Republic	1220.35	22.8	5159.52	34.1
Hungary	1844.36	39.2	3918.14	43.8
Poland	593.14	10.8	2871.91	20.0
Slovakia	110.19	5.3	2931.41	41.6
EU+Extra-EU	Export		Import	
%	Extra EU	Intra EU	Extra EU	Intra EU
Czech Republic	18.8	13.5	25.1	11.6
Hungary	23.0	13.1	27.9	11.7
Poland	7.9	5.0	9.8	9.7
Slovakia	9.0	7.9	22.3	12.4

Source: own calculations based on Eurostat data

Table 3 also shows the differences among Visegrad countries: high tech export volume and share to Asia is the highest in the case of Hungary and quite high for the Czech Republic but low in the case of Poland and Slovakia. For the sake of comparison the table includes high-tech intensity of trade with the EU and non-EU countries too. It is seen that Visegrad-Asia trade is much more high-tech intensive than Visegrad-EU trade.

As seen, GVC-based trade with Asia seems to be the most high-tech intensive in the case of Hungary. High-technology import of electronics and telecommunications products (SITC 764, mainly cellular phone sets and their parts) of Hungary is rather high in value from China, Japan and South Korea and also from Malaysia and Singapore. Telecommunication equipments dominate in the import from Southeast Asia too. At the same time the first or second most important export articles of Hungary to most Asian countries are also telecommunications equipment (SITC 764)¹⁶. This group gave 28,7% of all Hungarian exports to Asia. Other main export products are internal combustion piston engines (SITC 713) with 11.6% of all Asian exports and automatic data processing machines 6.8% of all exports to Asia (SITC 752).

In the case of the Czech Republic the leading export product groups are the following: data processing machines (SITC 752 with 6.2% of all exports), telecommunications equipment (SITC 764 with 5.3%), motor cars and vehicles (SITC 781 with 5.1%), parts of motor vehicles (SITC 784 with 4%) and electrical apparatus for switching (SITC 772 with 4.5%). The leading import products are portable automatic data processing machines (21.7% of all imports from Asia) and telecommunications equipment (11%).

As known, Slovakia is integrated into car producer chains. This is well reflected in its trade with Asia, Slovakian export to Asia as a whole dominantly (65% in 2012) consists of motor

¹⁶

Countries where the first or second Hungarian export product group is SITC 764 are the following (given the share in total export). United Arab Emirates: 88.3%, Saudi Arabia: 47.7%, India: 24.6%, Pakistan 39.8%, Singapore 53.2%, Malaysia: 16.2%, Thailand: 18.6%, Kazakhstan: 13.6%, Azerbaijan: 14.7%

cars and other motor vehicles (SITC 781) mostly to Northeast Asia (China)¹⁷. Main import products from Asia are optical instruments and apparatus (SITC 871 representing 20.6% of imports), telecommunications equipments (13.7%) and parts of motor vehicles (10%).

Polish trade pattern with Asia is different from the other V4 countries. It exports such a big volume of copper (SITC 682) to China that this is its most important export product to Asia at all (9%). Copper, copper wires are important base material for producing integrated circuits, electronic parts,¹⁸ the key components of electronic devices produced in China. Other important product groups are ships and boats (SITC 793) with 7%, telecommunication equipment (SITC 764) and meat (SITC 012) with 4-4% of total exports to Asia. Main Polish import products from Asia are telecommunications equipments (12.5%) and automatic data processing machines and parts (10%).

Comparative advantages

It is interesting to analyse the changes in the relative production specialisation in Visegrad Group towards Asia. This enables us to better understand the character of the current trade of the examined countries with Asian countries, and helps to find the answer where the possible gains from trade may be found. Proper instruments can be in this respect the indices of revealed comparative advantage.

There are several indices mentioned in economic literature, to improve the standard Balassa index of revealed comparative (RCA), given by the following formula:

$$RCA = \frac{\frac{x_{ij}}{x_{it}}}{\frac{x_{nj}}{x_{nt}}} \quad (3)$$

where x denotes the export, i is an analysed country, n is the set of analysed countries, j is an analysed commodity, t is a set of the all commodities. The index is multiplicative, taking values from 0 to infinity and thus possesses such problems as the non-interpretable moving mean, and dependence of the number of reference countries (see: Hoen and Oosterhaven, 2006). The alternative additive RCA (ARCA) is free of these problems. It is also more stable empirically than the Balassa index (see ibidem).

Its algebraic formula is as follows:

$$ARCA = \frac{x_{ij}}{x_{it}} - \frac{x_{nj}}{x_{nt}} \quad (4)$$

and takes values from -1 to 1, where values closest to 1 mean that the given country possesses a comparative advantage in the particular commodity, whereas the values closest to -1 mean that the country owes a comparative disadvantage.

Because Asia is a heterogeneous continent, calculating the ARCA with the whole continent as a group of reference countries would not include the specific characteristics of each Asian country. Thus, the indexes were calculated vis a vis the most important Asian trading partners for V4, which are as follows: China, Japan, South Korea, Singapore, United Arab Emirates,

¹⁷ Motor vehicle export to China alone gives 53 per cent of total Slovakian exports to Asia.

¹⁸ Europe's second biggest copper producer (after Norddeutsche Affinerie) is Polish KGHM Polska Miedź S.A. and strongly cooperates with Chinese Minmetals.

India and Kazakhstan. Since for the proper calculation of the index, the total export of the Asian countries is necessary, the additional data from the UN COMTRADE were acquired (3-digit SITC, rev. 3). Results of our calculations are given in the annex tables.

One may see that V4 countries possess comparative advantages in similar products over the all selected trade partners. For instance the products in which Czech Republic in 2000 had the biggest comparative advantage over the selected Asian countries are motor cars (with exception Japan and South Korea) or parts of them, and electrical machinery (with exception of China and Japan). This country possessed also an advantage in producing articles of base metal (compared to China, Japan and South Korea), and furniture and furnishings (compared to Japan). Across the time, little has changed, but it appeared that even before the crisis, Czech Republic strengthened its advantage in producing data-processing machines over selected Asian countries except for China, and this remained until 2012.

Hungary had in 2000 advantages in producing piston engines, data-processing machines (except for Singapore) and parts of them (over Singapore, UAE, India and Kazakhstan). It had also an advantage in producing motor cars compared to China and Singapore. Across the time Hungary changed slightly its profile, with the biggest advantages in telecom equipment (excluding China and South Korea) in 2007 and 2012. Also it appeared, that in 2012, Hungary noted a strong comparative advantage in medicaments over China and South Korea. On top of that, the monitors and projectors started to be the products in which this country has a comparative advantage over Japan, South Korea and India.

Interestingly, in 2000 Poland possessed comparative advantage in furniture and furnishing over the Asian countries. Also motor cars had a relatively strong position in Polish exports over selected Asian countries (with exception to Japan). Interestingly, Poland is strong in producing women clothes and exporting coal compared to Japan. Over time, much has changed, but still Poland is relatively good at producing and exporting furniture and furnishing (with the exception relative to China). The change in specialisation from motor cars to the parts of them is also visible, and this is the effect of production fragmentation within the automotive industry and thus the increasing trade in semiproducts within the industry. But the co-existence of advantages in motor cars and parts of them suggests the significance of the automotive industry in Poland's 2012 trade. Poland also started to note a comparative advantage in household equipment over Japan and in articles of base metal over South Korea.

Slovakia has a stable comparative advantage in motor cars over selected Asian countries and nothing in this respect has changed in the recent years. In 2000, the other products in which Slovakia possessed advantage were the products of iron and steel (with exception to Kazakhstan) and petroleum oils (with exception to UAE). But the country lost some of the advantages at the articles of iron and steel and petroleum oils and advantages in such products as monitors and parts used in the automotive industry. This, in this respect, is similar to the Polish case. Apart from motor cars and parts thereof the items in which Slovakia has comparative advantage are, the monitors and projectors.

Let us see the revealed comparative advantages from the perspective of the Asian countries. Since they are specialised in particular goods, the comparative advantage over the Visegrad countries would be quite similar, due to relative similarity of the CEE region. Thus China, in 2000 had advantages in articles of apparel (excluding Poland), baby carriages (excluding Czech Republic), telecom equipment (excluding Hungary) and data-processing machines over

the most of the Visegrad countries. It slightly changed over time and in 2012 China had the advantage in thermionic valves and tubes, and the country strengthened the position of data-processing machines in their exports compared to the Visegrad countries (with exception of Czech Republic). Quite an important commodity with a significant comparative advantage is the telecom equipment (except towards Hungary), too.

Japan in 2000 is characterised by the comparative advantage in thermionic valves and tubes (over all Visegrad countries), motor cars (over Czech Republic, Hungary and Poland), parts for data-processing machines (over Czech Republic, Poland and Slovakia). But before the crisis Japan enhanced the comparative advantage in equipment for specialised industries over Visegrad countries at the cost of parts for data-processing machines and this advantage was maintained in 2012.

South Korea, and Japan, in 2000 was specialised (compared to Visegrad countries) in manufacturing and exporting thermionic valves and tubes, and parts for data-processing machines (over Czech Republic, Poland and Slovakia). It also possessed the comparative advantage in telecom equipment (over Czech Republic, Poland and Slovakia). In 2007 an important exporting commodity of this country compared to the Visegrad countries, became ships (excluding Poland, having several shipyards, thanks to the coastline). Additionally for Poland and Hungary, these countries noted the comparative disadvantage in optical instruments. In 2012, quite surprisingly, South Korea started noting relatively big comparative advantage in petroleum oils over all Visegrad countries.

Singaporean export structure in 2000 showed comparative advantage in household equipment and office machines over all Visegrad countries. Also this country possessed a significant advantage in data-processing machines, but not over Hungary, where it possessed the advantage in bituminous petroleum oils. In 2007, the comparative disadvantage in bituminous petroleum oils touched all Visegrad countries. Also “miscellaneous items” was the product in which Singapore noted the advantage over most of Visegrad countries (except for Poland) in 2007. In case of Poland it noted the disadvantage in data-processing machines. In 2012, the only change in this picture was the replacement of the disadvantage in data-processing machines in Poland by the miscellaneous items.

Quite different from the above mentioned countries is India, with a comparative advantage in pearls over Visegrad countries during the entire research period. In 2000 over these countries, the comparative advantage in textile yarn, and over Czech Republic, Hungary and Slovakia the comparative advantage in women clothing is significant. As concerning Poland, India had then the advantage in exporting crustaceans. In 2007, the specialisation of India changed and in that year (but also in 2012) this country acquired a significant comparative advantage in petroleum oils and in jewelry.

The other case is UAE, which in 2000 had comparative advantage over Visegrad countries in commodities that belong to the “resources group”. This country, compared to Visegrad states has a very strong advantage in bituminous petroleum oils, and petroleum oils, and natural gas. The picture has changed only slightly in 2007, where, the natural gas was replaced by the advantage in gold export.

Kazakhstan is quite similar case as UAE, but with other natural resources. In 2000 it has the comparative advantage in bituminous petroleum oils, copper and products of steel and iron (except for Slovakia, over which it possessed a comparative advantage in wheat). In the next

years little has changed - the significant comparative advantage in products of steel and iron was replaced by pig-iron. The 2012 was similar to 2007, and the only change was in case of Poland where the copper was started to be an important exporting good, and this disadvantage was replaced by the radioactive materials.

To sum up, several conclusions from the additive revealed comparative advantage index may be drawn. First, the Visegrad countries have quite similar production profile, with such common advantages toward Asian countries as the products in the automotive industry. There are also several differences, for instance Poland is strong in exporting furniture and furnishings or Hungary – in medicaments. Also some countries, partly started specialising in technologically advanced products, as data-processing machines (Czech Republic), monitors and projectors or telecom equipment (the so-called Nokia effect in Hungary, see Éltető-Völgyi,2013).

Besides, the disadvantages were various and strongly dependent of the trading partner of the Visegrad countries. The products in which the Visegrad countries have advantage vary from raw materials (like copper) to technologically advanced items, as the telecom equipment or data-processing machines. It is worth noting, that during the crisis little has changed in comparative advantages (and disadvantages), and the biggest changes took place in the earlier period.

Given the involvement of V4 countries in global value chains and the high content of imported inputs in exports, specialisation patterns calculated from gross exports can be different from the specialisation based on value added. Koopman et al.(2012) shows that RCA indices for automotive, electrical and other manufacturing branches calculated from value added trade in 2007 were much smaller in the case of several Asian countries than “normal” RCA indices. However, in the case of Visegrad countries just on the contrary, RCA indices from value added trade are *higher* in these branches than traditional RCA indices. This means that these countries occupy such places in GVCs that produce relatively more value added.

Effects of crisis

The general effect of the international crisis, the worldwide “great trade collapse” was felt in Visegrad-Asian trade too. In 2009 trade decreased, but this drop was generally smaller than in the Visegrad-EU or general Visegrad-non-EU trade. As it was seen in Table 2, a year later trade already gained momentum and the pace of increase was higher than in the case of EU trade.

This drop and quick recovery can be caused by the effect of crisis on GVC trade that is mentioned by several authors as the “bullwhip effect” (Escaith et al.,2010, Altomonte et al. 2012, Zavacka, 2012). This means that low demand expectations force lead firms to adjust by their inventories. After the crisis, if demand for the product is recovered, sold out inventories can be accumulated again, so trade increase can also be magnified by GVCs. A demonstration is given by Alessandria et al. (2010). They use the example of the car industry to show that during the crisis, as sales of cars dropped dramatically, sellers started running down their inventories as the demand was dropping. This action led to a lack of orders to their suppliers and a much larger drop in sales of parts and components in comparison with sales.

Altomonte et al.(2012) note that intermediate exports of French firms experienced a relatively larger drop than those of other firms and attribute this result to the bullwhip effect. Further, they point out that the drop may be reduced for transactions involved in intra-firm rather than arm's-length trade because a firm will have a better ability to coordinate the inventories of a chain internally.

Using US industry-level import data. Zavacka (2012) shows that the volatility of trade after the Lehman shock was higher for upstream industries. These are also more likely to drop out of trade completely, but mostly temporarily: about 90 per cent of products return to trading within two years after the shock. Bullwhip-driven drop outs and recoveries are propelled mostly by product characteristics; country characteristics do not seem to have much effect in mitigating the impact.

As for Visegrad trade with Asia is largely controlled by multinational companies and their production in the global production chains, the relocation decisions of these firms -as a possible consequence of the crisis- can have negative effects too. Relocating plants from Hungary, for example, decreased the Hungarian export capacity significantly in 2012¹⁹.

Slovakian trade pattern that concentrates on motor vehicle exports can also be vulnerable. „The successful Slovak business model has thus come under pressure and a new source of stimulus is needed for the continuation of a rapid catch-up of the Slovak economy....The rapid success of the export-led growth strategy was also achieved by a concentration on mobile industries which, though they could move in quickly, could also leave easily.” (Fidrmuc et al., 2013). Similar conclusions on vulnerability are drawn by Frank (2013) but adding the fact that, the exports of motor vehicles to Asian countries contributed to fast recovery of Slovak exports after the recession in 2009.

Beside relocation, the crisis probably induced certain positive effects on GVCs in the Visegrad countries. Sass –Szalavetz (2013) analysed the effects of crisis on GVC integrated Hungarian automotive and electronic industry based on interviews. According to their results the firms has had functional upgrading effects induced by the crisis and reorganisation of multinationals.

These findings can be reinforced from the recent OECD-WTO statistics. In all countries the share of domestic value added in exports from 2005 to 2009 (last available year) increased and foreign value added share decreased (with the exception of Czech Republic). Furthermore, these trends in value added in the branches with significant share of multinationals (OECD provides data for several broad industries) are more apparent than in total export. That can hint to a sort of upgrading, repositioning in the involvement in GVCs for the Visegrad countries (see Table 4).

¹⁹ Nokia established its greenfield factory in Hungary in 1999 with the profile of making cellular phones; in 2004 a new investment doubled its capacity. Several Arab and Asian countries were supplied from here, 97% of the revenues of the Hungarian Nokia plant stemmed from export sales. In 2012 Nokia downgraded its affiliate in Hungary. The work of assembling phones was switched to Nokia's plants in South Korea and in Beijing. Therefore, in 2012 the huge export of cellular phones from Hungary already decreased. However, the competitive advantage in producing telecom equipment over several Asian countries was maintained during the crisis.

Table. 4. Share of foreign value added in branches including commodities most exported to Asia, per cent

	Branch including:	2000	2005	2009
Czech Republic	Data processing machines	56,0	61,6	63,5
	All commodities	39,2	40,6	39,4
Hungary	Telecom. equipment	60,5	67,2	53,6
	All commodities	46,2	49,1	39,9
Poland	Copper	31,6	36,5	32,5
	All commodities	23,3	30,7	27,9
Slovakia	Motor cars	74,1	63,7	58,3
	All commodities	48,3	48,0	44,3

Source: OECD-WTO Trade in Value Added (TIVA) statistics²⁰

Integration in global value chains is the least apparent in Polish trade with Asia, its export structure is more dispersed. The effect of foreign multinational companies on export seems to be lower than in other V4 countries. This was reflected in the higher domestic value added shares in export too. Furthermore, the relocation decisions during the crisis made by the multinationals have two sides. On one hand they could induce outflows of capital to regions with lower costs, and thus decrease production. On the other hand some additional investments have been relocated from Western Europe to Poland due to low cost seeking by multinationals²¹ (FDI, even during the crisis, has continued to fuel this economy - see: e.g. Leven, 2012).

A small part of trade with Asia is realised by small and medium sized enterprises. Some, even successful ones, were hit hard by the crisis, mainly by the stop of financing possibilities, lack of bank credits (Éltető-Völgyi, 2013). But those that are part of a global production chain as suppliers could have recovered soon. According to Milberg and Winkler (2010) crisis, steeply falling demand and increasing competitive pressures have two contradictory effects on firm networks. The demand effect is the consequence of declining demand for the products of a given company, which induces lead firms to decrease their off-shoring activities and reduce in turn their purchases from suppliers. The “substitution effect” is just the opposite: it leads to increasing purchases from suppliers as lead firms have incentives to off-shore or outsource

²⁰ http://stats.oecd.org/Index.aspx?DataSetCode=TIVA_OECD_WTO

²¹ E.g. in 2013 Mars Petcare moved the factory from Peterborough, England to Sochaczew, Poland. But a part of production was also moved to Bokros, Hungary. However this investment was not too costly, as the Mars had already run some production before in Sochaczew. Also, Kraft moves the production of chocolate bars called 'huesitos' from Saragossa to Poland. In the automotive industry, Volvo Bus quit Sweden and concentrated production in Wrocław, Poland. The cost of this last relocation was estimated at the level of 48 million Polish zloty. The analyst of Euromonitor International stated, that the Italy as a country lost much from the existence such production hubs, as Poland, where production between 2007 and 2012 has doubled (see: <http://blog.euromonitor.com/2013/05/italy-inexorably-losing-its-industrial-backbone.html>) due to the at least partly relocation of production by such firms as Indesit or Whirlpool .

more in order to increase competitiveness and efficiency and to lower prices. These two effects impact upon lead firms and suppliers differently. The impact on suppliers also differs according to their position in the value chain. Lead firms and closely integrated “tier-one suppliers” try to consolidate their activities and rationalise supply chains. Lower-tier suppliers can aim at diversifying their activities in terms of producing more products or serving more buyers (Sass, Szalavetz, 2013).

Conclusions

The main trade partner of the Visegrad countries remains the European Union. However, data show, that since 2000 the share of Asia in Visegrad countries’ trade is dynamically increasing. The only exception is 2009, the first full year of the economic downturn. Although during the first decade of 21 century the product structure of trade changed considerably, such shifts are less visible since the beginning of the crisis. The same picture can be drawn from the Visegrad Group RCA indices over the main Asian countries. The evidence thus showed the stabilisation of trade structure and export specialisation towards Asia even before the crisis.

The commodity-specific structure of trade is often determined by the trade partners, which are bigger than the Visegrad countries. For instance, China being the biggest Asian trading partner, as an electrical equipment producer is supplied by Polish copper. Additionally, the geographic composition of trade shows, that despite the general negative trade balance with Asia, there are examples of trade surplus too, towards West Asia.

Trade between the Visegrad countries and Asia is characterised by higher than average concentration. The most concentrated is Slovakian trade, motor cars represent more than two-third of exports. Hungary also shows considerable concentration on telecommunication equipment. In several cases the most traded products are technology intensive ones so no wonder that the share of high-tech products in Visegrad-Asia trade is remarkably high. Import and export is often high in the same high-tech product group (like telecommunication equipment and parts) showing the role of global production chains.

As the GVC related literature states, country competitiveness measures based on gross export data can be biased by large trade of intermediate products and high import content. Therefore recently there are intents to calculate RCA indices based on value added trade (OECD/WTO database, Koopman et al.(2012)). These use broad, largely aggregated manufacturing sectors. In our calculations we used gross export data, and in order to get a detailed view on trade characteristics we used SITC 3 digit level classification of almost 300 product group. We calculated additive revealed comparative advantage indices for Visegrad countries and their main Asian partners based on gross export data. These ARCA indices reveal general comparative advantages in automotive sector and the above mentioned telecommunication equipments for the Visegrad countries vis a vis their main Asian partners, undoubtedly as an effect of GVC participation.

It is worth noting that across the time the Visegrad countries started to have comparative advantage over Asian countries in increasingly sophisticated products, that have several stages of processing (and thus more exposed to fragmentation of production.) This enables

these countries to be included in the GVCs. However these changes took place mainly before the crisis, afterwards there were only minor changes.

OECD-WTO data show falling foreign value-added component in the general export of Visegrad countries in those products that are mainly exported to Asia. However lack of recent data (availability for 2000, 2005, 2008 and 2009, and only for exports to the world) disables to draw strong conclusions on this aspect of the patterns of trade of the Visegrad Group with Asia as well as on further developments during the crisis.

Visegrad countries are integrated into GVCs to a different degree, with different patterns. This mainly has country-specific reasons. Polish trade with Asia seems the less influenced by GVCs. It is a big country with large internal market. The main motivation of foreign multinationals investing here has been market seeking and not export orientation. The other three Visegrad countries are small, their integration in the multinational networks determines their trade. The main motivation of foreign investors here has been efficiency seeking, utilising relatively cheap and well qualified labour force. Apart from that foreign firms could utilise special advantages and conditions in these countries before EU adhesion, like customs-free zones in Hungary.

Following this line, it is interesting to know what determines the position of one country, or its companies in the global value chains. Cattaneo et al. (2013) enumerate several internal and external factors that help upgrading, joining, better positioning or maintaining positions in GVCs. The analyse of these factors in the case of Visegrad countries would be a topic of further research.

Annex

Table 5. Herfindahl-Hirschman indices for Hungarian export and import

West Asia	UNITED ARAB EMIRATES		ISRAEL		SAUDI ARABIA	
	Export	Import	Export	Import	Export	Import
2000	0.270	0.309	0.275	0.230	0.410	0.746
2012	0.883	0.387	0.314	0.368	0.490	0.246
South Asia	INDIA		IRAN		PAKISTAN	
	Export	Import	Export	Import	Export	Import
2000	0.301	0.219	0.656	0.723	0.377	0.346
2012	0.299	0.321	0.231	0.842	0.433	0.375
CIS	AZERBAIJAN		KAZAKHSTAN		UZBEKISTAN	
	Export	Import	Export	Import	Export	Import
2000	0.501	0.878	0.283	0.550	0.568	0.937
2012	0.483	0.586	0.484	0.967	0.810	0.732
Southeast Asia	MALAYSIA		SINGAPORE		THAILAND	
	Export	Import	Export	Import	Export	Import
2000	0.452	0.411	0.787	0.615	0.307	0.355
2012	0.483	0.561	0.553	0.602	0.365	0.406
Northeast Asia	CHINA		HONG KONG		JAPAN	
	Export	Import	Export	Import	Export	Import
2000	0.257	0.293	0.380	0.373	0.259	0.297
2012	0.404	0.505	0.445	0.320	0.302	0.258

Table 6. Herfindahl-Hirschman indices for Slovakian export and import

West Asia	UNITED ARAB EMIRATES		ISRAEL		SAUDI ARABIA	
	Export	Import	Export	Import	Export	Import
2000	0.367	0.666	0.388	0.306	0.538	0.582
2012	0.538	0.335	0.451	0.395	0.456	0.766
South Asia	INDIA		IRAN		PAKISTAN	
	Export	Import	Export	Import	Export	Import
2000	0.633	0.386	0.464	0.525	0.638	0.461
2012	0.401	0.322	0.404	0.979	0.686	0.494

CIS	AZERBAIJAN		KAZAKHSTAN		UZBEKISTAN	
	Export	Import	Export	Import	Export	Import
2000	0.468	0.602	0.243	0.509	0.453	0.970
2012	0.262	0.866	0.319	0.981	0.356	0.642
Southeast Asia	MALAYSIA		SINGAPORE		THAILAND	
	Export	Import	Export	Import	Export	Import
2000	0.832	0.354	0.727	0.473	0.370	0.205
2012	0.445	0.336	0.308	0.528	0.332	0.395
Northeast Asia	CHINA		SOUTH KOREA		JAPAN	
	Export	Import	Export	Import	Export	Import
2000	0.362	0.146	0.441	0.243	0.474	0.202
2012	0.810	0.308	0.320	0.408	0.671	0.393

Source: Frank (2013) and own calculations

Table 7. Herfindahl-Hirschman indices for Polish export and import

West Asia	UNITED ARAB EMIRATES		ISRAEL		SAUDI ARABIA	
	Export	Import	Export	Import	Export	Import
2000	0.274	0.701	0.694	0.318	0.347	0.502
2012	0.254	0.650	0.209	0.222	0.217	0.708
South Asia	INDIA		IRAN		PAKISTAN	
	Export	Import	Export	Import	Export	Import
2000	0.276	0.205	0.342	0.683	0.390	0.319
2012	0.271	0.252	0.371	0.672	0.278	0.321
CIS	TURKMENISTAN		KAZAKHSTAN		UZBEKISTAN	
	Export	Import	Export	Import	Export	Import
2000	0.636	0.885	0.268	0.765	0.841	0.920
2012	0.240	0.731	0.175	0.740	0.231	0.537
Southeast Asia	MALAYSIA		SINGAPORE		THAILAND	
	Export	Import	Export	Import	Export	Import
2000	0.415	0.376	0.848	0.412	0.391	0.255
2012	0.302	0.316	0.625	0.731	0.236	0.405
Northeast Asia	CHINA		SOUTH KOREA		JAPAN	
	Export	Import	Export	Import	Export	Import
2000	0.494	0.191	0.353	0.281	0.209	0.199
2012	0.358	0.177	0.338	0.432	0.276	0.225

Source: Gradziuk, Toporowski (2013) and own calculatons

Table 8. Herfindahl-Hirschman indices for Czech export and import

West Asia	UNITED ARAB EMIRATES	ISRAEL	SAUDI ARABIA
------------------	-----------------------------	---------------	---------------------

	Export	Import	Export	Import	Export	Import
2000	0.585	0.768	0.426	0.329	0.405	0.627
2012	0.335	0.296	0.456	0.196	0.292	0.333
South Asia	INDIA		IRAN		PAKISTAN	
	Export	Import	Export	Import	Export	Import
2000	0.327	0.242	0.519	0.569	0.306	0.338
2012	0.219	0.202	0.300	0.641	0.291	0.313
CIS	AZERBAIJAN		KAZAKHSTAN		GEORGIA	
	Export	Import	Export	Import	Export	Import
2000	0.467	0.780	0.329	0.938	0.321	0.482
2012	0.245	0.999	0.319	0.951	0.299	0.830
Southeast Asia	MALAYSIA		SINGAPORE		THAILAND	
	Export	Import	Export	Import	Export	Import
2000	0.635	0.395	0.718	0.387	0.439	0.209
2012	0.261	0.421	0.243	0.580	0.222	0.514
Northeast Asia	CHINA		SOUTH KOREA		JAPAN	
	Export	Import	Export	Import	Export	Import
2000	0.288	0.174	0.416	0.245	0.334	0.204
2012	0.169	0.368	0.227	0.444	0.229	0.244

Source: Kříž (2013) and own calculations

Table 9. Finger-Kreinin indices for Hungarian export and import

West Asia	UNITED ARAB EMIRATES		ISRAEL		SAUDI ARABIA	
	Export	Import	Export	Import	Export	Import
2000-2012	0.077	0.122	0.319	0.300	0.144	0.049
2000-2007	0.111	0.073	0.216	0.439	0.126	0.003
2007-2012	0.801	0.095	0.390	0.249	0.702	0.380
South Asia	INDIA		IRAN		PAKISTAN	
	Export	Import	Export	Import	Export	Import
2000-2012	0.275	0.234	0.158	0.767	0.184	0.470
2000-2007	0.305	0.301	0.324	0.679	0.063	0.549
2007-2012	0.431	0.342	0.272	0.030	0.492	0.076
CIS	AZERBAIJAN		KAZAKHSTAN		UZBEKISTAN	
	Export	Import	Export	Import	Export	Import
2000-2012	0.475	0.002	0.411	0.002	0.565	0.001
2000-2007	0.354	0.357	0.369	0.008	0.594	0.001
2007-2012	0.630	0.000	0.516	0.005	0.718	0.0002
Southeast Asia	MALAYSIA		SINGAPORE		THAILAND	
	Export	Import	Export	Import	Export	Import
2000-2012	0.473	0.374	0.201	0.209	0.346	0.226
2000-2007	0.568	0.686	0.623	0.246	0.300	0.344
2007-2012	0.578	0.390	0.295	0.224	0.213	0.322
Northeast Asia	CHINA		SOUTH KOREA		JAPAN	
	Export	Import	Export	Import	Export	Import

2000-2012	0.218	0.512	0.471	0.389	0.459	0.589
2000-2007	0.199	0.584	0.537	0.237	0.297	0.669
2007-2012	0.650	0.248	0.546	0.403	0.506	0.221

Table 10. Finger-Kreinin indices for Czech export and import

West Asia	UNITED ARAB EMIRATES		ISRAEL		SAUDI ARABIA	
	Export	Import	Export	Import	Export	Import
2000-2012	0.353	0.159	0.511	0.425	0.143	0.222
2000-2007	0.642	0.091	0.342	0.384	0.305	0.186
2007-2012	0.599	0.397	0.460	0.539	0.533	0.322
South Asia	INDIA		IRAN		PAKISTAN	
	Export	Import	Export	Import	Export	Import
2000-2012	0.385	0.409	0.147	0.616	0.312	0.460
2000-2007	0.497	0.466	0.141	0.651	0.284	0.593
2007-2012	0.616	0.563	0.531	0.616	0.471	0.626
CIS	AZERBAIJAN		KAZAKHSTAN		GEORGIA	
	Export	Import	Export	Import	Export	Import
2000-2012	0.222	0.738	0.240	0.937	0.153	0.285
2000-2007	0.532	0.739	0.374	0.796	0.265	0.288
2007-2012	0.422	0.999	0.496	0.803	0.524	0.849
Southeast Asia	MALAYSIA		SINGAPORE		THAILAND	
	Export	Import	Export	Import	Export	Import
2000-2012	0.263	0.437	0.125	0.459	0.302	0.228
2000-2007	0.277	0.511	0.366	0.403	0.444	0.394
2007-2012	0.550	0.594	0.526	0.515	0.499	0.547
Northeast Asia	CHINA		SOUTH KOREA		JAPAN	
	Export	Import	Export	Import	Export	Import
2000-2012	0.353	0.461	0.220	0.304	0.296	0.476
2000-2007	0.445	0.508	0.303	0.358	0.318	0.450
2007-2012	0.564	0.731	0.529	0.301	0.579	0.722

Table 11. Finger-Kreinin indices for Slovak export and import

West Asia	UNITED ARAB EMIRATES		ISRAEL		SAUDI ARABIA	
	Export	Import	Export	Import	Export	Import
2000-2012	0.076	0.057	0.192	0.358	0.079	0.004
2000-2007	0.073	0.162	0.298	0.484	0.063	0.040
2007-2012	0.696	0.035	0.636	0.534	0.654	0.190
South Asia	INDIA		IRAN		PAKISTAN	
	Export	Import	Export	Import	Export	Import
2000-2012	0.094	0.529	0.104	0.494	0.003	0.190
2000-2007	0.128	0.549	0.132	0.487	0.072	0.287
2007-2012	0.325	0.668	0.243	0.934	0.054	0.555
CIS	AZERBAIJAN		KAZAKHSTAN		UZBEKISTAN	
	Export	Import	Export	Import	Export	Import
2000-2012	0.046	0	0.248	0.00003	0.120	0

2000-2007	0.079	0	0.266	0.406	0.253	0
2007-2012	0.343	0	0.268	0.260	0.482	0
Southeast Asia	MALAYSIA		SINGAPORE		THAILAND	
	Export	Import	Export	Import	Export	Import
2000-2012	0.031	0.390	0.038	0.267	0.071	0.263
2000-2007	0.024	0.437	0.371	0.418	0.090	0.210
2007-2012	0.274	0.527	0.375	0.243	0.361	0.391
Northeast Asia	CHINA		SOUTH KOREA		JAPAN	
	Export	Import	Export	Import	Export	Import
2000-2012	0.101	0.410	0.168	0.223	0.096	0.373
2000-2007	0.164	0.380	0.291	0.188	0.085	0.431
2007-2012	0.810	0.671	0.481	0.499	0.762	0.634

Table 12. Finger-Kreinin indices for Polish export and import

West Asia	UNITED ARAB EMIRATES		ISRAEL		SAUDI ARABIA	
	Export	Import	Export	Import	Export	Import
2000-2012	0.356	0.668	0.149	0.362	0.239	0.470
2000-2007	0.440	0.093	0.179	0.442	0.313	0.646
2007-2012	0.482	0.231	0.606	0.654	0.515	0.707
South Asia	INDIA		IRAN		PAKISTAN	
	Export	Import	Export	Import	Export	Import
2000-2012	0.260	0.493	0.152	0.278	0.233	0.497
2000-2007	0.352	0.573	0.179	0.260	0.437	0.642
2007-2012	0.341	0.673	0.303	0.604	0.416	0.681
CIS	TURKMENISTAN		KAZAKHSTAN		UZBEKISTAN	
	Export	Import	Export	Import	Export	Import
2000-2012	0.162	0.090	0.434	0.044	0.016	0.065
2000-2007	0.482	0.418	0.497	0.188	0.320	0.020
2007-2012	0.270	0.106	0.600	0.528	0.475	0.050
Southeast Asia	MALAYSIA		SINGAPORE		THAILAND	
	Export	Import	Export	Import	Export	Import
2000-2012	0.203	0.489	0.749	0.250	0.240	0.529
2000-2007	0.466	0.385	0.066	0.206	0.222	0.477
2007-2012	0.264	0.562	0.213	0.511	0.648	0.476
Northeast Asia	CHINA		SOUTH KOREA		JAPAN	
	Export	Import	Export	Import	Export	Import
2000-2012	0.559	0.609	0.198	0.318	0.329	0.566
2000-2007	0.627	0.602	0.291	0.363	0.335	0.598
2007-2012	0.640	0.799	0.422	0.831	0.513	0.647

Table 13: Top 3 items with biggest relative advantage of Visegrad countries over main Asian countries

Year	Rank	China	Japan	South Korea	Singapore	UAE	India	Kazakhstan
Czech Republic								
2000	Top1	Motor cars	Articles of base metal	Parts for motor cars	Motor cars	Motor cars	Motor cars	Motor cars
	Top2	Parts for motor cars	Furniture, furnishings and parts thereof	Articles of base metal	Parts for motor cars	Parts for motor cars	Parts for motor cars	Parts for motor cars
	Top3	Articles of base metal	Parts for motor cars	Electrical machinery	Electrical machinery	Electrical machinery	Electrical machinery	Electrical machinery
2007	Top1	Motor cars	Computers	Parts for motor cars	Motor cars	Parts for motor cars	Motor cars	Motor cars
	Top2	Parts for motor cars	Parts for motor cars	Computers	Parts for motor cars	Motor cars	Parts for motor cars	Parts for motor cars
	Top3	Articles of base metal	Articles of base metal	Articles of base metal	Articles of base metal	Computers	Computers	Computers
2012	Top1	Motor cars	Computers	Computers	Motor cars	-	Motor cars	Motor cars
	Top2	Parts for motor cars	Articles of base metal	Articles of base metal	Parts for motor cars	-	Computers	Parts for motor cars
	Top3	Articles of base metal	Parts for motor cars	Parts for motor cars	Computers	-	Parts for motor cars	Computers
Hungary								
2000	Top1	Piston engines	Piston engines	Piston engines	Piston engines	Piston engines	Piston engines	Piston engines
	Top2	Motor cars	Computers	Computers	Motor cars	Computers	Computers	Computers
	Top3	Computers	Equipment for distributing electricity	Electrical machinery	Parts for computers	Parts for computers	Parts for computers	Parts for computers
2007	Top1	Piston engines	Telecom equipment	Piston engines	Telecom equipment	Telecom equipment	Telecom equipment	Telecom equipment
	Top2	Motor cars	Piston engines	Parts for motor cars	Piston engines	Piston engines	Piston engines	Piston engines
	Top3	Parts for motor cars	Computers	Monitors and projectors	Motor cars	Computers	Motor cars	Motor cars
2012	Top1	Piston engines	Telecom equipment	Piston engines	Telecom equipment	-	Telecom equipment	Telecom equipment
	Top2	Motor cars	Piston engines	Medicaments	Piston engines	-	Piston engines	Piston engines
	Top3	Medicaments	Monitors and projectors	Monitors and projectors	Motor cars	-	Monitors and projectors	Motor cars
Poland								
2000	Top1	Furniture, furnishings and parts thereof	Furniture, furnishings and parts thereof	Furniture, furnishings and parts thereof	Furniture, furnishings and parts thereof	Furniture, furnishings and parts thereof	Furniture, furnishings and parts thereof	Furniture, furnishings and parts thereof
	Top2	Motor cars	Women clothing	Motor cars	Motor cars	Piston engines	Motor cars	Motor cars
	Top3	Piston engines	Coal	Articles of base metal	Piston engines	Motor cars	Piston engines	Piston engines
2007	Top1	Motor cars	Furniture, furnishings	Furniture, furnishings	Furniture, furnishings	Furniture, furnishings	Furniture, furnishings	Furniture, furnishings

			and parts thereof	and parts thereof	and parts thereof	and parts thereof	and parts thereof	and parts thereof
	Top2	Furniture, furnishings and parts thereof	Monitors and projectors	Parts for motor cars	Motor cars	Parts for motor cars	Motor cars	Motor cars
	Top3	Parts for motor cars	Household equipment	Piston engines	Piston engines	Piston engines	Parts for motor cars	Piston engines
2012	Top1	Parts for motor cars	Furniture, furnishings and parts thereof	Furniture, furnishings and parts thereof	Furniture, furnishings and parts thereof	-	Furniture, furnishings and parts thereof	Parts for motor cars
	Top2	Motor cars	Monitors and projectors	Monitors and projectors	Parts for motor cars	-	Parts for motor cars	Furniture, furnishings and parts thereof
	Top3	Piston engines	Household equipment	Articles of base metal	Motor cars	-	Monitors and projectors	Motor cars
Slovakia								
2000	Top1	Motor cars	Petroleum oils	Motor cars	Motor cars	Motor cars	Motor cars	Motor cars
	Top2	Petroleum oils	Products of iron and steel	Products of iron and steel	Petroleum oils	Products of iron and steel	Products of iron and steel	Petroleum oils
	Top3	Products of iron and steel	Motor cars	Parts for motor cars	Products of iron and steel	Parts for motor cars	Petroleum oils	Parts for motor cars
2007	Top1	Motor cars	Monitors and projectors	Monitors and projectors	Motor cars	Motor cars	Motor cars	Motor cars
	Top2	Monitors and projectors	Petroleum oils	Motor cars	Monitors and projectors	Monitors and projectors	Monitors and projectors	Monitors and projectors
	Top3	Parts for motor cars	Motor cars	Parts for motor cars	Parts for motor cars	Parts for motor cars	Parts for motor cars	Parts for motor cars
2012	Top1	Motor cars	Monitors and projectors	Motor cars	Motor cars	-	Motor cars	Motor cars
	Top2	Monitors and projectors	Motor cars	Monitors and projectors	Monitors and projectors	-	Monitors and projectors	Monitors and projectors
	Top3	Parts for motor cars	Telecom equipment	Parts for motor cars	Parts for motor cars	-	Parts for motor cars	Parts for motor cars

Table 14: Top 3 items with biggest comparative disadvantage of Visegrad countries to main Asian countries

Year	Rank	China	Japan	South Korea	Singapore	UAE	India	Kazakhstan
Czech Republic								
2000	Top1	Articles of apparel	Thermionic valves and tubes	Thermionic valves and tubes	Household equipment	Bituminous petroleum oils	Pearls	Bituminous petroleum oils
	Top2	Telecom equipment	Motor cars	Telecom equipment	Office machines	Petroleum oils	Women clothing	Copper
	Top3	Computers	Parts for computers	Parts for computers	Computers	Natural gas	Textile yarn	Products of iron and steel
2007	Top1	Telecom equipment	Motor cars	Thermionic valves and tubes	Household equipment	Bituminous petroleum oils	Petroleum oils	Bituminous petroleum oils
	Top2	Computers	Thermionic valves and tubes	Telecom equipment	Bituminous petroleum oils	Petroleum oils	Pearls	Copper

	Top3	Articles of apparel	Equipment for specialised industries	Ships	Miscellaneous items	Gold	Jewelry	Pig-iron
2012	Top1	Telecom equipment	Thermionic valves and tubes	Petroleum oils	Household equipment	-	Petroleum oils	Bituminous petroleum oils
	Top2	Thermionic valves and tubes	Ships	Thermionic valves and tubes	Bituminous petroleum oils	-	Pearls	Pig-iron
	Top3	Articles of apparel	Equipment for specialised industries	Ships	Miscellaneous items	-	Jewelry	Copper
Hungary								
2000	Top1	Baby carriages	Thermionic valves and tubes	Thermionic valves and tubes	Household equipment	Bituminous petroleum oils	Pearls	Bituminous petroleum oils
	Top2	Articles of apparel	Motor cars	Ships	Office machines	Petroleum oils	Textile yarn	Copper
	Top3	Footwear	Equipment for specialised industries	Petroleum oils	Bituminous petroleum oils	Natural gas	Women clothing	Products of iron and steel
2007	Top1	Computers	Motor cars	Thermionic valves and tubes	Household equipment	Bituminous petroleum oils	Petroleum oils	Bituminous petroleum oils
	Top2	Articles of apparel	Thermionic valves and tubes	Ships	Bituminous petroleum oils	Petroleum oils	Pearls	Copper
	Top3	Parts for computers	Equipment for specialised industries	Optical instruments	Miscellaneous items	Gold	Jewelry	Pig-iron
2012	Top1	Computers	Motor cars	Petroleum oils	Household equipment	-	Petroleum oils	Bituminous petroleum oils
	Top2	Thermionic valves and tubes	Thermionic valves and tubes	Thermionic valves and tubes	Bituminous petroleum oils	-	Pearls	Pig-iron
	Top3	Jewelry	Equipment for specialised industries	Ships	Miscellaneous items	-	Jewelry	Copper
Poland								
2000	Top1	Computers	Thermionic valves and tubes	Thermionic valves and tubes	Household equipment	Bituminous petroleum oils	Pearls	Bituminous petroleum oils
	Top2	Telecom equipment	Motor cars	Parts for computers	Office machines	Petroleum oils	Textile yarn	Products of iron and steel
	Top3	Baby carriages	Parts for computers	Telecom equipment	Computers	Natural gas	Crustaceans	Copper
2007	Top1	Computers	Thermionic valves and tubes	Thermionic valves and tubes	Household equipment	Bituminous petroleum oils	Petroleum oils	Bituminous petroleum oils
	Top2	Telecom equipment	Motor cars	Telecom equipment	Bituminous petroleum oils	Petroleum oils	Pearls	Copper
	Top3	Parts for computers	Equipment for specialised industries	Optical instruments	Computers	Gold	Jewelry	Pig-iron

			industries					
2012	Top1	Telecom equipment	Thermionic valves and tubes	Thermionic valves and tubes	Bituminous petroleum oils	-	Petroleum oils	Bituminous petroleum oils
	Top2	Computers	Motor cars	Petroleum oils	Household equipment	-	Pearls	Pig-iron
	Top3	Thermionic valves and tubes	Equipment for specialised industries	Optical instruments	Miscellaneous items	-	Jewelry	Radioactive materials
Slovakia								
2000	Top1	Telecom equipment	Thermionic valves and tubes	Thermionic valves and tubes	Household equipment	Bituminous petroleum oils	Pearls	Bituminous petroleum oils
	Top2	Baby carriages	Electrical machinery	Parts for computers	Office machines	Petroleum oils	Women clothing	Copper
	Top3	Computers	Parts for computers	Telecom equipment	Computers	Natural gas	Textile yarn	Wheat
2007	Top1	Computers	Thermionic valves and tubes	Telecom equipment	Household equipment	Bituminous petroleum oils	Petroleum oils	Bituminous petroleum oils
	Top2	Telecom equipment	Equipment for specialised industries	Thermionic valves and tubes	Bituminous petroleum oils	Petroleum oils	Pearls	Copper
	Top3	Parts for computers	Electrical machinery	Ships	Miscellaneous items	Gold	Jewelry	Pig-iron
2012	Top1	Computers	Thermionic valves and tubes	Thermionic valves and tubes	Household equipment	-	Petroleum oils	Bituminous petroleum oils
	Top2	Thermionic valves and tubes	Equipment for specialised industries	Ships	Bituminous petroleum oils	-	Pearls	Pig-iron

References

- Alessandria, G., Kaboski, J. P. and V. Midrigan, (2010): The great trade collapse of 2008-09: an inventory adjustment? *NBER Working Paper* 16059
- Altomonte, C., Di Mauro, F., Ottaviano, G., Rungi, A., and V. Vicard (2012): Global Value Chains during the Great Trade Collapse A Bullwhip Effect? *ECB Working Paper* no. 1412.
- C. Altomonte and G. Ottaviano (2009), The Great Trade Collapse: Causes, Consequences and Prospects., VOX, www.voxeu.org.
- Amighimi, A. (2005), China in the international fragmentation of production: Evidence from the ICT industry, *The European Journal of Comparative Economics*, vol.2, no.2: 203-219.
- Athukorala, P., Yamashita, N. (2006), Production fragmentation and trade integration: East Asia in a global context, *The North American Journal of Economics and Finance*, Elsevier, vol. 17(3), December: 233-256.
- Baldwin, R. (2012): Global Supply Chains: Why they emerged, why they matter and where they are going. *CEPR Discussion Paper* no. 9103.
- Beltramello, A., De Backer, K., Moussiégt, L. (2012): The Export Performance of Countries within Global Value Chains. OECD, STI Working Papers no. 2.
- Cattaneo, O., Gereffi, G., Miroudot, S. and D. Taglioni (2013): Joining, Upgrading and Being Competitive in Global Value Chains. A Strategic Framework. *World Bank Policy Research Working Paper* no. 6406. April.
- Damijan, J., Crt, K. and M. Rojec (2013): Global Supply Chains at Work in Central and Eastern European Countries: Impact of FDI on export restructuring and productivity growth. Institute for Economic Research, *Paper prepared for the GRINCOH project*.
- Éltető A. and K. Völgyi (2013): The development of Hungarian foreign trade with Asia. *Working paper no. 200*. Institute for World Economics, RCERS HAS
- Escaith, H., Lindenberg, N. and S. Miroudot (2010), "International supply chains and trade elasticity in times of global crisis", *MPRA Paper 20478*, University Library of Munich, Germany.
- Fidrmuc, J., Klein, C., Price, R. and A. Wörgötter (2013): Slovakia: A Catching Up Euro Area Member In and Out of the Crisis. IZA Policy Paper No. 55
- Foster, N., Stehrer, R. and M. Timmer (2013): International fragmentation of production, trade and growth: Impacts and prospects for EU member states. *European Economy Economic papers* 484, European Commission, DG ECFIN.
- Frank, K. (2013): Development of Slovak foreign trade with Asia. Institute for Economic Research of the Slovak Academy of Sciences (EÚSAV) *Working Paper* no. 48.

- Galar, M. (2012): Competing within global value chains. European Commission ECFIN Economic Brief no. 17. December
- Gaulier, G.-L., and D. Francoise-Ünal (2012): The rise of emerging economies in the EU15 trade. *The European Journal of Comparative Economics*, vol.9. no.1: 133-175.
- Gereffi, G. (2013): Global value chains in a post-Washington Consensus world. *Review of International Political Economy*, (2013) : 29 pp (Ahead of print)
- Gradziuk, A. and P. Toporowski (2013): Doing business with tigers: Trends, features and prospects for Poland's trade with Asia. *Polish Institute of International Affairs Report*.
- Hoen, A. And J. Oosterhaven, (2006) : On the measurement of comparative advantage. *The Annals of Regional Science* 40(3): 677-91.
- IMF (2012): Changing Patterns of Global Trade. Departmental Paper no. 12/1.
- Jensen, M., Barfield, C. (2012): Global Value Chains and the continuing case for free trade. *Paper prepared for the AEI Conference*, November 18, 2012.
- Kimura, F., Takahashi, Y. And K. Hayakawa (2005), *Fragmentation and Parts and Components Trade: Comparison between East Asia and Europe*. Manuscript.
- Koopman, R., Wang, Z., and S.-J. Wei (2012): The Value-added Structure of Gross Exports and Global Production Network. *Paper for Presentation at the Final WIOD Conference "Causes and Consequences of Globalization"* April 24-26, 2012 Groningen, the Netherlands.
- Kříž, E. (2013): Features of foreign trade between the Czech Republic and Asia. *Europeum Institute for European Policy Working Paper*.
- Lall, S., Albaladejo, M. and J. Zhang (2004), Mapping fragmentation: Electronics and automobiles in East Asia and Latin America, *QEH Working Paper Series*, February.
- Leven, B. (2012), The Impact of Global Recession on FDI – Poland's Case Study, *International Journal of Business and Social Science*, July
- Mani, S. (2000), Exports of high technology products from developing countries: is it real or a statistical artefact? *UNU/INTECH Discussion Papers*.
- Milberg, W., Winkler, D. (2010): Trade Crisis and Recovery. Restructuring of Global Value Chains. *Policy Research Working Paper* 5294. World Bank .
- Sass M., Szalavetz A. (2013), Crisis and upgrading: The case of the Hungarian automotive and electronics sectors. *Europe-Asia Studies* Vol. 65. No. 3. p. 489-507.
- Srholec, M. (2005), High-tech exports from developing countries: A symptom of technology spurts or statistical illusion? *TIK Working Papers on Innovation Studies*.

Srholec, M. (2006), Fragmentation and Trade: A Network Perspective, *Paper presented at the 8. ETSG conference*, Vienna, 7-9 September 2006.

UNCTAD (2013): World Investment Report. Global Value Chains: Investment and Trade for Development.

Vogiatzoglou, K. (2012), Global production networks and export expansion: Cross-sectoral evidence from China, *INFER Working Paper*, no. 2012/7.

Zavacka, V. (2012): The bullwhip effect and the Great Trade Collapse. EBRD Working Paper no. 148.

Internet sources:

www.euromonitor.com (Euromonitor international)

<http://epp.eurostat.ec.europa.eu/portal/page/portal/eurostat/home/>

<http://stats.oecd.org/>

