

**Suggested Citation:**

**Grodzicki, M.J.** (2014). Global Value Chain and Competitiveness of V4 Economies (chapter 1). In: **Kiendl-Wendner, D. & Wach, K.** (eds), *International Competitiveness in Visegrad Countries: Macro and Micro Perspectives*. Graz: Fachhochschule Joanneum, pp. 13-31.

**1**

# Global Value Chain and Competitiveness of V4 Economies

**Maciej Jan Grodzicki**

Jagiellonian University  
Faculty of Management and Social Communication  
Institute of Economics and Management  
ul. Łojasiewicza 4, 30-348 Kraków, Poland  
e-mail: [maciej.grodzicki@uj.edu.pl](mailto:maciej.grodzicki@uj.edu.pl)

---

## Summary:

The paper aims to investigate the competitiveness of V4 economies from a new angle, related to fragmentation of global value chains (GVC). In the paper, a new methodology of analysing competitiveness of economies, developed by Timmer *et al.* (2012), was employed. Making use of World Input-Output Database, a value of GVC income of particular industries in V4 economies in 1995-2010 was calculated. Then, a thorough examination of computed values was conducted, in order to observe evolving openness, revealed comparative advantages (RCA) and position of V4 economies in the GVC. V4 economies since 1995 have become increasingly integrated in global value chains. On the one hand, they have imported more and more intermediate inputs for manufacturing industries. On the other, their contribution to GVC production have steadily increased. Although some tendencies were common for all V4 countries, some significant differences were detected as well. Firstly, level of integration into the GVC varied: Poland, probably due to size of the economy, is to a least extent dependent on participation in GVC, either by imports or by exports; while Hungary is the leader in both categories. Czech Republic, Slovakia and Hungary managed to develop RCA in capital-intensive and high-tech industries. Conversely, Poland finds its comparative advantage still predominantly in resource-based industries. Employment of a relatively new research technique sheds new light on the processes of integration of V4 into global economy. Comparison of our results with traditional ones, based on raw exports and imports data points to some important differences. So far, at least to our knowledge, no analysis like this for V4 has been performed.

**Keywords:** manufacturing, global value chain, input-output analyses, competitiveness, CEE

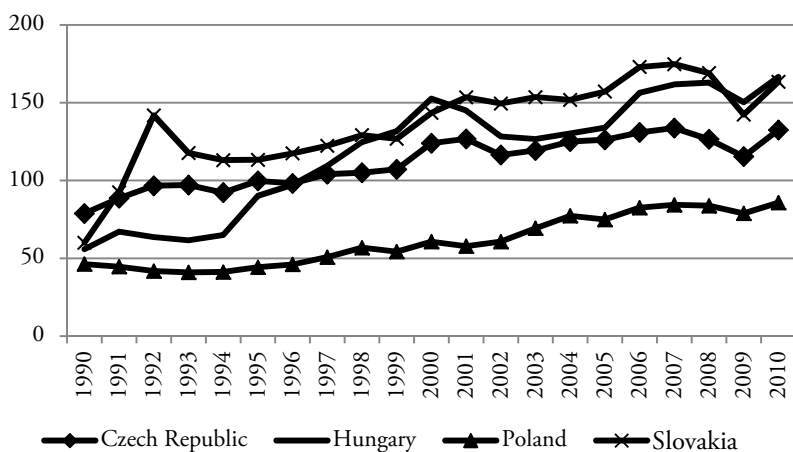
**JEL classification:** F60, O47, O57

---

\* The article was prepared within the research project entitled "Convergence in countries and regions of the European Union" funded by the Polish National Science Centre, on the basis of the decision No. DEC-2011/01/N/HS4/03077.

### 1.1. INTRODUCTORY REMARKS

One of the undeniable features of the economic development of Visegrad-4 (V4) economies in the last 25 years has been their dynamic integration with the global economy. For decades hidden behind the Iron Curtain, they had been able to establish business connections almost only with other countries of the former Soviet block. Now, after 25 years of political and economic transition, economic relationships of Czech Republic, Hungary, Poland and Slovakia with the rest of the world are intense and multifaceted. To have a glimpse overview of this fact, we can take a look at the index of economic openness of those economies since 1990 (measured as a sum of imports and exports in % of GDP), which is presented in figure 1.1. Dynamics of international trade has been the most pronounced in Hungary and Slovak Republic but also Poland and Czech Republic have experienced a nearly twofold increase of the figure.



Note: openness measured as a sum of imports and exports in % of GDP

**Figure 1.1.** Openness of V4 economies, 1990-2010

Source: own study based on Penn World Tables v.7.1.

Another important aspect of economic integration refers to an increasing involvement of multinational corporations into the production structures of V4 countries. According to the UNCTAD data, the inflow of foreign direct investments to V4 economies amounted on average in 1993-2012 to: from 3.3% of GDP in Poland to 6.5% of GDP in Slovakia (with respective values for both developing (2.9% of GDP) and developed (1.9%) economies much lower). In 2008 the role of multinationals in all four economies was significant – they employed ca. a quarter of all labour force and produced from 30% to almost a half of the domestic product.

The up-to-date overall impact of both mentioned phenomena – international trade and presence of multinationals – on development of V4 economies was undoubtedly positive. It is a fact widely supported by empirical research that international relationships fostered economic convergence of the region, via the channels of capital accumulation, knowledge diffusion, structural transformation and others (Jakab *et al.*, 2000; Hotopp *et al.*, 2002; Baldone *et al.*, 2001; Parteka & Wolszczak-Derlacz, 2011).

However, the increasing involvement of V4 economies into global production networks raises concerns regarding their real-world consequences but also of an analytical nature. Many observers doubt whether the convergence of the whole region can be sustained within current development model, named by some as the dependent market economy (Nölke & Vliegenthart, 2009). Jerzy Hausner, former minister of economy and labour of Poland, argued in a recent interview:

“We are indeed in the global value chains, however through the foreign firms - we account for the role of suppliers and assemblers. It means that although we export more and more, its value added is low. And if so, it is difficult to increase the incomes of employees significantly”  
(Hausner, 2014).

Vladimír Baláž (2013), Slovakian economist, asks in his article about the future of his country in a similar tone: “how to avoid becoming the Detroit of Europe?”. In essence, those two remarks underline limits and risks of a development model based on foreign technology and capital. In this article, we are not going to tackle those profound and complex issues. Instead, we will present how global interdependencies make traditional categories of international trade economics unsuitable for descriptive purposes. Hausner’s words lead us to a first limitation of the traditional approach: how can we tell what the true value added of exported goods, which comes from the reporting country, is? Are we truly contributing to the value of export or do we simply re-export imported intermediate goods after a low-value added processes of assembly? Another examples of problems that might appear when using traditional analytical approach will be presented in further parts of the text.

The article is situated within the theoretical approach of global value chains and fragmentation of production (Gereffi, 2005; Jones & Kierzkowski, 2005; Baldwin 2006). It is a quite novel approach, which tries to analyse contemporary phenomena within the international economics and for this purpose develops new theoretical categories and research techniques. The main objective of the article is to describe in details involvement of V4 economies in global value chains (GVC) making use of world input-output data. We will draw some implications about the true competitiveness and development potential of V4 economies.

The article is probably the first one to describe the competitiveness of V4 economies from the GVC perspective in such a comprehensive manner. In that way it presents undoubtedly a value added for current discussions on the development model of V4 economies. Some previous works took into consideration whole European Union and therefore will serve as a useful reference. In the article we also modify some of the already existing techniques, in order to get a more insightful view of the problem.

The structure of the article is as follows. Section 2 presents theoretical description of the fragmentation of production and its economic consequences. In section 3 we will briefly describe up-to-date empirical research on GVC, with special recognition of the situation of V4 economies. Section 4 contains a short description of the methodology in use, with a reference to appropriate literature which presents it in details. In section 5 the results are demonstrated and discussed, while section 6 concludes.

## 1.2. FRAGMENTATION OF PRODUCTION IN ECONOMICS

The problem of fragmentation of production can be viewed as a contemporary version of the discussion on consequences of division of labour, which has its sources in the writings of Adam Smith. In general, every division of complex production processes into simpler tasks, performed by separate workers or production units, generates positive economies, due to effects of specialization. However, at the same time it raises the costs of coordination of multiple tasks, which might include the management of dispersed units, communication and transportation of processed goods between them. In other words, organization of production is always a question of balance between the transformation and transaction costs (Baldwin, 2006; 2009).

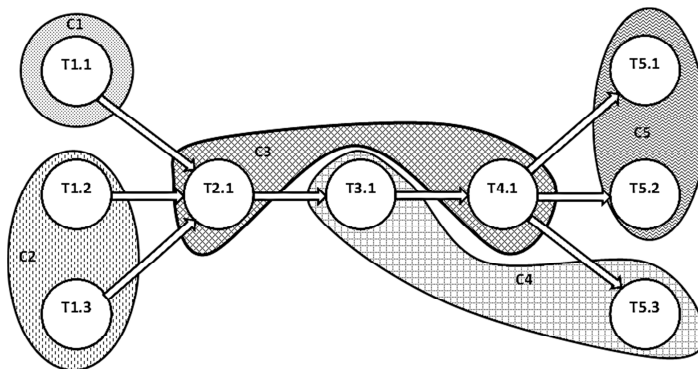
At different stages of development of global economy this question referred to different levels of production structures. Initially, Smith had in mind division of labour between particular workers that took part within a single manufacturing plant. In contemporary analyses three other dimensions gain in importance. A company might decide to slice its value chain between a number of plants, each of them focusing on a different part of the whole process (intra-firm level). It can also outsource some of the activities to other companies, which specialize in them (inter-firm level). Finally, the decision to split some production tasks between plants or firms might have the international dimension – when some activities are offshored to other countries. This third aspect of the division of labour is of a high importance for our analyses. According to Gereffi (2005, p. 166) three characteristics distinguish the current stage of globalization from the previous ones:

1. larger share of trade in intermediate inputs in total trade;

2. the fact that many companies are able to disperse their production processes all around the globe;
3. “the emergence of a global production networks framework”, with their consequences for governance and distribution of economic returns.

Those features lead to a whole range of new phenomena, which deserve a thorough explanation. At the moment the new paradigm functions in economic theory under different names, each of them highlighting some of its aspects. The 'global value chain' refers to a truly international character of value flows and to contribution, direct and indirect, of multiple nations to bringing “a good or service from conception, through the different phases of production,(...) delivery to final consumers, and final disposal after use” (Gereffi, 2005, p. 168). Similarly, the concept of 'vertical specialisation' puts emphasis on involvement of different countries at different stages of a vertically-sliced production process – within one, multinational or a multiple of smaller firms (Gereffi, 2005). 'Trade in tasks' underlines the fact that nowadays a large part of the international trade concerns not final goods, but different types of activities, which are necessary to produce those goods. These activities might take a physical form of intermediate goods, but more and more often services of different kinds are being traded (Lanz *et al.*, 2011).

An example of a fragmented production process is presented in figure 1.2. It consists of two types of links: 'spiders' and 'chains' and is distributed within five stages, each of them including different kinds of tasks (T1-T5). Those tasks take place in five different countries (C1-C5).



**Figure 1.2.** Fragmentation of production

Source: own study.

According to Baldwin (2006; 2009) fragmentation of production was possible thanks to a radical decrease in transportation and coordination costs, which made it possible to exploit the economies of specialization in an unprecedented manner. This decrease

took place in two steps, which triggered two waves of globalization. Each of them consisted in, in words of Baldwin, an unbundling of the supply chain. Each of those waves changed the global economic landscape, but it also made previous economic theories insufficient to explain the new phenomena.

The first unbundling was taking place from the late 19th century, but it had its peak in the post-war period and its sources were the advancements in means of transportation. Lower transport costs allowed firms to move goods and production factors between regions and countries - production no longer had to be placed close to final consumers. Consequently, firms could undertake location decisions on the basis of new motives and benefit from agglomeration economies, which found a proper description in the New Economic Geography (Baldwin, 2006; 2009).

Whereas the first unbundling and its description by NEG referred to location decisions of whole firms, the key novelty of the second unbundling lies in the possibility of division of production processes into several stages. It means that the analysis of agglomeration and dispersion forces no longer refers to whole sectors of production, but to single types of activities.

From the point of view of middle-income economies, such as the V4, the new paradigm brings profound consequences for their convergence. On the one hand, fragmentation of production gives to such economies many possibilities of entering the global production networks. Since competition takes place no longer on the level of whole sectors but on the level of single tasks, it becomes much easier to develop new types of activities and to attract foreign investors. However, since the competition is truly global, sustained development requires constant upgrading to activities bringing higher value added (Gereffi, 2005).

Final remarks will be analytical in nature and will motivate usage of new research techniques. Fragmentation naturally leads to a situation in which goods produced and exported by a particular country contain a significant part of imported intermediate inputs. On the other hand, imported goods might be actually re-imports of goods exported previously by a country and processed or assembled abroad. In result, traditional concepts based on gross exports or imports data (such as balance of trade or revealed comparative advantage) lose their descriptive significance. Slicing of the value chain makes also the sectoral taxonomies according to technology-advancement or innovation-specificity of industries less relevant for the assessment of competitiveness of nations, since different types of activities in each sector can be distributed in different ways among countries. Finally, outsourcing of many non-production tasks from manufacturing firms to B2B services providers means that real contribution of services to the value of international trade is higher than one obtained from direct trade flows. In order to capture all of these effects, a new framework of analysis is needed.

### 1.3 EMPIRICAL RESEARCH REVIEW

Previous empirical research demonstrates a dynamic integration of the whole Central and Eastern Europe region with the global economy, especially with the European Union. Both exports and imports of CEE countries were increasing at a high pace long before their accession to the EU. Early studies indicated that Czech Republic and Hungary were the best integrated economies, while Slovakia and Poland lagged behind (Jakab *et al.*, 2000; Bussière *et al.*, 2005). Other analyses show positive consequences of economic openness for economic development of the region: it supported the structural change and technological development (Baldone *et al.*, 2001; Hotopp *et al.*, 2002; Parteka & Wolszczak-Derlacz, 2011).

During the transition period, specialisation patterns and comparative advantages of V4 economies changed heavily. Initially, their exports was based on commodities and natural resources. In time, more and more manufactured goods from those countries have been traded, with a growing share of human-capital and technology-intensive products (Hotopp *et al.*, 2002; Zaghini, 2005; Fertő & Soós, 2008). First differences within the V4 group take shape, with Poland lagging behind the other three countries in terms of the exports structure.

Another growing strand of research is devoted to analyses of fragmentation of production and its impact on particular countries and industries. Several studies describe a changing model of organization and management, both in multinational corporations and in smaller enterprises, which leads to global production sharing (Yeats, 1997; Jones & Kierzkowski, 2005; Baldwin, 2009). The production chains become increasingly complex and globally dispersed, which is not necessarily visibly in the pure data on trade in intermediates (Yeats, 1997; Hummels *et al.*, 2001). Those processes are especially well documented empirically for the European Union (see: Stehrer *et al.*, 2012; Timmer *et al.*, 2012).

V4 economies are heavily involved in those processes – their presence in global production networks resembles the European average levels, particularly in small countries – the Czech Republic, Hungary and Slovakia. The CEE region increased its share in the European incomes from participation in the global value chain from 4.4% in 1995 to 9.3% in 2008, with a continuous growth of number of high-skilled workers involved in production processes. The V4 economies specialize mainly in electronics (HU, SK), machinery (CZ, SK) and transport equipment (all countries) (Timmer *et al.*, 2012).

More detailed case-studies demonstrate an ongoing industrial upgrading in the Visegrad region. Whereas early involvement of those countries in the GVC focused mainly on assembly operations, more and more tasks of higher complexity are being performed in the region. CEE-10 countries became an important supplier of network products and parts (Kaminsky & Ng, 2005). Examples of two industries – apparel

and textiles and automotive – show that CEE countries make use of their traditional comparative advantages and of early presence of multinationals (Baldone *et al.*, 2011; Fortwengel, 2011). On the other hand, some authors indicate that, due to the fact that most of the strategic decision regarding the location of processes are being made in the Western Europe, further upgrading might be very difficult to achieve (Fortwengel, 2011; Jacoby, 2010).

This study aims to describe in details industrial development of V4 economies, taking into account the specificity of the current stage of globalization. Making use of input-output research methods, it focuses on involvement of those economies in the GVC and on following dimensions of competitiveness: production structures, revealed comparative advantages and position in value chains.

#### 1.4. RESEARCH METHODS

Description of research methods used in the article will focus on the most important issues. A detailed derivation and discussion of all presented concepts can be found in works of Koopman *et al.* (2010) and Timmer *et al.* (2012). All calculations are based on the World Input-Output Database (Timmer, 2012), which presents direct flows of gross output between countries and sectors for 1995-2011. It includes 40 countries (and Rest of the World as a separate unit) and 35 economic sectors.

A following notation will be used (Timmer *et al.*, 2012):

- $y_i(s)$  - gross output of sector  $i$  in country  $s$ ;
- $f_i(s,t)$  - final demand for goods of sector  $i$  in country  $s$  from users from country  $t$ ;
- $m_{ij}(s,t)$  - intermediate inputs from sector  $i$  in country  $s$  used in production in sector  $j$  in country  $t$ ;
- $S$  - number of sectors,  $N$  – number of countries.

In the first step, on the basis of input-output tables a (SNxSN) matrix  $\mathbf{A}$  is calculated which contains coefficients of direct intermediate inputs between country-sectors:

$$a_{ij}(s,t) = m_{ij}(s,t) / y_j(t) \quad (1)$$

Product of each sector is distributed between final demand of  $N$  countries and intermediate inputs of  $SN$  country-sectors:

$$y_i(s) = \sum_j^S \sum_t^N m_{ij}(s,t) + \sum_t^N f_i(s,t) \quad (2)$$

On the basis of (1) and (2), we can write a following matrix equation:

$$\mathbf{y} = \mathbf{A}\mathbf{y} + \mathbf{f} \quad (3)$$

where:  $\mathbf{y}$  – a (SNx1) vector of gross output of country-sectors;

$\mathbf{f}$  – a (SNx1) vector of final demand of country-sectors.



After simple transformations of (3) we obtain a so-called Leontief-inverse matrix:

$$\mathbf{y} = (\mathbf{I} - \mathbf{A})^{-1} \mathbf{f} = \mathbf{L}\mathbf{f} \quad (4)$$

where:  $\mathbf{L} \equiv (\mathbf{I} - \mathbf{A})^{-1}$  is the Leontief-inverse matrix and  $\mathbf{I}$  is a (SNxSN) identity matrix.

Values of Leontief-inverse,  $l_{ij}(s,t)$ , inform us how many units of gross output of sector  $i$  in country  $s$  were needed, both directly and indirectly, to produce a unit of gross output of sector  $j$  in country  $t$ . Now, thanks to pre- and post-multiplications of Leontief-inverse by proper matrices of inputs and outputs, we can obtain information about absolute value added flows between country-sectors. For this purpose, let us form two additional matrices:

$\mathbf{P}$  – an (SNxSN) diagonal matrix in which each diagonal element  $p_i(s)$  is a ratio of value added to gross output in sector  $i$  in country  $s$ ;

$\mathbf{D}$  – an (SNxSN) diagonal matrix in which each diagonal element  $d_i(s)$  is value of final demand for products of sector  $i$  in country  $s$ .

To investigate the role of foreign final demand, a separate matrix  $\mathbf{D}(s)$  for each country is needed, which contains final demand from all countries, apart from the country  $s$ .

After a calculation:  $\mathbf{V} = \mathbf{PLD}$  we receive a (SNxSN) matrix  $\mathbf{V}$ , where  $v_{ij}(s,t)$  informs us about total value added of sector  $i$  in country  $s$  embodied in gross output of sector  $j$  in country  $t$ . Proper summations of columns or vectors of this matrix will give us all the information about the global value flows. The empirical part of the article consists in calculation for V4 economies and for EU-27 (for comparison), for 1995-2011 period, of following measures:

1. In order to obtain GVC Income of sector  $i$  in country  $s$  we multiply matrices:

$$\hat{\mathbf{v}} = \mathbf{V}\mathbf{u} \quad (5)$$

where  $\mathbf{u}$  is a (SNx1) vector with 1 in places related to manufacturing industries and 0 elsewhere.

$\hat{v}_i(s)$  informs us about the total value added of sector  $i$  in country  $s$  embodied in global manufacturing value chain.

2. GVC income of country  $s$  is a summation of GVC income of its all sectors and its interpretation is analogous:

$$GVC(s) \equiv \hat{\mathbf{v}}(s) = \sum_i^S \hat{v}_i(s) \quad (6)$$

3. Contribution of country  $s$  to global production of industry  $j$ :

$$GVC_j(s) = \sum_i^S \sum_t^N v_{ij}(s,t) \quad (7)$$

On the basis of those contributions, revealed comparative advantages can be calculated:

$$RCA\_GVC_j(s) = \frac{GVC_j(s)/GVC_j}{GVC(s)/GVC} \quad (8)$$

They will serve to inform us about evolving patterns of specialization of V4 economies.

4. Finally, two measures will be calculated that will provide information about the position of country-sectors in the manufacturing global value chain:
  - Indirect GVC income ratio – IGVC – is a share of GVC income of a country-sector, due to final demand for goods of foreign producers:

$$IGVC_j(s) = [\sum_i^S \sum_{t \neq s}^N v_{ij}(s, t)] / GVC_j(s) \quad (9)$$

The higher the IGVC, the higher the dependence of a country-sector on foreign producers – recipients.

- Ratio of foreign value added embodied in gross output – FVA:

$$FVA_i(s) = [\sum_{t \neq s}^N \sum_j^S v_{ij}(s, t)] / y_j(s) \quad (10)$$

This measure indicates the extent of dependence of a country-sectors on foreign suppliers.

## 1.5. RESULTS AND DISCUSSION

### GVC Income of V4 Economies

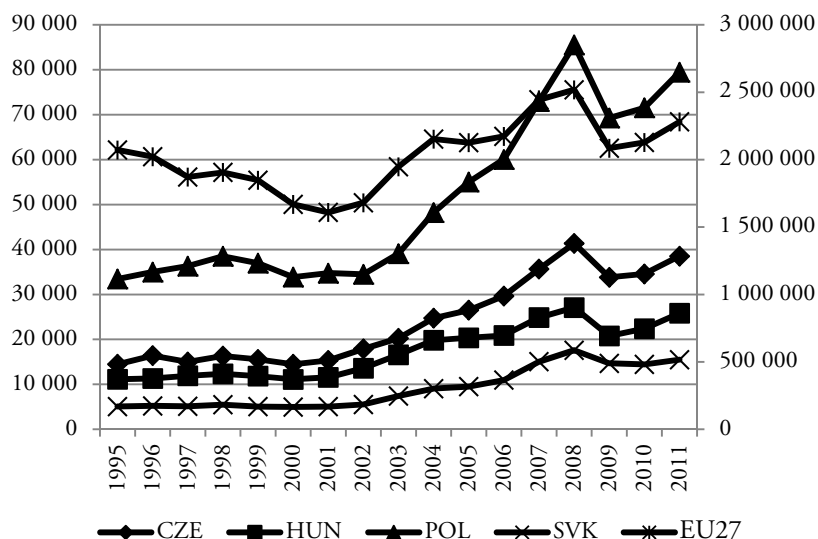
GVC income is the measure that captures total contribution of a country to global production of manufacturing goods. Its values, presented in figure 1.3, suggest a truly dynamic integration of V4 countries with global economy, especially after 2001-2003. Economic Crisis in 2009 hit manufacturing production and international trade in the region, but a slow rebuilt has been observed since 2010. GVC income increased in the whole period by: from 132% in Hungary to 206% in Slovakia. When we combine it with the fact, that in whole EU27 GVC income did not grow almost at all, we receive a proof of a fast catching-up of the whole region. Comparison of tendencies for GVC income and economic openness indicates a first difference, stemming from different research approaches. In 1995-2000 we can observe a sharp increase of trade value, especially in Hungary, with a simultaneous slight decline in GVC income.

Table 1.1 presents detailed information about the GVC income of V4 economies. The region more than doubled its share in European GVC income: from

---

<sup>1</sup> It is an adaptation of a simple Balassa RCA index:  $RCA\_EX_j(s) = \frac{EX_j(s)/EX_j}{EX(s)/EX}$ .

3% to 7%. Manufacturing production in all V4 economies has a clearly external orientation - most of their GVC income comes from abroad. Slovakia and Czech Republic are the most dependent on foreign markets; Poland, probably since it has much bigger internal market - only in about two thirds. In that way V4 economies, apart from Poland, are much more export-oriented than European average.



Note: series for V4 countries - left axis, series for EU27 - right axis; values deflated by US CPI index.

**Figure 1.3.** GVC income of V4 economies (mln USD 1995), 1995-2011

Source: own study based on WIOD data (Timmer, 2012).

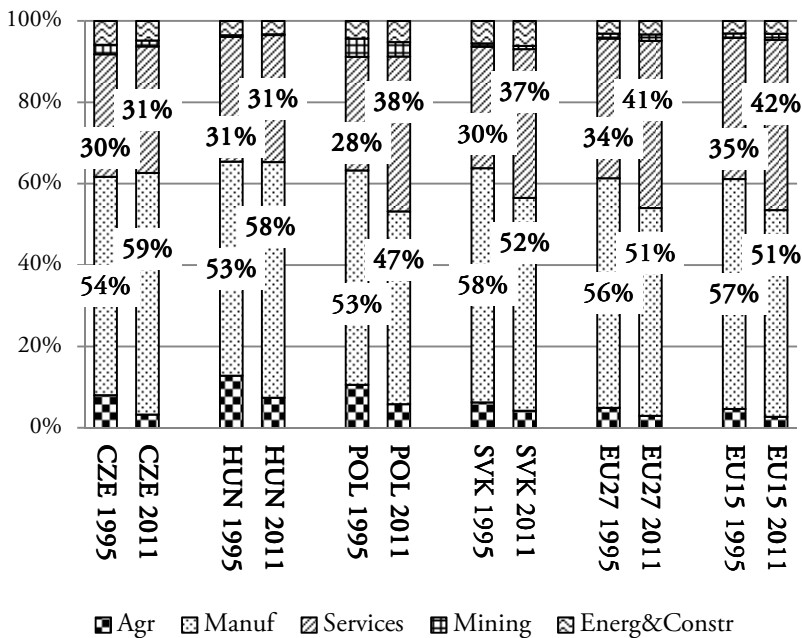
**Table 1.1.** GVC income - summary of basic information, 1995-2011

Country	GVC Income (mln USD 1995)		Share of EU27 GVC		%Foreign <sup>a</sup>		Growth <sup>b</sup>
	1995	2011	1995	2011	1995	2011	
CZ	14 477	38 523	0.7%	1.7%	57%	79%	6.3%
HU	11 120	25 824	0.5%	1.1%	45%	77%	5.4%
PL	33 439	79 457	1.6%	3.5%	43%	67%	5.6%
SK	5 060	15 482	0.2%	0.7%	64%	82%	7.2%
EU27	2 072 175	2 280 466	100%	100%	52% <sup>c</sup>	67%	0.6%

Notes: <sup>a</sup>GVC income due to final demand from abroad as a share of GVC income due to total final demand. <sup>b</sup>average annual growth rate of GVC income. <sup>c</sup>percentages for EU27 measure weighted average for all countries.

Source: own study based on WIOD data (Timmer 2012).

Country's GVC income can be also analysed from the point of view of contributing sector - division of the income into 5 main economic sectors in 1995 and 2011 is presented in figure 1.4. In all countries manufacturing holds the dominant position, however its role varies considerably. In Czech Republic and in Hungary manufacturing share in GVC income is nearly 60% and it has increased distinctly since 1995. Conversely, it is much lower in Poland and Slovakia, with a big drop since 1995. Those two countries are much closer to production patterns of Western Europe, with an important role of services in generation of value added of manufacturing goods.



**Figure 1.4.** Contribution of economic sectors to GVC income of V4, EU27 and EU15, 1995 and 2011

Source: own study based on WIOD data (Timmer, 2012).

### RCA Based on GVC Income

In the next part specialisation patterns of V4 economies will be discussed. Following figures demonstrate how those patterns changed in 1995-2011 in all four countries. For better understanding, industries are placed on the graph in a specific order:

- upper- right part consists of traditional sectors, producing non-durable goods,
- in the lower-right part of the figures resource-based industries are situated,
- in the lower-left part of the figure chemicals-related industries are placed,

- d) upper-left part of the figures consists of modern industries, e.g. machinery and electronics.

The figures (1.5a-1.5d) demonstrate a diversity of revealed comparative advantages, which might seem surprising for such a small and, seemingly, homogenous group of countries. In 1995 (solid line) all of them specialized in traditional, labour-intensive industries. Additionally, Czech Republic and Poland specialized in resource-based industries, while Hungary and Slovakia – in chemicals. The most important change in 1995-2011 is that all V4 economies lost their previous advantage in traditional industries, which probably should be assigned to a growing role of imports of non-durables from developing countries. However, they found their new RCAs in different types of industries. Czech Republic, Slovakia and Hungary managed to maintain some of their previous advantages in resourced-based manufacturing (CZ, SK) and chemicals (HU). At the same time those three countries developed new, strong industries in modern types of activities: machinery (CZ, HU), electrical products (HU, SK) and transportation (CZ, HU, SK). Poland, on the contrary, did not undergo such a potentially beneficial structural change – its RCAs are still mainly in resource-based industries. Both reasons and consequences of such diverse developments should be subject to further investigation.

### **Position of V4 Economies in Global Value Chains of Manufacturing Goods**

The last dimension of our analysis refers to the degree of integration of V4 economies into the global production networks. Measures presented in this part can be used also to find the position of a country or industry in the global value chain or its dependence on foreign suppliers or customers. In table 1.2 two measures are presented – foreign value added share in manufacturing output (FVA) and indirect GVC income (IGVC).

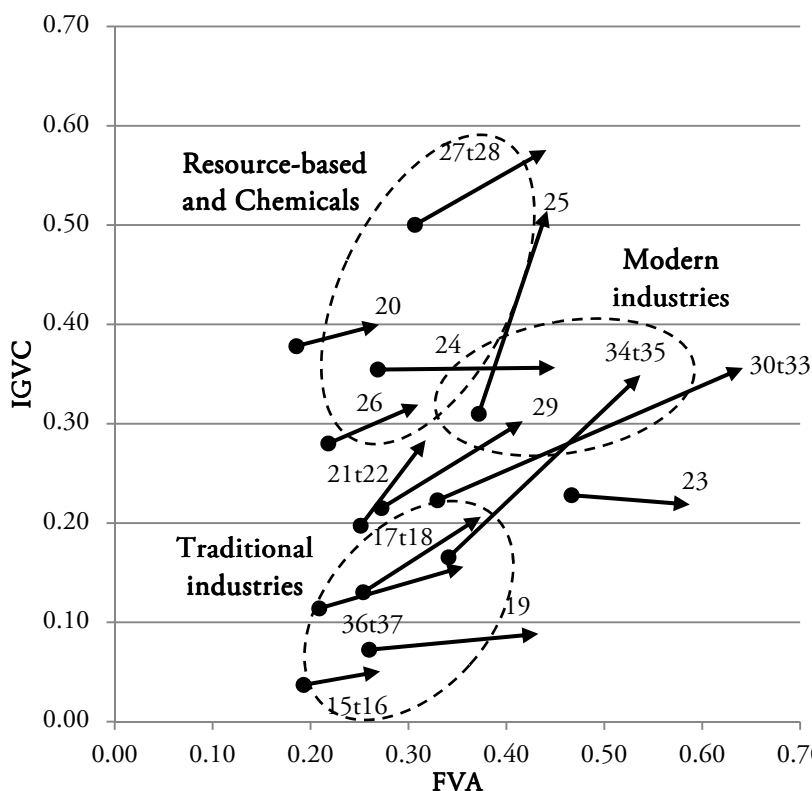
It is visible that three small economies are highly dependent on foreign inputs – about a half of their gross output in manufacturing comes from abroad. Poland is more alike to EU27 average, however it has experienced a twofold increase of FVA in 1995-2011. Similar observations can be made in reference to IGVC. In Czech Republic, Hungary and Slovakia a large part (ca. 40%) of GVC income is obtained by supplying inputs to final product of other countries. Poland again has a much more moderate figure, which might be assigned to a larger internal market.

Both figures were calculated also for each manufacturing industry, but here, for lack of space, only results for the whole V4 region as a one unit are presented<sup>2</sup>. In the figure 1.6 position of each industry in global value chain in 1995 and 2011

---

<sup>2</sup> Detailed analysis of GVC positions of particular industries of V4 economies, as well as their consequences for development potential will be an object of further research.

is presented. Arrows indicate how those positions changed during the whole period. First important observation is that all sectors became more integrated with the global value chain – points for 2011 lie much more northeast than ones for 1995. They are much more dependent on imported inputs and, apart from Coke, Refined Petroleum and Nuclear Fuel industry, on demand of foreign producers.

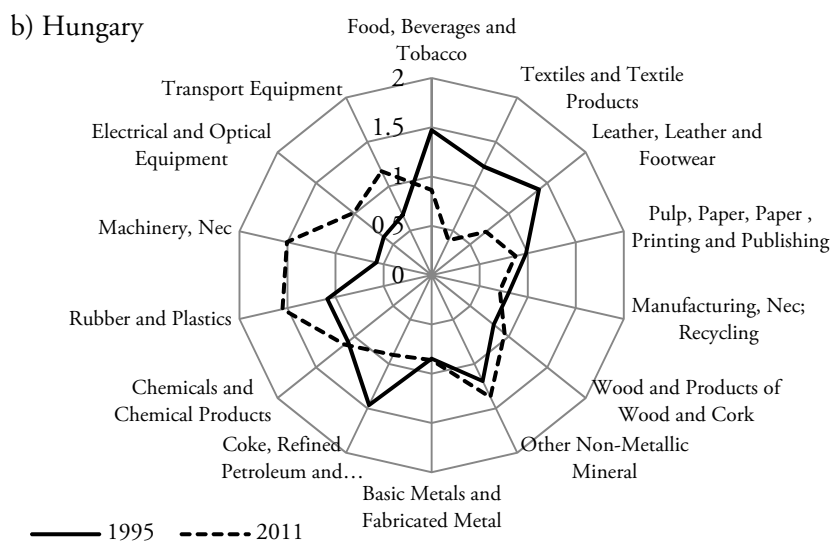
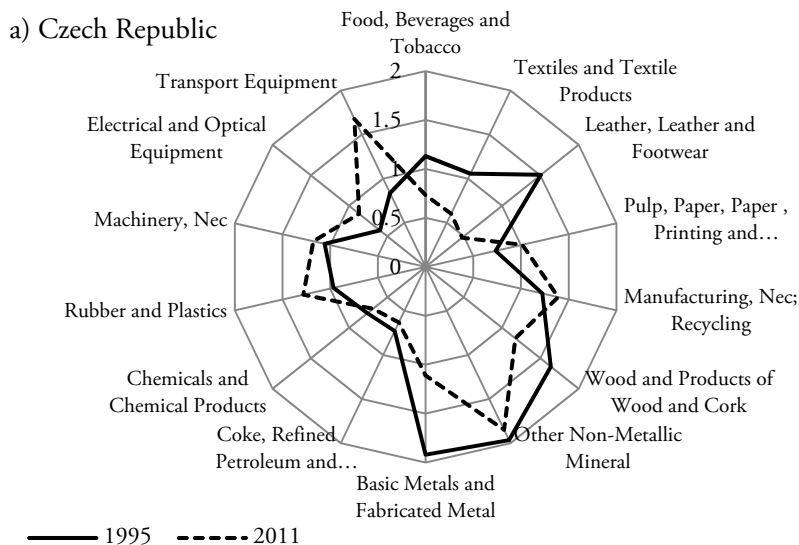


Notes: data for V4 calculated as a weighted average of values of four countries. Industry codes are as follows: 15t16 - Food, Beverages and Tobacco; 17t18 - Textiles and Textile Products; 19 - Leather, Leather and Footwear; 20 - Wood and Products of Wood and Cork; 21t22 - Pulp, Paper, Paper, Printing and Publishing; 23 - Coke, Refined Petroleum and Nuclear Fuel; 24 - Chemicals and Chemical Products; 25 - Rubber and Plastics; 26 - Other Non-Metallic Mineral; 27t28 - Basic Metals and Fabricated Metal; 29 - Machinery, Nec; 30t33 - Electrical and Optical Equipment; 34t35 - Transport Equipment; 36t37 - Manufacturing, Nec; Recycling.

**Figure 1.6.** Position of V4 region in GVC by sector, 1995 and 2011

Source: own study based of WIOD data (Timmer, 2012).

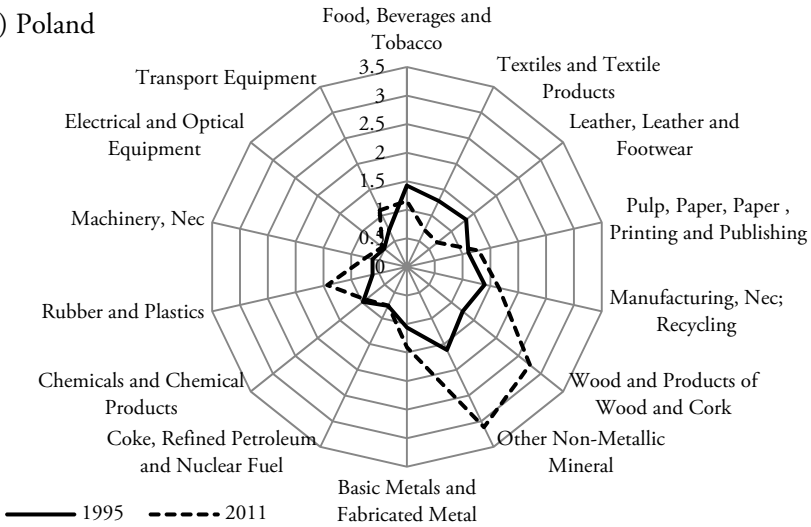
Some clear sectoral patterns take shape. Three clusters of sectors can be distinguished: resource-based and chemicals, traditional and modern ones with different GVC position for each cluster. In traditional industries production is based mainly on domestic inputs and factors and their output is being sold to final users



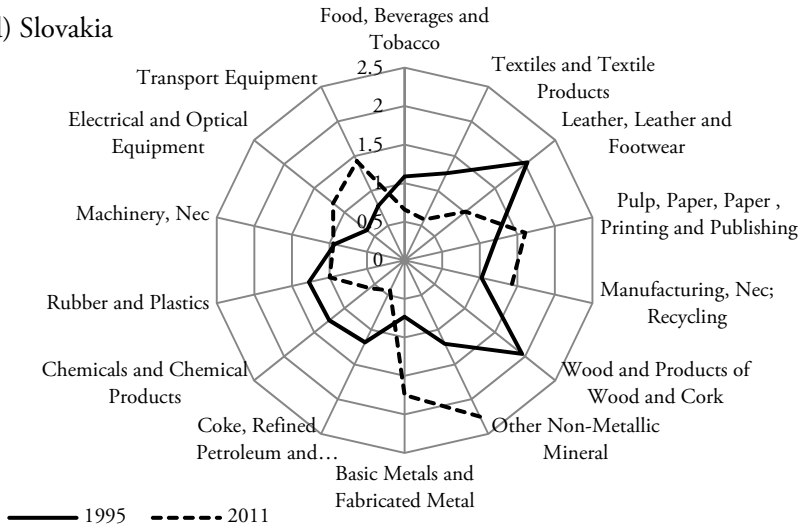
**Figure 1.5.a-b** Revealed comparative advantage based on GVC income, V4 countries, 1995 and 2011.

Source: own study based on WIOD data (Timmer, 2012).

## c) Poland



## d) Slovakia



Note: for Slovakia a data point for Wood and Products of Wood and Cork was deleted in order to improve clarity of the figure. RCA of Slovakia in this industry in 2011 was very high: 5.10.

**Figure 1.5.c-d** Revealed comparative advantage based on GVC income, V4 countries, 1995 and 2011.

Source: own study based on WIOD data (Timmer, 2012).



mainly by domestic producers. It might be assigned to the fact that V4 economies were in the 90's relatively competitive in those sectors and probably managed to maintain previous networks of suppliers and distributors. In resource-based and chemicals sectors the content of foreign value added is also relatively low, however a large share of output of those sectors serves as an input to foreign production of final goods. Since those sectors naturally serve as suppliers of intermediate inputs, it might be a sign that they underwent a positive, export-oriented development. Finally, modern industries (and to some extent Chemicals and Chemical Products industry, which might be due to the role of Pharmaceuticals) are highly dependent on foreign value added in production and on foreign producers in distribution of output. It is in line with the 'conventional wisdom' that in production of machinery, electronics and transport equipment V4 economies serve as assemblers and suppliers for multinational corporations.

**Table 1.2.** Position of V4 economies in GVC

Country	FVA		IGVC	
	1995	2011	1995	2011
CZ	34%	51%	33%	40%
HU	34%	51%	25%	39%
PL	18%	36%	20%	30%
SK	34%	49%	41%	43%
EU27	23%	34%	23%	31%

Notes: FVA – is foreign value added share in manufacturing gross output of a country. IGVC – is a ratio of GVC income due to final demand for foreign products to total GVC income.

Source: own study based on WIOD data (Timmer, 2012).

## 1.6 CONCLUSIONS

In the article a comprehensive description of the involvement of V4 economies in the global value chain was presented. In some respects those results present a view which is in contradiction to traditional analyses, based on gross trade data. The research supports the notion of an ongoing integration of V4 economies with global value chain, however this integration brought those economies benefits to in terms of increased GVC income only after 2001. In 2011 V4 economies accounted for ca. 7% of European GVC income, with a major part of it coming from abroad. Although, still most of this income is being provided by manufacturing industries, in Poland and Slovakia services have gained a very important position in GVC production. Another evidence for an ongoing integration of the region is the increased dependence of domestic companies on foreign suppliers and on demand of foreign producers. Three clusters of industries were distinguished on the basis of V4 position in the global value chain: traditional, modern and resource-based and chemicals ones.

Our results demonstrate that within the V4 region important differences between the countries have taken shape. Small countries – the Czech Republic, Hungary and Slovakia – are to a much higher extent dependent on global supply and demand than Poland. Those three countries managed to undergo in 1995-2011 a substantial structural change, as presented by their revealed comparative advantages. Poland, on the other hand, still specialises in traditional, resource-based industries.

The article provides a number of questions, which should serve as a basis for further research. Firstly, is involvement and the position in the GVC related to labour productivity of a sector? Secondly, what is the nature of relationships between the GVC position and patterns of specialisation? Answers to those questions could shed more light on the growth potential of V4 economies and their capabilities to converge to the Western Europe development levels.

## REFERENCES

- Baláž, V. (2013). *How to avoid becoming the Detroit of Europe?* Available from <<http://www.presseurop.eu/en/content/article/4019471-how-avoid-becoming-detroit-europe>>. [6 February 2014].
- Baldone, S., Sdogati, F. & Tajoli, L. (2001). Patterns and Determinants of International Fragmentation of Production: Evidence from Outward Processing Trade between the EU and Central Eastern European Countries. *Weltwirtschaftliches Archiv*, 137(1), pp. 80–104.
- Baldwin, R. (2006). *Globalisation: the great unbundling(s)*. Office of the Prime Minister of Finland, Helsinki.
- Baldwin, R. (2009). Integration of the North American Economy and Newparadigm Globalization. *CEPR Discussion Papers*, no. 7523.
- Bussière, M., Fidrmuc, J., & Schnatz, B. (2005). Trade integration of Central and Eastern European countries. Lessons from a gravity model. *ECB Working Paper Series*, no. 545.
- Fertő, I. & Soós, K.A. (2008). Trade Specialization in the European Union and in Postcommunist European Countries. *Eastern European Economics*, 46(3), pp. 5–28.
- Fortwengel, J. (2011). Upgrading through Integration? The Case of the Central Eastern European Automotive Industry. *Transcience Journal*, 2(1).
- Gereffi, G. (2005). The Global Economy: Organization, Governance, and Development. In: N.J. Smelser & R. Swedberg (eds), *The Handbook of Economic Sociology*, Princeton: Princeton University Press, pp. 160–182.
- Hausner, J. (2014). *Budujemy zamki na pustyni*, interview by M. Sutowski, 07.01.2014. Available from <<http://www.krytykapolityczna.pl/artykuly/gospodarka/20140107/hausner-budujemy-zamki-na-pustyni>>. [6 February 2014].

- Hotopp, U., Radosevic, S. & Bishop, K. (2002). Trade and Industrial Upgrading in Countries of Central and Eastern Europe: Patterns of Scale and Scope-based Learning., *University College London, Centre for the Study of Economic and Social Change in Europe Working Papers*, no. 23.
- Hummels, D., Ishii, J. & Yi, K.M. (2001). The Nature and Growth of Vertical Specialization in World Trade. *Journal of International Economics*, 54(1), pp. 75–96.
- Jacoby, W. (2010). Managing globalization by managing Central and Eastern Europe: the EU's backyard as threat and opportunity. *Journal of European Public Policy*, 17(3).
- Jakab, Z.M., Kovács, M.A. & Oszlay, A. (2000). How far has trade integration advanced? An analysis of actual and potential trade of three Central and Eastern European countries. *NBH Working Paper*, no. 1/2000.
- Jones, R.W. & Kierzkowski, H. (2005). International fragmentation and the new economic geography. *The North American Journal of Economics and Finance*, 16(1), pp. 1–10.
- Kaminski, B. & Ng, F. (2005). Production disintegration and integration of Central Europe into global markets. *International Review of Economics and Finance*, 14, pp. 377–390.
- Koopman, R., Powers, W., Wang, Z. & Wei, S.J. (2010). Give Credit Where Credit Is Due: Tracing Value Added in Global Production Chains. *NBER Working Papers*, no. 16426.
- Krugman, P. (1991). Increasing Returns and Economic Geography. *Journal of Political Economy*, 99, pp. 483–499.
- Lanz, R., Miroudot, S. & Nordås, H.K. (2011). Trade in Tasks. *OECD Trade Policy Papers*, no. 117.
- Nölke, A. & Vliegenthart, A. (2009). Enlarging the Varieties of Capitalism. The Emergence of Dependent Market Economies in East Central Europe. *World Politics*, 61(4), pp. 670–702.
- Parteka, A. & Wolszczak-Derlacz, J. (2011). Market Size, Competitiveness and Technological Frontier - the Impact of Trade Integration with the UE on Productivity in Polish Manufacturing Sectors., *National Bank of Poland Working Paper*, 82.
- Stehrer, R., Borowiecki, M., & Dachs, B. (2012). Global Value Chains and the EU Industry. *wiiw Research Reports*, no. 383.
- Timmer, M.P., Los, B., Stehrer, R. & de Vries, G.J. (2012). Fragmentation, incomes and jobs: an analysis of European competitiveness. *Economic Policy*, 28(76), pp. 613–661.
- Timmer, M.P. (ed.) (2012). The World Input-Output Database (WIOD): Contents, Sources and Methods. *WIOD Working Paper*, no. 10.
- Yeats, A.Z. (1997). Just How Big Is Global Production Sharing?. *World Bank Policy Research Paper*, No. 1871.
- Zaghini, A. (2005). Evolution of trade patterns in the new EU member states. *Economics of Transition*, 13(4), pp. 629–658.

