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Changing Patterns In The Export Of Goods *Versus* International Competitiveness. A Comparative Analysis For Central-East European Countries In The Period 2000-2011

Abstract

This paper discusses the existing links between changing patterns in the export of goods, broken down by technology-intensity, versus intrenational competitiveness. The study covers nine Central-East European (CEE) economies: Bulgaria, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania and the Slovak Republic, in the time span 2000-2011. We examine the hypothesis of a strong, positive and statistically significant relationship between flows of export of high-tech and ICT manufactures industries goods, and an economy's level of international competitiveness (approximated by the Global Competitiveness Index – GCI, see: World Economic Forum). Our methodological approach relies on elaboration of each country`s individual export patterns with regard to industries of different technology-intensities, and statistical analysis between the international GCI variable and variables identifying shares in total export of certain industries. Contrary to what was initially expected, our empirical results do not seem to support the hypothesis on statistically positive links between growing shares of high-tech and ICT manufactures industries in the total value of export versus the Global Competitiveness Index in the analyzed countries.

***Keywords**: competitiveness, export, technology-intensity, comparative analysis*

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1. Introduction

Over last two decades, transition economies have undergone tremendous structural changes in various areas. The process of liberalization, deregulation of markets and privatization, and increased pressure on introducing the CEE countries into the global economy forced these countries not only to invest and acquire foreign investment inflows, but also to boost the volume and value of export. After 1989, most of the former 'Soviet bloc countries' had lost their leading trading partners. This led to a diametrical reorientation in their export markets, which required substantial improvements in the quality of goods and services offered abroad. The quality adjustments resulted in shifts in the technologies used in different industries. By entering an investment-driven phase of economic development, these countries were forced to base their international competitiveness on increasing productivity, efficiency, and the assimilation of newly emerging technologies and innovations to make their production of goods and services more sophisticated and demand-oriented. In transition economies, investing in new technologies is perceived as an enabler for shifting from low-, to high-added value industries (Roztocki & Weistroffer 2008), which generates economic growth and creates conditions for gaining competitive advantages, in both relative and absolute terms. Additionally, new technologies may be used to support international competitiveness by increasing a country's share on the global export market.

According to the World Economic Forum (2012), international competitiveness can be described as *"the set of institutions, policies, and factors that determine the level of productivity of a country."*[1] Growth of international competitiveness remains one of the most important aspects in the field of development economics, as it drives increases in a country`s productivity and enhances socio-economic progress and stability. J. Schumpeter (Schumpeter 1934) underlined that technological progress is treated as an important determinant of a country`s ability to develop in the long-term perspective. In that sense, technology and international competitiveness are interrelated, each strongly impacting the other.

This paper consists of five parts. Following this introduction, in section two we present the conceptual framework, combining issues of international competitiveness and export of goods broken down by technology-intensity. Section three explains the empirical targets and data applied in the analysis, and section four contains analysis of the empirical outcomes. The final part draws conclusions and indicates further research directions.

[1] The Global Competitiveness Report 2012-2013 (Klaus Schwab, Global Economic Forum), 2013.

2. Theoretical framework

The notion of international competitiveness is ambiguous. For many it is directly associated with overall economic performance, but on the other hand it is often perceived a factor driving economic growth (Nicoletti *et al.*, 2003; Porter, 2006; Fagerberg *et al.* 2007). Taking into account different perspectives, international competitiveness is linked with the low cost of labour or offering attractive geographic locations for new investments (Spencer, 2008). It captures a multitude of dimensions, covering issues associated with employment, productivity, economic growth, and income inequalities, level of education, political freedom, ability to assimilate innovation, and finally trade openness. A country`s openness to international competition fosters increases in capital and labour productivity, technology transfers, and accessing new knowledge (Bernard *et al.*, 2007). All these above-mentioned factors can be acquired by using international trade channels, which influence positively a country`s innovativeness, but – at the same time – subject a country`s industries to international exposure, forcing enterprises to compete on the globalized market. The positive effects of broad internationalization, leading to growth in international competitiveness *via* trading, have been reported in a broad array of studies (Alcala *et al.,* 2004; Dollar *et al*., 2003; Rodriguez *et al.* 2000). The OECD`s definition of international competitiveness combines it with country`s ability to trade goods on the global market (OECD 2005). Trabold (1995) states that "*ability to sell in terms of international competitiveness means the ability to export. Market shares on the main export markets and changes over time can be taken as the basic indicators of international competitiveness"* (see Transnational Corporations, UNCTAD/ITE/IIT/27 (Vol.10, No.2), 2001). Differentiation in trade patterns deeply depends on a country`s ability to assimilate and use new technologies, national economic elasticity and dynamism, and/or the availability of a highly-skilled labour force. As Lall claims (Lall, 2000), crucial differences in export patterns broken down by the technology-intensity of industries can only be explained by differences in "national learning capabilities". Technology and technological capabilities might be strong determinants of growth in international competitiveness. Technological advancement radically reshapes ways of competition, constituting a great "promise" for the lagging-behind economies. The diffusion of new technologies diffusion enables reduction in the costs of physical (geographical) and economic distance. Enterprises are enhanced or permanently improved, and technological upgrading in the field of production of goods and services intensifies intra- and international trade flow. Furthermore, the massive diffusion and adoption of new technologies by industrial sectors determines changes in patterns of international trade. The breakdown of industries by technology and R&D intensity level accounts for the

common trend of the growing relative importance of high-technology industries and ICT manufactures, whereby medium-low technology and low-technology industries` shares in country`s global export should potentially decrease.

Additionally, many postulated concepts (i.e. Leontief, 1953; Posner, 1961; Cantwell, 1989; Dosi *et al.*, 1990) link international competitiveness with international trade flows, which are affected by technological progress. The idea that technology and trade play a massive role in growth of a country`s competitiveness lies behind the neo-Schumpeterian concepts, where changing patterns of international trade – treated as a proxy of international competitiveness – are a direct consequence of interactions between innovation and the diffusion of technologies on the global market. Following the Schumpeterian approach, we assume that the existence of absolute differences in technology level of countries significantly influences its export performance, in turn influencing international competitiveness. Dosi *et al.*(1990 state that differences in technological advancement particularly influence a country's market share on world export markets (Narula & Wakelin, 1993), while country`s trade position is a "product" of the country`s absolute advantage with respect to its competitors (other countries). Empirical evidence in this regard is reported in the works of Fagerberg (1989) and Amable and Verspagen (1995). They claim that existing technology gaps among countries differentiate their export of goods and service, influencing international competitiveness. Similar conclusions can be derived from works of Chesnais (1992), Dunning (1993) or Wood (1994). Empirical evidence provided by Hatzichronoglou (1997), Buiter (1995), Carlyn, Glyn *et al.* (2001) and Lopez (2005), shows that growth of exports correlates positively with competitiveness, while a major role in export dynamics is played by the dynamics of high-technology industries (high-tech export).

In a broad conceptual framework, international competitiveness can be seen through the lens of productivity, costs and market shares (Porter *et al.* 2012). To complete our analytical targets we deploy the concept which explains international competitiveness through increasing/decreasing market shares. It is then assumed that countries tend to benefit by growth in international competitiveness and their companies gain new markets (Hausmann *et al.*, 2006; MacGarvie, 2006). Following this logic, one country can only improve its international competitiveness at the cost of another country (Fagerberg *et al.*, 2007). Such a concept implies that macro-competitiveness refers to a country`s ability to gain better position in the "play" on global markets, which should potentially lead to wealth creation (Aiginger 2006).

3. Empirical targets and data

The main goal of this study is twofold. Firstly, we aim to uncover substitution effects with regard to export patterns in high-tech/medium-high-tech export *versus* medium-low-tech/low-tech export of goods. Secondly, statistical links are tested between the following pairs of variables: high-tech export and the Global Competitiveness Index; ICT manufactures and the Global Competitiveness Index; low-tech export and the Global Competitiveness Index.

To achieve our goals, we adopt a sample covering nine East-Central European countries, namely: Bulgaria (BG), Czech Republic (CZ), Estonia (EST), Hungary (HU), Latvia (LV), Lithuania (LT), Poland (PL), Romania (RO) and the Slovak Republic (SK) over an 11-year period (2000-2011). All nine selected countries are post-communist economies and relatively homogenous in kind, which makes inter-country comparisons rational. The data on country`s export are derived from OECD STAN[2] Bilateral Trade Database by Industry and End-use Category (BTDIxE). All statistics report exclusively on the value of export of goods[3] (in current US dollars), broken down by industry technology-intensity level. Therefore, export of goods is classified in four industrial categories: high technology industries[4] $(HTInd_{i,j})$, medium-high technology industries $(MHTInd_{i,j})$, medium-low technology industries $(MLTInd_{i,j})$, and low technology industries $(LTInd_{i,j})$, where *i* denotes the country, and *j* the year. Additionally, we deploy data on the export of Information and Communication Technology (ICT) Manufactures $(ICTMan_{i,j})$.

To assess the international competitiveness of countries, we apply an index developed by the World Economic Forum (WEF) – the Global Competitiveness Index which was introduced in the year 2006. In 2006, WEF changed an algorithm to calculate the international competitiveness index. To assure in-time comparability we exclusively analyze the period 2006-2011 with regard to the relationship between the value of goods exported and international competitiveness in the analyzed countries.

[2] STAN – Structural ANalysis Databes provided by OECD (www.oecd.org).

[3] Refers to value of export of goods to all international trading partners.

[4] For details, see Appendix 1.

4. Export of goods and international *competitiveness* –evidence regarding the Central-East European countries

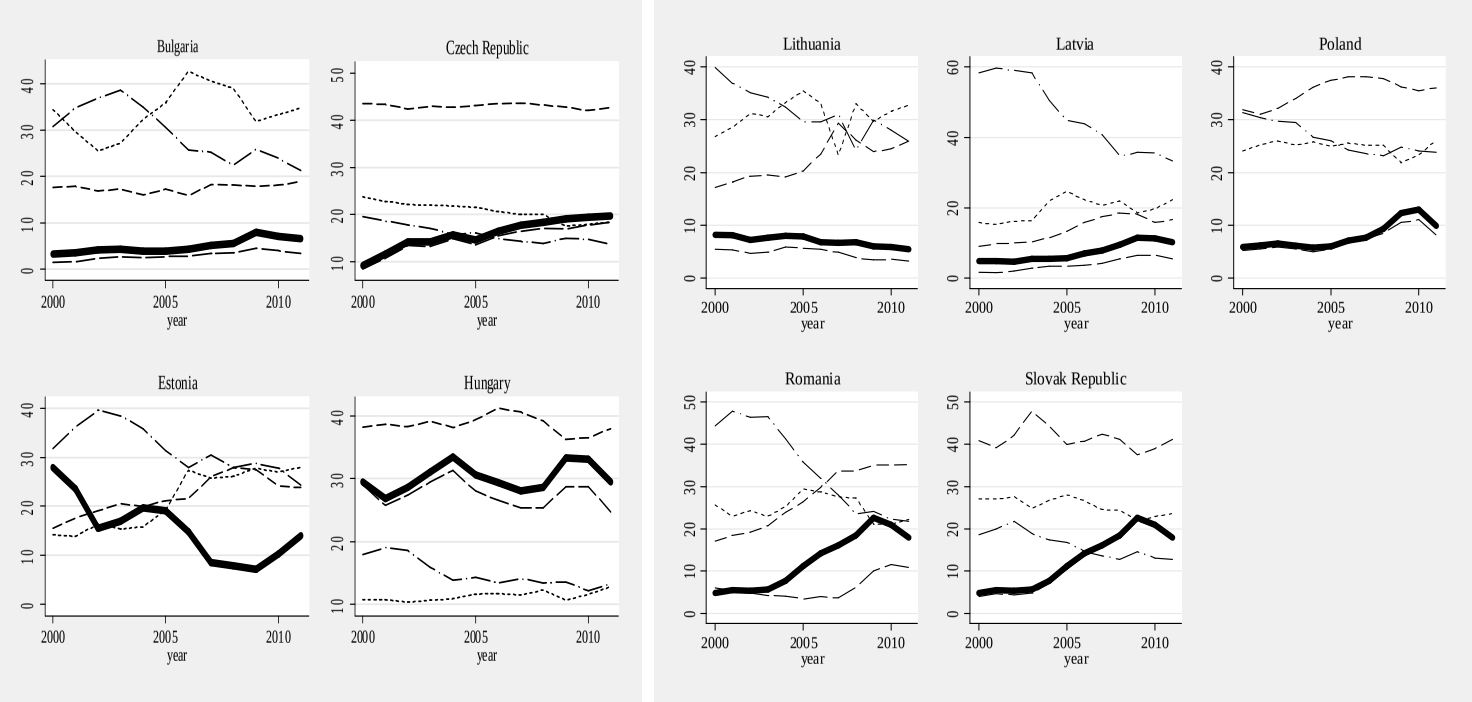
In the following section, we analyze changing patterns in the export of goods, broken down by technology intensity, in nine CEE countries. We report separately on trends in the changing shares of industries (*($HTInd_{i,j}$), ($MHTInd_{i,j}$), ($MLTInd_{i,j}$), ($LTInd_{i,j}$), ($ICTMan_{i,j}$)*) in the total value of export ($TotEXP_{ij}$) in each country. Plotting separate export patterns for each country individually allows us to assessing each variable's behaviour in time. In the case of high-technology industries *($HTInd_{i,j}$)* and ICT Manufactures (*$ICTMan_{i,j}$)*, it is expected to uncover significant growth in their share of the total export of goods. We also expect to detect decreasing shares of low-technology industries in *($TotEXP_{ij}$)*, and the total value of export should be substituted by the export of high-technology and medium-high-technology goods.

Chart 1 (see below) describes patterns in the export of goods in the nine selected countries. Patterns showing changes in the export of high-tech goods are marked as solid line. Clearly, in 2000, the best performing countries in terms of $HTInd/TotEXP_{ij}$ were Hungary and Estonia, where the shares were respectively: $HTInd/TotEXP_{Hungary,2000}$=29.5%, and $HTInd/TotEXP_{Estonia,2000}$ =27.9%. However, in Hungary the share of HTI_{ij}/TotEXP was relatively stable in the analyzed 11-year period (in 2011, the value for Hungary remained at $HTInd/TotEXP_{Hungary,2011}$=29.5%). In Estonia we can observe a significant drop in the share of HTI_{ij} in total value export of goods, with the final value in 2011 being: $HTInd/TotEXP_{Estonia,2011}$=13.9%. In Estonia, a negative trend is also observed in the case of ICT Manufactures, as its export pattern strictly follows that of the high-technology industry sector. Starting from the 2006, shares of medium-high technology industry and medium-low technology industry in $TotEXP_{Estonia,j}$, are significantly higher. Such changes are not considered as positive, as they do not create preferable relations in Estonian export markets. It is possible that such a disadvantageous situation in Estonia is a consequence of economic crisis that the country had to face in the last decade. Again it proves the volatility of Estonian export and its high exposure to external shocks. In the period 2000-2011, Hungary managed to maintain a high share of high-tech industry in its total export of goods, keeping analogically good scores in 2011. In the analyzed years, Hungary was the best performing country, both in terms of $HTInd/TotEXP_{Hungary,2000-2011}$ and $ICTMan/TotEXP_{Hunagry,2000-2011}$, which can be confronted with its relatively lowest share of low-technology industries in total export of goods, both in 2000 and 2011.[5] This shows that Hungary`s relative

[5] In 2011, an analogous low share of $LTInd/TotEXP_{i,j}$ is noted for the Slovak Republic (12.8%) and the Czech Republic (13.7%).

position with regard to export of goods is stable (for detailed numbers see Table 1). Additionally, in Hungary, the evolvement of all five patterns of industry-related exports of goods is highly simultaneous, which constitutes proof of the unvaried development path of its national economy, and its relatively good resistance to external disturbances. Different findings are reported for Bulgaria, the Czech Republic, Latvia, Lithuania, Poland, Romania and Slovak Republic. Overall, a comparative analysis of export patterns reveals their high heterogeneity and instability over time. Export structures, broken down by industries with differing technology-intensity levels, are differentiated and extrapolated in trends reporting on their substantial in-time variability. In the Slovak Republic, Czech Republic and Romania, significant increases in shares in the total value of export are reported for high-technology industries. In 2000, their respective shares of $HTInd_{i,j}$ in total export of goods were: $HTInd/TotEXP_{SlovakRep,2000}$=4.75%, $HTInd/TotEXP_{CzechRep,2000}$=9.1%, and $HTInd/TotEXP_{Romania,2000}$=6.0%; while in 2011 the analogous values are reported as: $HTInd/TotEXP_{SlovakRep,2011}$=17.9%, $HTInd/TotEXP_{CzechRep,2011}$=19.6% (in 2011 the Czech Republic was the second leading economy in the group in terms of $HTInd/TotEXP_{i,j}$), and finally $HTInd/TotEXP_{Romania,2011}$=10.9%.

Chart 1. Trade patterns in the export of goods, broken down by industry technology-intensity. Central-East European countries. Period 2000-2011



Source: own elaboration based on data derived from OECD STAN Bilateral Trade Database by Industry and End-use Category (BTDIxE). Note: solid line presents high-tech industries export pattern; on vertical axis – shares of industries in the total value of export of goods.

Table 1. Shares of export of goods (%) – by industries – in a country`s total export value, and Global Competitiveness Index scores. Years 2000, 2006 and 2011

	2000						2006					
	High-tech industries	*Medium-high-tech industries*	*Medium-low-tech industries*	*Low-tech industries*	*ICT manufactures*		*High-tech industries*	*Medium-high-tech industries*	*Medium-low-tech industries*	*Low-tech industries*	*ICT manufactures*	*Global Competitiveness Index*
Bulgaria	3.3	17.7	34.5	30.8	1.5		4.3	15.9	42.7	25.7	2.8	3.96
Czech Rep	9.1	43.6	23.7	19.5	8.4		16.4	43.5	20.6	14.9	15.5	4.74
Estonia	**27.9**	15.5	14.2	31.8	**27.8**		**14.8**	21.5	27.4	**27.9**	15.0	5.12
Hungary	**29.5**	38.2	10.7	17.9	**29.0**		**29.3**	41.2	11.7	13.4	**26.6**	4.52
Latvia	4.9	9.1	15.8	**58.3**	1.8		7.1	15.8	22.3	**43.8**	3.8	4.57
Lithuania	8.2	17.2	26.8	39.9	5.4		6.9	23.5	33.1	29.7	5.5	4.53
Poland	6.0	32.0	24.0	31.3	5.2		7.1	38.2	25.6	24.3	6.9	4.3
Romania	6.0	17.1	25.7	**44.3**	5.5		4.0	29.8	28.7	24.3	4.3	4.02
Slovak Rep	4.7	40.9	27.0	18.7	3.9		14.2	40.8	26.6	14.6	13.7	4.55

	2011					
	High-tech industries	*Medium-high-tech industries*	*Medium-low-tech industries*	*Low-tech industries*	*ICT manufactures*	*Global Competitiveness Index*
Bulgaria	6.5	18.9	34.8	21.3	3.4	4.27
Czech Rep	**19.6**	42.8	18.4	13.7	**18.3**	4.51
Estonia	13.9	23.8	28.0	24.3	13.6	4.64
Hungary	**29.5**	38.0	12.8	13.2	**24.8**	4.3
Latvia	10.3	16.6	22.3	**33.3**	5.6	4.35
Lithuania	5.5	25.9	32.8	**26.0**	3.2	4.41
Poland	9.9	36.1	26.2	23.9	8.2	4.46
Romania	10.9	35.2	22.2	23.9	10.2	4.07
Slovak Rep	17.9	41.1	23.7	12.8	17.5	4.14

Note: Industries classified according to technology-intensity. Scores for Global Competitiveness Index – exclusively for 2006 and 2011 (not available previously).

Source: Estimates are based on raw data derived from OECD STAN Bilateral Trade Database by Industry and End-use Category (BTDIxE).

In Bulgaria, Lithuania, Latvia and Poland, the share of high-tech industries in the total export of goods remained at a relatively low level. Analogously poor results are repeated when the ICTMan/TotEXP$_{i,j}$ variable is taken into account.

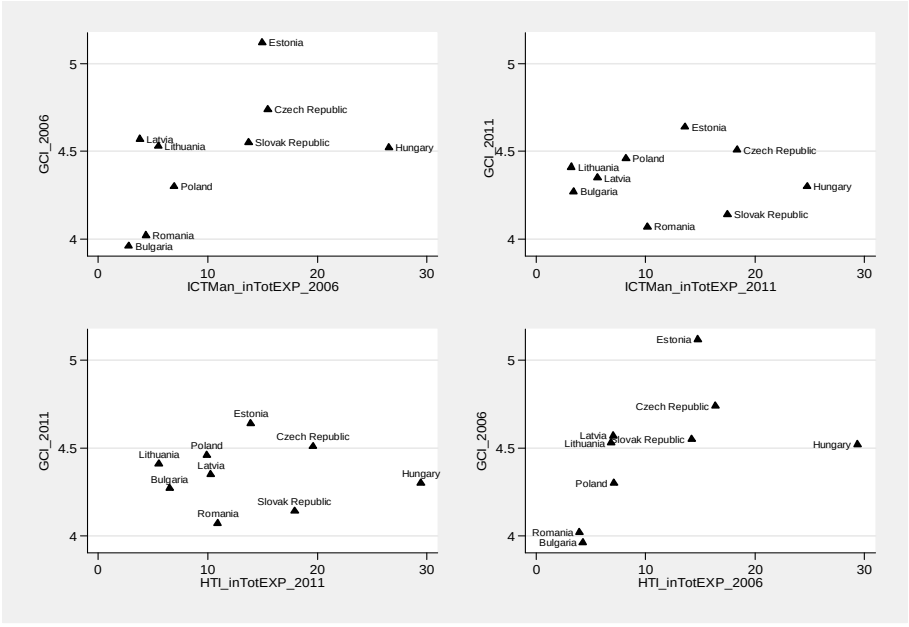
Tracing countries` individual trade patterns in all economies, specific substitution effects are displayed. Different dynamics in exports shape trade patterns differently with regard to certain industries. This implies substitution effects in changing shares of diverse industries in a country`s total export value, which can be identified (see Chart 1) in Bulgaria, Estonia, Lithuania, Poland, Romania and the Slovak Republic. In Bulgaria it is demonstrated that in 2004 and 2005 medium-low tech and low-tech industries substituted one another, as shares of MLTInd/TotEXP$_{Bulgaria,j}$ were rising, and falling for LTInd/EXP$_{Bulgaria,j}$. In Lithuania a definite substitution of low-tech industries by medium-low-tech industries is observed for the year 2004. In Poland, a three–times substitution between low-tech industries and medium-low-tech industries can be observed (finally however the effect is not stable, and possibly not permanent), In Romania, a definite substitution between low-tech industries and medium-high-tech industries took place in the year 2007. Finally, in the Slovak Republic a definite substitution took place between low-tech industries and high-tech industries/ICT Manufactures in the year 2007.

In the second part of our empirical analysis, we check the identified relationships between HTInd/TotEXP$_{ij}$ and ICTMan/TotEXP$_{ij}$ and the level of international competitiveness of countries. As recognized in the previous section, the data coverage – both including time and number of countries - is highly limited, which suggests that the results obtained from econometric modeling might be misleading. For this reason we exclude the econometric approach from our empirical evidence. Alternatively, interactions between selected variables are captured using graphical approximation, as such an approach allows for assessing existing relationships straightforwardly. Our hypothesis is that we will uncover positive and statistically significant relationships between the values of HTInd-/TotEXP$_{ij}$, ICTMan/TotEXP$_{ij}$ and GCI$_{ij}$ variables.

Charts 2 and 3 plot sequential pairs of variables: Chart 2 – GCI$_{i,2006}$ *versus* HTInd/TotEXP$_{i,2006}$; GCI$_{i,2011}$ *versus* HTInd/TotEXP$_{i,2011}$; GCI$_{i,2006}$ *versus* ICTMan/TotEXP$_{i,2006}$ and GCI$_{i,2011}$ *versus* ICTMan/TotEXP$_{i,2011}$; and Chart 3 – GCI$_{i,2006}$ *versus* LTInd/TotEXP$_{i,2006}$ and GCI$_{i,2011}$ *versus* LTInd/TotEXP$_{i,2011}$**.** According to the empirical evidence, the hypothesis on the existence of a statistically significant and positive relationship between the share level of high-technology industries in total export of goods and international competitiveness has to be rejected**.** In Chart 2, the dots referring to countries are highly scattered both for 2006 and 2011 (the correlation coefficients for 2006 and 2011 are respectively: r^2=0.25 and r^2=0.0004).

Paradoxically, in the period 2006-2011, international competitiveness measured by $GCI_{i,j}$ dropped in six analyzed countries (out of 9). The declining achievements in terms of the value of international competitiveness were accompanied by constant increases in the export shares of high-technology industries in seven out of nine analyzed cases. Four countries - the Czech Republic, Hungary, Latvia and the Slovak Republic - experienced slight decreases in $GCI_{i,2006\text{-}2011}$, while the $HTInd/TotEXP_{i,2006\text{-}2011}$ increased. Only Bulgaria, Poland and Romania accounted for increases in $GCI_{i,2006\text{-}2011}$ in the period 2006-2011 while the value of $HTInd/TotEXP_{i,2006\text{-}2011}$ was changing in the same direction. Bulgaria made the relatively greatest progress in terms of international competitiveness - in 2006 the $GCI_{Bulgaria,2006}$=3.96, and five years later: $GCI_{Bulgaria,2011}$ =4.27. The dynamics of $HTInd/TotEXP_{Bulgaria,2006\text{-}2011}$ was at about 8,34% annually,[6] achieving the second best score in the group.

Chart 2. High-technology industries' and ICT Manufactures industries' shares of total national export and the Global Competitiveness Index. Years 2006 and 2011



Source: authors own elaboration based on data derived from OECD STAN Bilateral Trade Database by Industry and End-use Category (BTDIxE) and World Economic Forum statistics. Note: on X axis – shares of HTI(i,j) and ICTMan(i,j) in total value of export of goods.

[6] Author`s own estimates based on time trends

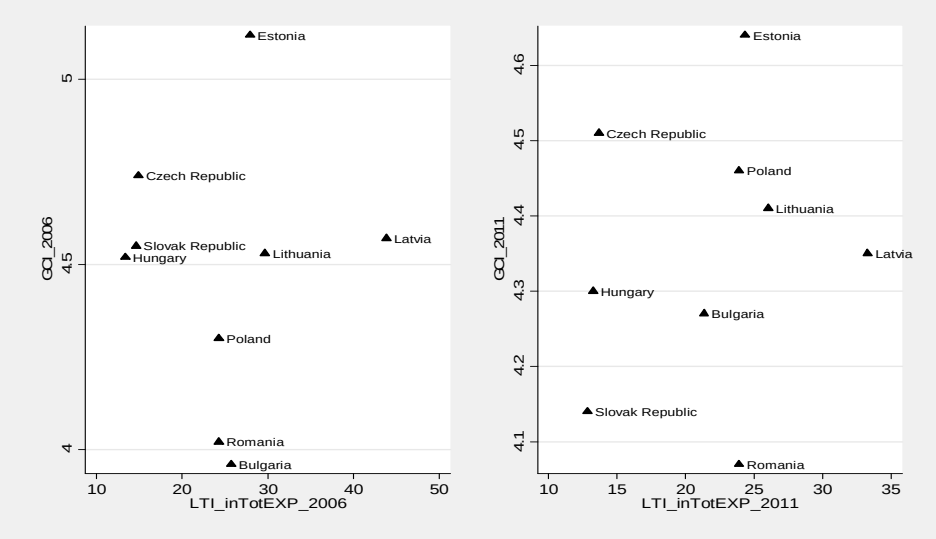
The best performing country, in terms of $HTInd/TotEXP_{i,2006\text{-}2011}$ dynamics, was Romania, with an average annual growth of approximately 20.23%. Relatively, the best scores were achieved by the two weakest countries in the sample, which probably reflects the catching-up effect that these countries are experiencing. Very low initial levels of $HTInd/TotEXP_{i,j}$ enhanced more rapid growth than in the initially "richer" economies.

As might be expected, quite analogous conclusions can be derived when analyzing the plots in Chart 3. They explain relationships between variables $ICTMan/TotEXP_{i,j}$ and $GCI_{i,j,}$ again in 2006 and 2011. Correlation coefficients are statistically insignificant and low: in 2006 – r^2=0.27, and in 2011 – r^2=0.000; which prevents us from uncovering any statistical regularities between the variables. In the cases of Estonia, Hungary and Lithuania, the variables' changes in value follow similar paths. In addition drops, both in global competitiveness and export shares of goods delivered by ICT Manufacturing industries, are reported. However the greatest decline occurred in Lithuania, where in 2006 $ICTMan/TotEXP_{Lithuania,2006}$=5.5%, while in 2011 $ICTMan/TotEXP_{Lithuania,2011}$= 3.2%.These changes were accompanied by slight decrease in GCI value ($GCI_{Lithuania,2006\text{-}2011}$=(-0.12)% pp), compared to Estonia: ($GCI_{Estonia,2006\text{-}2011}$= (-0.48)%pp) and Hungary ($GCI_{Hungary,2006\text{-}2011}$=(-0.22)%pp). The results for the Czech Republic, Latvia and the Slovak Republic may be confusing. In these countries we observe a growth of export in ICT Manufacturing sector in total export value, which contrasts with declines in international competitiveness. The most significant and dynamic changes in the ICT Manufacturing sector are reported for Romania, which accounts for 5.8%pp growth of ICTMan/ $TotEXP_{Romania,2006\text{-}2011}$. However this seems to have no significant impact on the growth in international competitiveness of Romania.

Chart 3. explains relationships between export shares of low-technology industries ($LTInd/TotEXP_{i,j}$) and international competitiveness ($GCI_{i,j}$). On the basis of general intuition, we again expected to find statistically significant and negative correlation coefficients. On the contrary, in both years (2006 and 2011), the coefficients were: r^2=0.000 (in 2006) and r^2=0.028 (in 2011).[7] In the analyzed period 2006-2011, in each country downward trends in $LTInd/TotEXP_{i,j}$ are revealed. Except for Latvia (see Chart 1), low-technology industries are substituted by industries of higher technology-intensity. This process, however positive in nature, seems to have had no significant impact on growth in international competitiveness as measured by the Global Competitiveness Index.

[7] Regressing GCI on LTInd/TotEXP, both for 2006 and 2011, the coefficients are positive, but statistically insignificant.

Chart 3. Low-technology industries (shares of total export value) and the Global Competitiveness Index. Years 2006 and 2011



Note: on X axis – shares of $LTI_{(i,j)}$ in total value of export of goods.

Source: authors own elaboration based on data derived from OECD STAN Bilateral Trade Database by Industry and End-use Category (BTDIxE) and World Economic Forum statistics.

The obtained empirical results differ dramatically from what was initially expected. We hypothesized that we would identify significant and positive relationships between the development of high-technology industries and ICT Manufacturing sector and a country`s global competitiveness. But relying on our analysis of the outcomes, one should conclude just the opposite. Such results are at odds with general economic intuition, and may seem to be paradoxical. It is hard to admit that growth in the export of high-tech industries has no impact on international competitiveness.

However, our *"strange"* results may be a consequence of four aspects. Firstly, the geographic and time coverage was very limited, which resulted in a small number of observations. Secondly, the measure of international competitiveness – $GCI_{i,j}$, is highly complex, covering a multitude of different variables, which negatively affects it in time variability. Thirdly, the selected countries are highly specific. In the former "transition countries", some trends observed in national economies are the direct result of dynamic structural adjustments that these countries have had to undergo to catch-up with the highly developed economies. Additionally, trade patterns depend not only on a country`s current individual endowments, but are conditioned by wide bundle of different, often exogenous, factors. High vulnerability and lack of ability to resist external

shocks constitutes an obstacle to entering a stable development path. Fourthly, and in relation to the previous observation, the period taken into consideration (2006-2011) was highly unstable due to the spread of the economic crisis across the world. The turmoil disrupted development processes, which was especially serious in the case of Estonia. All the imperfections listed above account for the significant lack of robustness of the final results presented in the empirical part of this paper.

5. Concluding remarks

The main aim of the paper was to check for intensity of changes in the trade patterns of nine Central-East European countries over the period 2000-2011, concentrating exclusively on the export of goods classified by the level of technology-intensity of industries. Having reference to the traditional concepts that technological progress explains international trade flows and national competitiveness, we also aimed to identify the relationship to changing trade patterns in international competitiveness, measured by the Global Competitiveness Index. Our empirical results rejected the hypothesis of the existence of positive links between growth of exports in technology-intensive industries and international competitiveness in the analyzed countries. However, the obtained outcomes should be interpreted with caution. The trade patterns uncovered in each country show that technological changes positively impact international trade flows and that the examined economies are gradually opening their internal markets to the global economy. The study also revealed substitution effects in industries' shares in a country's total export of goods, contributing positively to changing the structure of the national economy. As countries become more export-oriented, growth of high-tech and medium-high-technology industries in total export of goods legitimizes the assumption of an increase in their competitive potential. The link between the two is not direct however, and possibly reveals itself with significant time lags, and – above all – international competitiveness cannot be explained solely by technological factors. However, as technology potentially constitutes an important catalyst of growing international competitiveness, enhancing countries to transform from technology-importing countries into efficient and innovation-led developments, driven by growing export of high-technology industries, indicate that future studies of these aspects are desirable.

References

Arrow, Kenneth J. (1962), *Economic Welfare and the Allocation of Resources to Invention*, The Rand Corporation, United States

Aiginger, K. (2006), *Competitiveness: From a Dangerous Obsession to a Welfare Creating Ability with Positive Externalities*, 'Journal of Industry, Competition and Trade', Springer, 6 (2)

Alcalá, F. and Ciccone, A. (2004), *Trade and Productivity*, 'Quarterly Journal of Economics', Oxford Journals, 119 (2)

Amable, B., Verspagen, B. (1995), *The role of technology in market shares dynamics*, Open Access publications from Maastricht University, Maastricht, no. 27-18070

Bernard, A., J. Jensen, S. Redding and P. Schott. (2007), *Firms in International Trade, Journal of Economic Perspectives*, American Economic Association, 21(3)

Cantwell, J. (1989), *Technological Innovation and Multinational Corporations*, B.Blackwell Publishing

Carolyn, F. (2001), *Rebating environmental policy revenues: output-based allocation and tradable performance standards*, Discussion Chapters db-01-22, Resources for the Future, 01-22

Chesnais, F. (1992), *National Systems of Innovation, Foreign Direct Investment and the*

Operations of Multinational Enterprises, in Lundvall, B. A. (ed) *National Systems of Innovation*, Pinter Publishers: London

Delgado M., Ketels C., Porter M., Stern S. (2012), *The determinants of national competitiveness*, Working Paper 18249, National Bureau Of Economic Research, United States

Delgado, M. and C. Ketels. (2011), *Assessing Country Competitiveness: Case of Spain*, in P.Cooke, J.L. Curbelo and M.D. Parrilli (eds.) *Innovation, Global Change and Territorial Resilience*, Edward Elgar, Cheltenham

Dollar, D. and A. Kraay. (2003), *Institutions, Trade, and Growth*, Journal of Monetary, Economics, Elsevier, 50 (1)

Dosi, G., K.L.R. Pavitt and L.L.G. Soete, (1990), *The Economics of Technical Change and International Trade*, Harvester Wheatsheaf, Hemel Hempstead

Dunning, J.H. (1993), *Multinational Enterprises and the Global Economy*, Wokingham, Berks: Addison-Wesley

Fagerberg, J., M. Srholec and M. Knell. (2007), *The Competitiveness of Nations: Why Some Countries Prosper While Others Fall Behind*, World Development, Elsevier, 35 (10)

Fagerberg, J. (1989), *Innovation, catching-up and growth*, Working Chapter 1989137, Centre for Technology, Innovation and Culture, University of Olso

Hatzichronoglou, T. (1997), *Revision of the high-technology sector and product classification*, OECD Science, Technology and Industry Working Chapter 1997/02, OECD

Hausmann, R. and B. Klinger. (2006), *Structural Transformation and Patterns of Comparative Advantage in the Product Space*, Working Paper No. 128.Cambridge, MA: Harvard University Center for International Development

Krugman P. (1994), *Competitiveness – a dangerous obsession*, Foreign Affairs. Issue: March/April 1994 (volume 73, number 2)

Lall, S. (2000), *The technological structure and performance of developing country manufactured exports, 1985-98, Oxford Development Studies*, Oxford, vol. 28(3)

Lall, S. (2001), *Competitiveness, Technology and Skills*. Edgar Elgar, Cheltenham

Leontief, W. (1953), *Domestic production and foreign trade; the American position re-examined*, Proceedings of the American Philosophical Society, American Philosophical Society, Vol. 97, No.4

Lopez, R.A. (2005), *Trade and growth: reconciling the international and microeconomic evidence*, Journal of Economic Surveys, Wiley Blackwell, vol. 19(4)

MacGarvie, M. (2006), *Do firms learn from international trade?*, Review of Economics and Statistics, MIT Press, 88 (1)

Narula, R. (1993), *Technology, international business and Porter`s diamond: synthesising a dynamic competitive development model*, Management International Review, Springer, special issue, vol. 2

Nicoletti, G., Scarpatta S. (2003), *Regulation, Productivity and Growth*, OECD Working Paper, OECD, No. 347

Porter, M. E. (2006), *The Microeconomic Foundations of Prosperity: Findings from the Business Competitiveness Index*, with C. Ketels and M. Delgado, in World Economic Forum (ed.), *Global Competitiveness Report 2006-2007*, Geneva: World Economic Forum

Porter, M.E., M. Delgado, C. Ketels, and S. Stern. (2008*), Moving to a New Global Competitiveness Index*, in World Economic Forum (ed.), 2008, *The Global Competitiveness Report 2008-2009*

Posner, M.V. (1961), *International Trade and Technical Change*, Oxford Economic Chapters, Oxford, 13

Rodríguez, F. and D. Rodrik. (2000), *Trade Policy and Economic Growth: A Skeptic's Guide to the Cross-National Evidence*, in B. Bernanke and K. Rogoff (eds.), *NBER Internationals Annual 2000.* Cambridge, MA: National Bureau of Economic Research

Roztocki N., Weistroffer, H.R. (2008), *Information Technology in transition economies,* Journal of Global Information Technology Management, Ivy League Publishing, Vol.11, No.4

Spencer, B. and J. Brandner. (2008), *Strategic Trade Policy*, in: *The New Palgrave Dictionary of Economics*, ed. by S.N. Durlauf and L. E. Blume, Basingstoke, Hampshire: Palgrave Macmillan

Trabold, H. (1995), *Die internationale Wettbewerbsfähigkeit einer Volkswirtschaft*, DIW-Vierteljahresheft, Berlin, No. 2

Wood, A. (1994), *Give Heckscher and Ohlin a Chance!*, Weltwirtschaftliches Archiv, Kiel, Vol. 130(1)

Streszczenie

ŚCIEŻKI EKSPORTU DÓBR VERSUS MIĘDZYNARODOWA KONKURENCYJNOŚĆ. ANALIZA PORÓWNAWCZA DLA KRAJÓW WSCHODNIEJ I ŚRODKOWEJ EUROPY W LATACH 2000-2011

W artykule analizie poddano zmieniające się ścieżki eksportu dóbr w podziale na gałęzie o różnej intensywności technologicznej. Analizę przeprowadzono dla lat 2000-2011 dla 9 wybranych krajów Europy Centralnej i Wschodniej, tj: Bułgarii, Republiki Czeskiej, Estonii, Litwy, Łotwy, Polski, Rumunii oraz Słowacji. Dodatkowo postawiono hipotezę o zachodzącej pozytywnej relacji między rosnącym – w stosunku do całej wartości eksportu kraju–udziale sektorów technologicznie-chłonnych oraz międzynarodową konkurencyjnością, która jest aproksymowana za pomocą Global Competitiveness Index (GCI).

Dane dotyczące eksportu pochodzą z bazy OECD STAN Bilateral Trade Database by Industry and End-use Category (BTDIxE), zaś te dotyczące międzynarodowej konkurencyjności – World Economic Forum. Wyniki przeprowadzonej analizy empirycznej nie potwierdzają statystycznej zależności między poziomem międzynarodowej konkurencyjności (GCI) a udziałem sektora high-tech oraz ICT w całości eksportu danego kraju.

Słowa kluczowe: *międzynarodowa konkurencyjność, ścieżki eksportu, intensywność technologiczna, analiza porównawcza*