

**Goran Nikolić**

European Studies Institute,  
Belgrade,  
Serbia  
✉ goranvnikolic@gmail.com

# Convergence of the Export Structure of Romania, Croatia, Serbia and Bosnia-Herzegovina to the Structure of Import Demand in Developed Countries

**Summary:** The similarity coefficients of the export structures of Romania, Croatia, Serbia and Bosnia-Herzegovina and the import structure of the EU and the U.S. have increased since 2000, but to date, they have not reached a critical turning point. This indicates that the qualities of exports from the observed transitional economies have not rapidly improved, and the export structure remains relatively unfavourable, particularly when compared to advanced transitional countries. The most important factors in the success of advanced transitional economies were: the inflow of foreign direct investment, imports of modern technology (and later, their own development), innovation, development of small and medium sized enterprises, foreign competition, the development of a market economy and macroeconomic stability. The export structures of Romania, Croatia, Serbia and Bosnia correlate with improvement in the process of transition in the observed countries. In 2009 Bosnia had the absolute lowest level of similarity coefficient among the studied countries, followed by Serbia, Romania and Croatia, which corresponds to the overall economic performance and foreign trade of the observed economies.

**Key words:** Similarity coefficients, Export, Import, Transitional countries, Convergence, EU, U.S.

**JEL:** F16, B41.

The aim of this paper is to compare the absolute level and trend of similarity coefficients of the export structures of observed transitional countries (Romania, Croatia, Serbia and Bosnia-Herzegovina) with the import structure of developed economies (EU and U.S.) to examine if there is convergence, and the level of that convergence since 2000. Potential increases in similarity ("overlap"), i.e. a better match with the commodity import structures of the EU and U.S. would indirectly indicate the potential for further growth and qualitative improvement of commodity exports from the observed transitional countries and the opportunity for these economies to make best use of their comparative advantages. The results of this research will help clarify the trends in the structural change of exports from the observed transitional countries and the quality level of exports achieved in each of the observed transitional countries, which should correlate with the achieved progress in transition reforms. The aim is to identify the deficiencies in exports from the observed transitional countries as devel-

opment of economic and export structures is an essential prerequisite for competitiveness, particularly within the EU market.

The paper begins with the hypothesis that since 2000 the structures of commodity exports from Serbia, Romania, Bosnia and Croatia have become better adjusted to the commodity import structure of the referenced developed economies. In fact, all four of these countries have accelerated reforms, particularly Croatia and Serbia, which, following the removal of authoritarian regimes, have more actively embraced international political and economic systems (FR Yugoslavia received autonomous trade preferences from the EU at the end of 2000).

To prove this hypothesis we used cosines and the Finger-Kreinin similarity (differences) measurement method for the structure of exports and imports, to compare the similarity of the commodity structure of exports of the observed transitional countries and the commodity import demand structure of the EU and the U.S. over the period 2000-09. In addition, we used the Bray-Curtis index for measuring similarity.

Similarity coefficients indicate the probability or intensity of the total bilateral trade that can be expected. It should be noted that increasing the similarity of export and import structures does not just indicate the convergence of exports from the observed transitional countries with the requirements of the EU and U.S. markets, but also indicates the general level of adjustment of the exports of the observed transitional markets to import demand in developed economies that are characterised by technologically advanced trade structures. Among other things, in an economic and monetary union, such as that within the EU, and which the observed countries aim to enter (Romania is an EU member, but not in the EMU), the similarity of the trade structure is important because a higher level of similarity may require smaller industrial relocation, makes monetary policy coordination and the definition of other common policies easier, increases resistance to asymmetric shocks, accelerates the convergence of factor prices and reduces the pressure of migration flows to the EU (Nuno Crespo and Maria P. Fontoura 2005). The sustainability of monetary union depends on the degree the common economic policy is in accord with that of the individual members, and this requires the similarity of economic indicators in these countries, including, among others, export structures.

Suppose that one country has a significant balance of payments deficit, and the other a surplus. If these two countries have the option of keeping an autonomous monetary policy, they will depreciate or appreciate their currency, change price levels or encourage the inflow or outflow of capital (or other factors of production) from the country. In the case of monetary union, there is no autonomous monetary policy, there are no significant fiscal transfers between countries, no significant labour mobility among EU member states, and "asymmetric" economic shocks are a significant challenge. For example, they can be caused by changing demand on the world market, which affects the exports of EU countries, but if the export structure of the EU is similar, the change will similarly affect all members, and economic policy measures may be unique. Alternatively, if changes in export demand were to occurring one country, leading to the growth of a deficit while another had a surplus, the "burden" in the Union would be unevenly deployed. The aim of changes in economic and ex-

port structure is, therefore, training for competition in the common EU market (the diversity of production and trade structures cause asymmetric shocks in the monetary union).

It is indicative that there was little, or no, correlation between supply shocks in any of the ten EU candidate countries, now EU members and the EMU member states (until 2002). There is, therefore, much smaller supply shock correlation than among the EMU member states (except Hungary, Greece and Ireland which had a low correlation). Thus, the two groups of countries have had repeated exposure to supply asymmetric shocks (Katerina Kalcheva 2006).

It should be noted that the structure, favourable or otherwise, is derived from the empirical analysis, which shows that most developed countries have a structure of exports (and imports), which is predominantly based on products of high stages of finalisation (which receive much higher unit revenues). The structure of trade is an indirect indicator of achieved development of the economy. Once a country where a resource (or primary) products dominate exports achieves a certain level of development, it needs to diversify its export supply to include products of greater sophistication or economic growth will slow. So, if more significant export growth is accompanied by the growth of similarity coefficients this would indicate quality improvement and growth of exports. In the second case, if the increase in exports is accompanied by a drop in the similarity coefficient, it is clear that this represents growth which is forced by resource-intensive products (low quality growth).

In this paper we use the structure of exports and imports by SITC (Standard International Trade Classification) to a two digit level for Romania, Croatia, Serbia, Bosnia, EU, U.S, Czech Republic, Slovenia. Data is sourced from national statistics.

The EU, the dominant trading partner of the observed transitional countries, together with the structure of the U.S. trade, serves as the reference system, based on which we will analyse the qualitative changes in the structure of the trade of the observed transitional economies. The advantage of the EU (and U.S.), trade structures for the purpose of comparison, stems from the high stability of the structures of export and import of this integration. The deficiency of the EU's external import structure (compared to total EU imports, which additionally include internal imports) is based on the high share of imports of energy products. This is why the structure of EU external imports have a lower "quality" in comparison to other developed countries (it is therefore important to introduce the analysis of the structure of U.S. trade). The advantage of comparison with the EU and U.S. import structures is that they are not static, but continually improves, while other indicators (if they are not viewed in comparison to other countries) may be influenced by progress that may be typical for worldwide trade (e.g. in the last few decades we have seen a near continuous reduction in the share of primary products in world trade).

## 1. Methodology and Methodological Problems

The cosines method is used to determine the similarities (differences) between the two structures that are classified in the same way (e.g. the 63 elements). The case takes a vector of  $E$ , which represents the structure of exports to specific countries (i). The vector is defined by a number of elements in  $n$ -dimensional space that have the

same dimensions as the vector E elements. The analogue vector to E, M takes a vector that represents the structure of import (or export) of a particular country (j). The vector is defined by a number of elements in n-dimensional space, which have the same dimensions as the vector E elements. Provided that the participation of all elements of total exports or imports is identical (absolute amounts are not important), the two radius vectors will have identical positions, in multidimensional space because they have the same coordinates, the angle between them will be 0 and the value of the cosine will be 1 (a complete identity of commodity structure). The cosine method allows us to take a more detailed look at the difference between export and import structure (the divisions in this case), and we can detect divisions where there is most potential for increasing exports, given of course real economic opportunities.

$$\text{COS}_{ij} = \frac{\sum_{k=1} E_{ik} * M_{jk}}{\sqrt{(\sum_{k=1} E_{ik}^2) * (\sum_{k=1} M_{jk}^2)}}$$

K = items in SITC;

k = 1 ... 63 (for two digit classification);

i = the exporting country;

j = the importing country.

The Finger and Kreinin (FKIS) index endeavours to estimate export similarity by calculating the relative importance of various commodities in the export structure of pairs of countries, and then using a filtering technique. The method is non parametric, therefore, it's not based on any assumptions about the distribution of variables (Michael J. Finger and Mordechai E. Kreinin 1979).

$$FKIS_{ij} \sum_{k=1} \min(E_{ik}, M_{jk})$$

K = items in SITC;

k = 1 ... 63 (for two-digit classification);

i = the exporting country;

j = the importing country.

Comparing foreign trade structure and quantification of the mobility (or persistence) structure of exports (or imports) can be done using a so-called similarity matrix. We used normalised Manhattan distance with the Bray-Curtis formula, broadly used in geostatistics and in biometrics (Michael Michie 1982). The value of this indicator ranges from 0 to 1, and if the value of this index is closer to 0 the two structures are closer together. If the index value is equal to 1 the two structures are different. The maximum value is 0 if the two structures are identical. In this paper we use the inverse value of this indicator.

$$B - C_{jk} = \frac{\sum_i |x_{ij} - x_{ik}|}{\sum_i (x_{ij} + x_{ik})}$$

$x_{ij}$  = part of the section of the country  $j$  (in total exports or imports) in the observed year;

$x_{ik}$  = part of the section of the country  $k$  (in total exports or imports) in the observed year;

$j, k$  = observed the country (or country in different periods).

The limitations of all these indicators are the coefficients themselves. Due to the configuration of the structure, they can sometimes show a completely inexplicable economic value, i.e. that they will not always be a true indicator of the similarity structure. Therefore, one should bear in mind that here, above all a structural analysis is not always a good measure and will not always indicate the real state. The most important handicap of the index of similarity is that it is possible that more competitive economic structures, in this case from the European Union (or U.S.), could show a lower coefficient (lower similarity).

Theoretically speaking, when comparing two export structures the structure of exports of a country may show a large discrepancy with the structure of exports of another country with a similar level of development. This may happen if one of those countries has a specialisation in certain technology intensive industries and the other has a similar level of technologically intensive industry but producing products which belong to different divisions of SITC.

When it comes to Serbia, it should be noted that until 2005 the data does not include figures for "export" to Montenegro. However, the significant disparity between the size of the economies of Serbia and Montenegro means that this limitation has a negligible influence and the structure of Serbian exports without exports to Montenegro is very similar to the structure of total exports from Serbia.

It should be emphasised that the use of these and other statistical methods cannot detect qualitative improvement in products of the same commodity group, or even customs nomenclature (except indirectly, for example, through the unit value of exports). It is possible, with a great certainty, to assume that in recent years, with the entry of foreign companies to the observed transitional economies, there has been a significant improvement in the quality of goods, especially those intended for foreign markets, though they are recorded under the same SITC or customs code.

What prevents a satisfactory assessment of the scientific correlation between the growth of similarity coefficients and increase the exports value, besides short series, is that both variables depend on time (a trend). In addition, for countries that are in the process of transition and seeking EU membership it can be expected that their initially low-quality export structure improves and adjusts to the import demand of their main trading partner, while the trend of export growth to significant extent is the result of starting from a low base. Therefore, additional research is needed that would, by isolating these factors, confirm the thesis of positive significant correlation between growth of similarity coefficients and increase in the value of exports.

## 2. The Same Methodology Used in Relevant Studies

Virtually the same methodology was applied in a study by Hans Linnemann and Cornelis P. Van Beers (1988), which also used the similarity of export and import structures. They used two similarity coefficients: Cosines and Finger-Kreinin. Their study also used two digit SITC (for manufactured products, sections 5-9) and data on foreign trade for 13 developed and 34 developing countries in 1980. The aim was to test the Linder hypothesis (Burenstam S. Linder 1961). The conclusions of the study do not support the thesis of Linder about the relatively more intensive trade in processed industrial goods (manufactures) between countries with similar levels of income per capita. Namely, the intensity of trade generally increases continuously with increasing income per capita of a country's trading partners.

Finger and Kreinin (1979) used the coefficient (since named after them) to compare the structure of exports of selected countries in certain markets (U.S, six EU, Japan, the rest of Western Europe) in the period from the beginning of 60's to the mid 70's. The main objective of their study was the detection of *Trade Creation* and *Trade Diversion*.

Loke Wai-Heng (2009) analysed the similarity of export structures in North East and South East Asian economies, also using the Finger-Kreinin index. The study covers a time series analysis from 1990 to 2008. It was considered important to know whether these countries were becoming more or less similar in trade structures over time. The analysis provides an indication whether these economies are competitors or complementary in their trade. Data are from the COMTRADE database, at a two and single-digit level of SITC.

The study by Michael G. Plummer and Seiji Naya (2006), used the Finger-Kreinin index to compare commodity exports of the countries of Southeast Asia (Indonesia, Thailand, Malaysia, Philippines, Singapore) to the U.S. market, at a five-digit SITC level, for the years from 1995 to 1999. Since trade negotiations between U.S. and these countries were being pursued bilaterally and not with ASEAN as a whole, there was a possibility of negative effects posed by export diversion for those countries that were excluded from a free trade area (FTA). The degree to which such countries were affected depended critically on how much overlap there was between their exports and those of countries that succeeded in obtaining preferential treatment through an FTA. The authors determined the extent to which exports of these countries to U.S. were similar to each other using the Finger and Kreinin index. It was shown that a decision to conclude an FTA with the U.S. was no longer a matter of weighing the costs and benefits of the FTA itself, in terms of greater margins of preference in the U.S. market, as might have been the case if FTA were an "exception" (as in the past), but rather a question of preserving Most-Favoured Nation Status.

Luka De Benedictis and Lucia Tajoli (2004, 2008) analysed the similarity of the export structures of Central and Eastern European Countries with the structure of exports of the EU, this time using the Bray-Curtis index. The study focused on countries' specialisation as suppliers to the EU market, and the author's assessed whether similar export patterns would foster a "catch-up" process in the Central and Eastern European Countries. The main finding was that similarity in export composition has a positive, significant and non-linear impact on "catch-up".

### 3. The Results

Comparing Romania, Croatia, Serbia and Bosnia's commodity exports structures with the commodity imports structures of the EU and the U.S. in the period 2000-2009 (at two digit level of SITC, revision 3 and 4) we obtained the similarity coefficients given in the following tables.

**Table 1** Indicators of Similarity between Romania's Exports Structure and the Import Structure of the EU27 and the U.S.

	Finger-Kreinin	Cosines	Bray-Curtis	Finger-Kreinin	Cosines	Bray-Curtis
	Romania – EU27			Romania – U.S.		
2000	0,477	0,424	0,475	0,451	0,431	0,451
2001	0,531	0,516	0,530	0,523	0,526	0,527
2002	0,555	0,577	0,555	0,543	0,543	0,543
2003	0,551	0,571	0,551	0,527	0,545	0,527
2004	0,561	0,602	0,562	0,535	0,580	0,536
2005	0,584	0,681	0,587	0,576	0,678	0,576
2006	0,579	0,701	0,583	0,584	0,721	0,589
2007	0,574	0,684	0,576	0,583	0,712	0,583
2008	0,577	0,696	0,582	0,600	0,730	0,601
2009	0,571	0,654	0,571	0,605	0,734	0,605

Source: European Commission (2010), National Institute of Statistics - Romania (2010), U.S. Census Bureau, International Trade Statistics (2010).<sup>1</sup>

**Table 2** Indicators of Similarity between Croatia's Exports Structure and the Import Structure of the EU27 and the U.S.

	Finger-Kreinin	Cosines	Bray-Curtis	Finger-Kreinin	Cosines	Bray-Curtis
	Croatia – EU27			Croatia – U.S.		
2000	0,599	0,699	0,597	0,558	0,555	0,558
2001	0,599	0,771	0,646	0,580	0,568	0,584
2002	0,631	0,744	0,632	0,586	0,588	0,586
2003	0,639	0,756	0,639	0,597	0,613	0,598
2004	0,652	0,760	0,653	0,612	0,627	0,613
2005	0,647	0,763	0,648	0,618	0,679	0,618
2006	0,626	0,732	0,630	0,599	0,662	0,603
2007	0,639	0,742	0,642	0,610	0,685	0,611
2008	0,607	0,681	0,611	0,579	0,637	0,580
2009	0,639	0,777	0,640	0,592	0,699	0,592

Source: European Commission (2010), Državni zavod za statistiku Republike Hrvatske (2010)<sup>2</sup>, U.S. Census Bureau, International Trade Statistics (2010).

<sup>1</sup> **European Commission.** 2010. *External and Intra-European Union Trade, Monthly Statistics*. Luxembourg: Publications Office of the European Union.

**National Institute of Statistics - Romania.** 2010. Buletinul Statistic de Comerț Internațional (International Trade Statistics), nr. 12/2009. [http://www.insse.ro/cms/files/arhiva\\_buletine2009/bsei\\_12.pdf](http://www.insse.ro/cms/files/arhiva_buletine2009/bsei_12.pdf) (accessed March 25, 2010).

**U.S. Census Bureau, International Trade Statistics.** 2010. Value of Exports, General Imports, and Imports by Country by 2-digit Commodity Groupings World (0000). <http://censtats.census.gov/cgi-bin/sitc/sitcCty.pl> (accessed March 5, 2010).

<sup>2</sup> **Državni zavod za statistiku Republike Hrvatske.** 2010. Robna razmjena Republike Hrvatske s inozemstvom za razdoblje od siječnja do prosinca 2001/2003/2004/2006/2007/2009. <http://www.dzs.hr/Hrv/Publication> (accessed March 5, 2010).

**Table 3** Indicators of Similarity between Serbia's Exports Structure and the Import Structure of the EU27 and the U.S.

	Finger-Kreinin	Cosines	Bray-Curtis	Finger-Kreinin	Cosines	Bray-Curtis
	Serbia – EU27			Serbia – U.S.		
2000	0,509	0,466	0,507	0,485	0,464	0,484
2001	0,537	0,531	0,536	0,517	0,525	0,522
2002	0,527	0,526	0,527	0,514	0,491	0,514
2003	0,547	0,542	0,546	0,508	0,445	0,507
2004	0,501	0,453	0,503	0,505	0,432	0,506
2005	0,479	0,423	0,483	0,491	0,417	0,492
2006	0,500	0,427	0,505	0,482	0,413	0,488
2007	0,549	0,468	0,553	0,510	0,429	0,512
2008	0,557	0,441	0,561	0,535	0,434	0,536
2009	0,557	0,530	0,558	0,539	0,535	0,539

Source: European Commission (2010), Republički zavod za statistiku Republike Srbije (2010)<sup>3</sup>, U.S. Census Bureau, International Trade Statistics (2010).

**Table 4** Indicators of Similarity between Bosnia's Exports Structure and the Import Structure of the EU27 and the U.S.

	Finger-Kreinin	Cosines	Bray-Curtis	Finger-Kreinin	Cosines	Bray-Curtis
	Serbia – EU27			Serbia – U.S.		
2000	0,413	0,347	0,414	0,409	0,374	0,410
2001	0,405	0,335	0,402	0,396	0,319	0,392
2002	0,394	0,326	0,397	0,384	0,319	0,384
2003	0,397	0,332	0,401	0,380	0,329	0,384
2004	0,431	0,373	0,434	0,394	0,339	0,396
2005	0,442	0,325	0,448	0,412	0,306	0,414
2006	0,466	0,414	0,466	0,449	0,407	0,449
2007	0,413	0,347	0,414	0,409	0,374	0,410
2008	0,405	0,335	0,402	0,396	0,319	0,392
2009	0,394	0,326	0,397	0,384	0,319	0,384

Source: European Commission (2010), Agencija za statistiku Bosne i Hercegovine (2010)<sup>4</sup>, U.S. Census Bureau, International Trade Statistics (2010).

## 4. Analysis of Results

The hypothesis of increasing similarity of export structures of observed transition countries and import demand in developed countries can easily be verified from the data in the previous tables. Based on the given tables it can be seen that in the selected period in all four observed transitional countries there has been an increase in the similarity of export structure with the import structures of developed economies (European Union, U.S.). The world economic crisis led to a rapid fall in exports and imports in the observed transitional countries 2009, while the coefficients of similarity of export structures with reference import structure noted mainly mild growth.

<sup>3</sup> Republički zavod za statistiku Republike Srbije. 2010. Spoljna trgovina, Saopštenja za javnost, Statistički godišnjak Srbije 2007. <http://webrzs.stat.gov.rs/WebSite/Public/PageView.aspx?pKey=93> (accessed February 23, 2010).

<sup>4</sup> Agencija za statistiku Bosne i Hercegovine. 2010. Mjesečne publikacije, Vanjska trgovina. <http://www.bhas.ba/saopstenja> (accessed February 23, 2010).

In Romania, since 2000 there was an increase similarity coefficient, although these processes were briefly interrupted in 2003. In 2005 they reached a maximum value of similarity in comparison with the import structure of the EU (in the following year they recorded a minimal fall, and values remained largely unchanged), while the similarity with the import structure of the U.S. increased over the period, with the exception of 2007.

In Croatia, the growth of the similarity index from 2000 was interrupted in 2005 when similarities with the EU import demand declined slightly (and similarly in 2006, with the import structure of the U.S.). Since then, the values of coefficients, has in fact, stabilised at those levels.

In Serbia in 2001 there was a slight increase in similarity index but a decline in the following year. 2003 saw significant growth in the coefficients of similarity, while the results for 2004 show a pronounced reduction in recorded index of similarity and an absolute value of the coefficient lower even than their values in 2000. For the next four years (2006-09) there was a noted increase in the coefficient of similarity.

From 2004, the export structure of Bosnia-Herzegovina recorded growth of similarities with the reference import structures in most years.

What are the causes of these trends, what are the economic implications and, most importantly, what trends can we expect in the future?

Intensification of the transition process in the observed transitional countries is an important factor which contributed to the partial improvement of the quality of exports that could be seen from the growth of the coefficients of similarity in the observed period. An aggravating factor when it comes to the qualitative improvement of exports was the continual strong double digit growth of exports in all the studied countries, which "forced" export based on the existing inappropriate structure and, therefore, made the difficulties in the export structure change. In addition, qualitative, positive trends are often uninterrupted, while the growth of the similarity coefficients and their reached absolute values of the observed transitional countries are relatively modest.

Comparatively observed, similarity of the U.S. export structure and EU27 external import structure has relatively high level. Namely, the similarity coefficients of these two structures have a high value because they come from two economies with very sophisticated trade. In 2000, the Finger-Kreinin index was 0.738, cosines coefficient 0.774, Bray-Curtis index 0.736. Nine years later it was registered somewhat lower, but still high, the similarity of the two structures.<sup>5</sup> The relatively low similarity of the U.S. export structure with the EU external import demand of 2009 was in consequence of statistical shortage of indicators themselves, i.e. their inability to see the level of sophistication or unit values of various products that belong to the same division. A similar problem occurs with coefficients of similarity of Czech exports (2009) with external import demand EU27 (Finger-Kreinin index was only 0.564, cosines coefficient 0.501, Bray-Curtis index 0.563), while significantly higher similarity coefficients is reported comparing the Czech export structure with the U.S.

---

<sup>5</sup> Finger-Kreinin index was 0.676, cosines coefficient 0.694, Bray-Curtis index 0.676.

import structure (Finger-Kreinin index was 0.646, cosines coefficient 0.664, Bray-Curtis index 0.646). Coefficients of similarity of exports of Slovenia with the EU external import demand were slightly higher.<sup>6</sup>

The problem is that when lower developed economies reach a certain level of quality of economic and foreign trade structure, the coefficients of similarity of their export to import of advanced structures are not adequate. Namely, due to the relatively high share of imports of energy (especially in EU external import demand), which in most countries have very little share in exports (except for countries which are exporting resources), there is increasing incongruity of structures. Therefore, a more adequate measure is the index of similarity of export with export structures.

In Table 5 we give the coefficients of similarity of the export structures of selected countries, where we can easily see some tendency. In observed transitional countries there was growth of these coefficients. However, in addition, their absolute level is still significantly lower compared with the coefficients of similarity of export structures of the following pairs of economies: EU27/U.S., EU27/Czech Republic, U.S./Czech Republic, U.S./Slovenia, although these structures, mostly, in the observed nine-year period, did not achieve the increase of congruency because the increase in the similarity of the advanced transition countries (such as e.g. Czech Republic or Slovenia) played in the second half of the 90s, several years before joining the EU.

Table 5 shows that Romania has achieved impressive growth of similarity coefficients between 2000 and 2009 whereas the growth index of similarity of Croatia, although slightly smaller, was nevertheless significant. In Serbia, growth was modest, while in Bosnia-Herzegovina it can be assumed, based on similarity of export with import reference structures, there was a slight increase.

**Table 5** Indicators of Similarity of Export Structure of Selected Countries

	Finger-Kreinin	Cosines	Bray-Curtis
2000 Romania-U.S.	0,402	0,321	0,402
2009 Romania-U.S.	0,602	0,747	0,601
2000 Croatia-U.S.	0,477	0,510	0,477
2009 Croatia-U.S.	0,633	0,774	0,633
2000 Serbia-U.S.	0,466	0,453	0,465
2009 Serbia-U.S.	0,533	0,596	0,534
2009 BH-U.S.	0,419	0,394	0,419
2000 Czech-U.S.	0,659	0,795	0,659
2009 Czech-U.S.	0,639	0,754	0,639
2000 Slovenia-U.S.	0,596	0,763	0,595
2008 Slovenia-U.S.	0,605	0,770	0,606
2000 EU-U.S.	0,800	0,909	0,796
2009 EU-U.S.	0,803	0,921	0,804
2000 Romania-EU	0,433	0,380	0,430
2009 Romania-EU	0,602	0,747	0,602
2000 Croatia-EU	0,566	0,625	0,563
2009 Croatia-EU	0,611	0,734	0,612

<sup>6</sup> In 2003, the similarity indices were generally higher than the same index for the observed transitional countries. The Finger-Kreinin index was 0.537, cosines coefficient 0.564, Bray-Curtis index 0.536. Similarity coefficients had much higher similarity comparing the Slovenian export structure with the U.S. import structure (Finger-Kreinin index was 0.607, cosines coefficient 0.719, Bray-Curtis index of 0.607).

2000 Serbia-EU	0,515	0,532	0,512
2009 Serbia-EU	0,558	0,623	0,559
2009 BH-EU	0,452	0,458	0,452
2000 Czech-EU	0,707	0,846	0,704
2009 Czech-EU	0,664	0,774	0,664

**Source:** European Commission (2010), Državni zavod za statistiku Republike Hrvatske (2010), National Institute of Statistics – Romania (2010), Agencija za statistiku Bosne i Hercegovine (2010), Republički zavod za statistiku Republike Srbije (2010), U.S. Census Bureau, International Trade Statistics (2010), Statistični urad Republike Slovenije (2010)<sup>7</sup>, Česku statistický urad (2010)<sup>8</sup>.

If we compare the export structure of the observed transitional countries in two digit figures SITC level with the EU and the U.S. (and the Czech Republic, Poland, Slovenia) export structure, we can clearly see the reasons for the relatively low coefficient of similarity of trade structure, especially for Serbia and Bosnia. Namely, Serbia and Bosnia-Herzegovina in 2009, as in previous years, had a high proportion of goods (divisions) that belong to sections 0 - Food and Live Animals and 6 - Manufactured Foods Classified by Material (mainly lower stages of processing goods, especially products) – 42,1% and 31% of total exports respectively. Whereas Croatia and Romania, 24,9% and 20,1% respectively, lower but still significant. In contrast, Serbia and Bosnia have a relatively low share of sections 7 - Machinery, Transport Equipment and 5 - Chemical Products, which mainly consists of technologically intensive products (collectively 25,7% and 18,8%). In Croatia the collective share of these two sections was 39,6% and in Romania at a high 47,9%, mainly due to divisions 78 - Road Vehicles and 77 - Electrical Machinery, which includes the production of motor vehicles and electrical machinery, intensified after 2000, thanks to investment from abroad.

In the U.S. the situation is quite different; export sections 7 and 5 made up 57% of exports in 2009, while products in sections 0 and 6 were only 15,7% of exports. The EU27 external export sections was based on the 7 in 5 (from 41,5% plus 17,1%), while the sections 0 and 6 were only 16,6% of the total external exports EU27. Share of sections 7 and 5 made up 52,1% of Poland's exports (2008) and as much as 59,6% of Czech exports in 2009. Poland has a significant proportion of sections 0 and 6 (as much as 30%), while the Czech Republic's share of these two sections was much smaller (20,9%). The situation was similar in Slovenia: the share of section 0 and 6 was 27,4%, and the participation of section 5 and 7 was 13,8% and 41% (of which 16% of division 78). All this data shows the vast qualitative export structure difference between compared countries.

So the biggest difference of the observed transitional countries export structures with the trade structures of the EU27 and the United States refers to sections 5 and 7, which are technologically intensive products - the transitional countries' small share indicates a poorly developed technological base and an outdated production

<sup>7</sup> Statistični urad Republike Slovenije. 2010. Zunanja trgovina, Izvoz in uvoz blaga, januar - december 2009, podrobnejši prikaz. [http://www.stat.si/novica\\_prikazi.aspx?id=2990](http://www.stat.si/novica_prikazi.aspx?id=2990) (accessed March 5, 2010).

Statistični urad Republike Slovenije. 2010. Statistične informacije, Zunanja trgovina. <http://www.stat.si/doc/statinf/24-si-017-0501.pdf> (accessed March 5, 2010).

<sup>8</sup> Česku statistický urad. 2010. External Trade by Commodities (VZO0020UU). [http://vdb.czso.cz/vdbvo/en/tabparam.jsp?voa=tabulka&cislotab=VZO0020UU&maklist\\_velikost=30&kapitola\\_id=27](http://vdb.czso.cz/vdbvo/en/tabparam.jsp?voa=tabulka&cislotab=VZO0020UU&maklist_velikost=30&kapitola_id=27) (accessed March 5, 2010).

technology. The development of sections 7 and 5 should be a priority in the process of economic transformation of the observed transitional countries. The development of industry, whose products belong to sections 7 and 5 (and other divisions, such as 87 - Professional, Scientific, Controlling Material or 88 - Photographic Apparatus, Optical Goods, Clocks) would lead to export growth of technology-intensive goods and decelerated growth of imports of the same. The same problem was present at earlier transition periods in now more advanced countries (i.e. the Czech Republic, Poland, Slovenia, Hungary, Slovakia), which currently have high value exports (total and per capita) and have reached a high qualitative level of exports. Their most important success factors were: the inflow of foreign investment, the development of the technological base mostly through imports of modern technology (and later their own development), innovation, the development of small and medium business, foreign competition, the development of market economy and macroeconomic stability. Of course, fulfilling these circumstances is a relatively slow and demanding process. It primarily demands attracting strategic foreign partners, which invest in medium- and high-technology intensive industries. It should be noted that the export of goods is virtually entirely yielded from the manufacturing industry.

## 5. Conclusion

Since 2000, the similarity coefficients of the observed transitional countries' export structure and reference import structure have increased and decreased. Until 2009, the coefficients increased the value, however not reaching a critical turning point. This indicates that the quality of exports of the observed transitional countries did not rapidly improve, and that its relatively unfavourable structure was maintained, which is especially remarkable if the indicator is the similarity of the pairs: Serbia/EU and Bosnia/EU (the situation is somewhat better in Croatia and Romania) compared with the indices for similarity of export structures of the US/EU, the Czech Republic/EU, Slovenia/EU, Czech Republic/U.S, Slovenia/U.S, which show far greater congruence of structure.

However, when it comes to more advanced transitional countries, significant structural adjustment with the EU trade structure is mainly achieved in the second half of the 90's. Following the signing of the "European Agreements" in the early nineties (and earlier, with the first EU facilitations), the Central European transitional countries marked growing coefficients of similarity. In the 1991-2001 decade there was a significant increase in the similarity of EU15 import and Poland's and the Czech Republic's exports, while at the same time, a strong decrease was recorded in the coefficient of similarity between EU15 import and Romanian and Serbian exports (Goran Nikolić 2004). Already in 2000, after considerable index growth, advanced transition countries had a significantly greater congruence of export structure to EU import demand than the observed transitional countries in 2009. Advanced transitional countries (Poland, Czech Republic, Hungary, Slovenia, Slovakia), showed the way in which Croatia, Serbia, Bosnia and Romania should follow and it is clear that their experiences in trade (as well as the overall economic) policies should be studied and applied.

Of importance is only briefly highlight the basic findings of studies dealing with the effect of export structure on economic growth (in developed countries and emerging, including and transition, countries). Study of Daniel Lederman and William F. Maloney (2009) shows some aspects of relation between export structure and economic growth. Export concentration, measured both as a Herfindahl index and as natural resource exports as a share of exports, has a negative effect (period 1980-99; 65 countries; *cross-section* regression analysis).<sup>9</sup> Sohn Cahn-Hyun and Lee Hongshik (2003) show that economic growth can be well explained by trade structure variables. In the empirics, the estimating equations have goodness of fit of about 0.4, showing a relatively significant relationship between trade structure and growth. The dynamic panel estimation from the data of 66 countries (1991-2001) verified strong validity and robustness of the relationship.<sup>10</sup>

In any case, the concern is the relatively low level and slowly increasing similarity of trade structure, especially Serbia and Bosnia-Herzegovina. It should be noted that relatively small changes of the similarity coefficients were the result of slow changes in the export structure, because more time is required for substantial economic change in the real sector, particularly export. It should be noted that the change of economic structure is the basis for resolving the problem of the foreign trade deficit. The causes of the low level of similarity coefficient (especially in Bosnia and Serbia), should be sought in these economies need to, at any cost, increase exports. This has maintained a high level of resource intensive products in their export (it is, before all, the relatively high participation of metal and agro-industrial complex, where these countries have a comparative advantage), which are much less represented in the import structure of the EU or the U.S.

It is indicative that the quality of achieved export structure of selected transitional countries, practically, correlates with transitional shifts of the observed countries. For example, in 2009, Bosnia-Herzegovina had the absolute lowest level coefficient of similarity of all the studied countries. Then following, come Serbia, Romania and Croatia. This corresponds to the overall economic performance and exports of the observed transitional economies.

---

<sup>9</sup> The Herfindahl index remains significant and negative with most control sets. However, the only specifications for which the resource export measure remains significant are poorly specified, and the result disappears when the Herfindahl measure of overall concentration is included. If indeed, there is no "resource curse", but there is a curse of export concentration, the implication is that policy makers should strive to provide a policy framework conducive to product and market diversification—but not necessarily one that promotes, through subsidies and incentives, diversification away from natural resource areas into manufactures.

<sup>10</sup> Trade structure variables that represent Heckscher-Ohlin model and Product Differentiation model respectively show strong evidence of positive effects on growth.

## References

- Benedictis, Luka De, and Lucia Tajoli.** 2004. "Openness, Similarity in Trade Structures and Income Convergence." Paper presented at the Annual Conference of the European Trade Study Group, Nottingham.
- Benedictis, Luka De, and Lucia Tajoli.** 2008. "Similarity in Trade Structures, Integration and Catching-Up." *Economics of Transition*, 16(2): 177-178.
- Cahn-Hyun, Sohn, and Lee Hongshik.** 2006. "Trade Structure, FTA and Economic Growth: Implications to East Asia." <http://faculty.washington.edu/karyiu/confer/beijing06/papers/sohn-lee.pdf>.
- Crespo, Nuno, and Maria P. Fontoura.** 2005. "Integration of CEECs into EU Markets: Structural Change and Convergence." Department of Economics at the School of Economics and Management (ISEG), Technical University of Lisbon, Working Paper 2004/15.
- Finger, Michael J., and Mordechai E. Kreinin.** 1979. "A Measure of 'Export Similarity' and Its Possible Uses." *The Economic Journal*, 89(356): 906-907.
- Kalcheva, Katerina.** 2006. "Institutional Arrangements for Credible Monetary Policy in Transition Countries." In *Economic Transition in Central and Eastern Europe*, ed. Sima Motamen-Samadian, 74-132. New York: Palgrave, Macmillan.
- Lederman, Daniel, and William F. Maloney.** 2009. "Trade Structure and Growth." In *Breaking into New Markets: Emerging Lessons for Export Diversification*, ed. Richard Newfarmer, William Shaw, and Peter Walkenhorst, 66-68. Washington, DC: World Bank.
- Linder, Burenstam S.** 1961. *An Essay on Trade and Transformation*. New York: Wiley.
- Linnemann, Hans, and Cornelis P. Van Beers.** 1988. "Measures of Export-Import Similarity, and the Linder Hypothesis Once Again." *Weltwirtschaftliches Archiv*, 124(3): 447-449.
- Michie, Michael.** 1982. "Use of the Bray-Curtis Similarity Measure in Cluster Analysis of Foraminiferal Data." *Mathematical Geology*, 14(6): 661-667.
- Nikolić, Goran.** 2004. "Strukturno prilagodavanje robnog izvoza Srbije uvoznj tražnji Evropske unije." *Ekonomski anali*, 162: 191-207.
- Plummer, Michael G., and Seiji Naya.** 2006. "A Quantitative Survey of the Economics of ASEAN-U.S. Free Trade Agreement." *ASEAN Economic Bulletin*, 23(2): 240-242.
- Wai-Heng, Loke.** 2009. "East Asia and Southeast Asia: Similarity in Trade Structures." Paper presented at The Singapore Economic Review Conference (SERC), Singapore.