INTERNATIONAL TRADE OF THE EUROPEAN UNION'S COUNTRIES. A COMPARATIVE ANALYSIS

Elena-Daniela VIORICĂ[1]

Abstract [*]

This paper's main objective is to comparatively identify the groups of EU countries that have similar characteristics regarding the international trade performance indicators, for 2007, before the economic crisis burst, and 2009, the lowest point of the economic crisis, when the international trade suffered the most important decline in export's volume according to the World Trade Organisation (WTO) report on International Trade in 2010. Using the factorial analysis, we construct an international trade map for 2007 and 2009, and we evaluate the differences between the two moments and define profiles for the aforementioned years.

The paper is structured into 2 main parts. The first part deals with the data and methodology used, and in the second part we present the analysis to which we identify the similar groups of countries in terms of international trade performance and, then,we present the 2007 and 2009 trade profiles based on the international trade statistics provided by the main specialised institutes.

Keywords: *international trade, E.U. countries, factor analysis, economic crisis*

1. Introduction

According to the World Trade Organisation (WTO) report on International Trade in 2010, in the second quarter of 2009, the lowest point of the economic crisis, the international trade suffered the most important decline in export's volume. After that moment, the exports for merchandise and commercial services trade made a significant upward turn, showing the recovery of international trade in the European Union (EU).

This paper's main objective is to identify the groups of EU countries that have similar characteristics regarding the international trade performance indicators, for 2007 and 2009, comparatively.

Using the factorial analysis, we construct an international trade map. For the countries' international trade statistics, we compare the results obtained for the 2009 data with the results obtained for the 2007 data, before the economic crisis burst. We evaluate the differences between the two moments and define profiles for the aforementioned years.

The working hypothesis is that the hierarchies amongst the countries did not change significantly, even if the trade volume and value decreased. Therefore, the two years' profiles may be very similar regarding the international trade performances.

The paper is structured into 3 main parts. The first part deals with the data and methodology used, in the second part we present the analysis to which we identify the similar groups of countries in terms of international trade performance. The final part presents the 2007 and 2009 trade profiles based on the international trade statistics provided by the main specialised institutes.

2. Data and methodology

The data used is grouped into two categories: indicators that reflect the performances of each country's international trade, and indicators that are related to an efficient international trade. The first group includes indicators such as Real growth in total trade, Balance of the current account (% of GDP), Contribution to WTO budget, Share in EU's total

[1] "Alexandru Ioan Cuza" University of Iaşi, Faculty of Economics and Business Administration

An. Inst.Cerc.Ec.„Gh. Zane", t. 20, i.II, Iaşi, 2011, p.179-187

[*] This paper is financed by the project "Post-doctoral studies in Economics: training program for elite researchers - SPODE", co-funded by European Social Fund Operational Programme Human Resources Development 2007 – 2013, contract no. POSDRU/89/1.5/S/61755.

exports/imports. The second group consists of indicators linked to the business environment and infrastructure, like Ease of Doing Business and Logistic performance index.

The sources for the indicators are World Trade Organisation, World Bank, Eurostat, and the countries' statistical institutes.

Real growth in total trade is the average annual growth rate of the total exports and imports in goods and services at constant 2000 U.S. dollars. The values are from the Balance of Payments (BOP) data, from the World Trade Organisation.

Balance of the current account (% of GDP) is the sum of net exports of goods and services, net income (such as interest and dividends), and net current transfers (such as foreign aid), calculated as a percentage of the country's Gross Domestic Product. The data source is Worldbank.

Contribution to WTO budget (%) represents the individual contributions calculated on the basis of shares in the total trade conducted by WTO members. The data source is WTO.

Share in EU's total exports/imports represents the share of trade exchanges (export or import) with the EU-27 (% of imports from the EU-27 in the total imports and % of the exports to the EU-27 in the total exports) of a Member States. The data source is Eurostat.

Logistic performance index reflects the overall perception of a country's logistics based on over 1,000 responses to a survey of logistics performance. The overall LPI was aggregated as a weighted average of seven key areas of logistics performance (1-5, best). Data are from WTO.

Ease of Doing Business is a rank indicator and represents a country's overall business climate based on seven indicators (1-183 worst). Data are from WTO.

In order to profile the two aforementioned years, we used the factor analysis – the principal components method, which will permit to visually identify the groups of countries with similar characteristics and the correlated variables that contribute at making this identification possible. For both years, we extracted two components, which explain more than 70% of the total variation for the targeted countries.

Also for the purpose of discerning the changes in international trade patterns for the two years, we used the cluster analysis, the hierarchical classification method, and we analysed the differences in the similar countries' groups that were identified based on the set of trade indicators.

3. Empirical results

First, we analysed the evolution of imports and exports for the EU's members. The time period 2007-2010 was significant for it comprised the years before the crisis and the years of the crisis. The results are presented in Fig. 1 and Fig. 2.

The graphical presentation shows the same trend in both exports and imports. The trend did not change in shape, the only significant differences during 2007-2010 time period was in value. Therefore, we can observe that year 2009 is, indeed, the year when the exports and imports were the lowest for that time period.

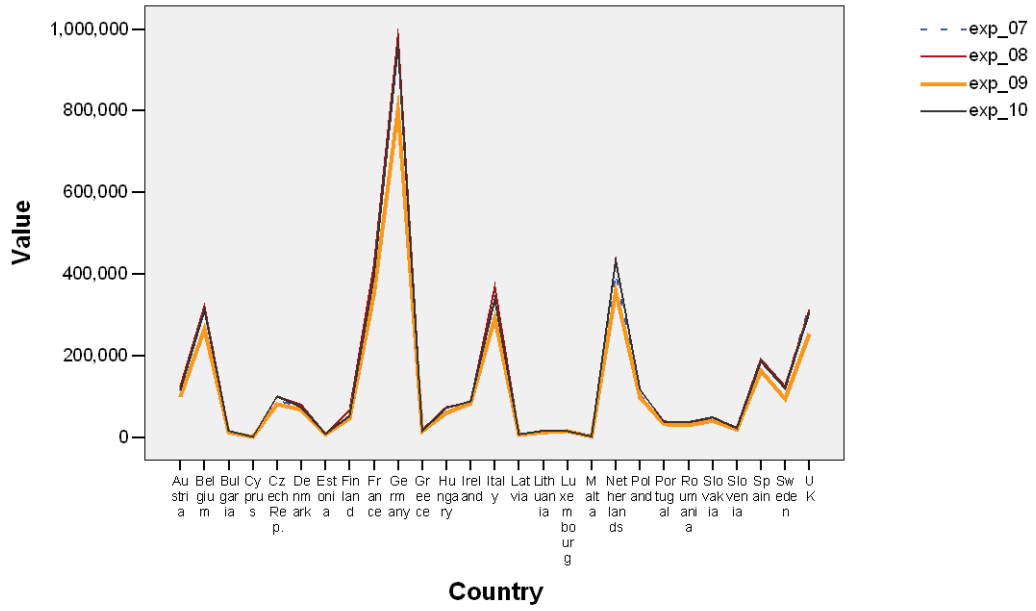

Fig. 1. *Evolution of the EU's countries' export value, during 2007-2010*

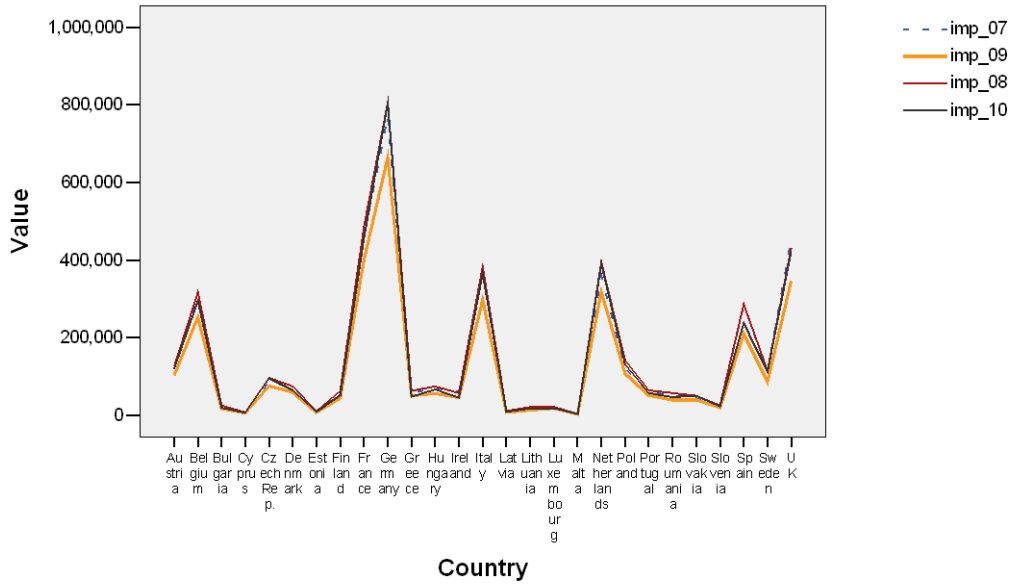

Fig. 2. *Evolution of the EU's countries' import value, during 2007-2010*

Following this line of results, we analysed the countries' specificities and correlations between the trade indicators that underline these specificities.

In order to identify the differences and/or similarities between the two years, 2007 and 2009, we applied the factor analysis to obtain a visual representation of the variables and countries, using the indicators from the two categories.

For 2007, the principal component analysis results are presented in Table 1, Fig. 3 and Fig. 4.

Table 1. Correlation coefficients of the variables with the two factorial axes, for 2007

Component Matrix[a]

	Component	
	1	2
Real growth in total trade	.807	.168
BCA (% GDP)	-.543	.717
Contribution to WTO budget	-.763	-.031
Share in EUs total exports	.551	.642
Share in EUs total imports	.551	.607
Ease of Doing Business	.573	-.284
Logistic perception index	-.878	.336

Extraction Method: Principal Component Analysis.

a. 2 components extracted.

In Table 1 are the coordinates of the variables on the two factorial axes (components), i.e. correlation coefficients between each variable and the factorial axis. We believe to be significant those variables with a correlation coefficient greater than 0.6. Thus, for the first component, the variables that are significant to explain the differences between countries are: *Real growth in total trade, Contribution to WTO budget* and *Logistic performance index*. For the second axis, the significant variable is Balance of the current account. Although the share in EU's total imports and exports have a correlation coefficient over 0.6 with the second component, they also have a correlation coefficient over 0.5 with the first component, which means they are not clearly correlated with either axis.

A suggestive display of the variables on the axes and their inter-correlations it is presented in Fig. 3. For the first axis, *Contribution to the WTO budget* and *Logistic performance index* are positively correlated with each other and negatively correlated to the first axis, and *Real growth in total trade* is positively correlated to the axis and negatively correlated to the two-variable group.

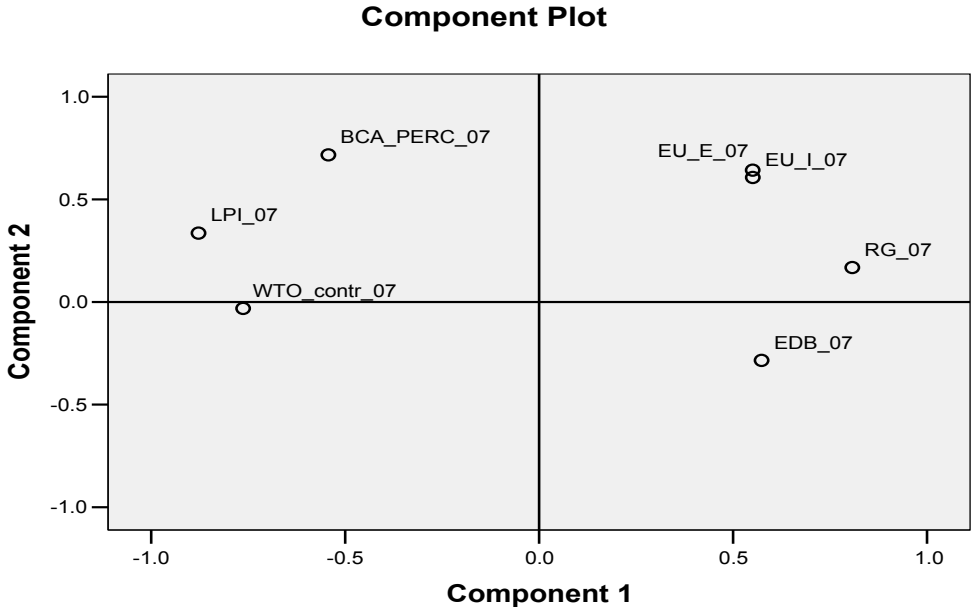

Fig. 3. *The display of the variables on the two factorial axes, for 2007*

In Fig. 4 we can observe the display of the EU countries and, by comparing it with the variables' display, we can draw the following conclusion:

- Luxembourg, Austria, Denmark, Belgium, Netherlands have high values for *Real growth in total trade* and low values for *Contribution to WTO budget* and *Logistic performance index*;
- Bulgaria, Greece, UK and Italy have high values for *Logistic performance index* and low values for *Real growth in total trade*;
- UK and Italy have high values for *Contribution to WTO budget* and low values for *Balance of the current account as a % of GDP;*
- Romania, Latvia, Poland, Czech Republic, Slovakia, Slovenia have high values for *Balance of the current account (% of GDP)*.

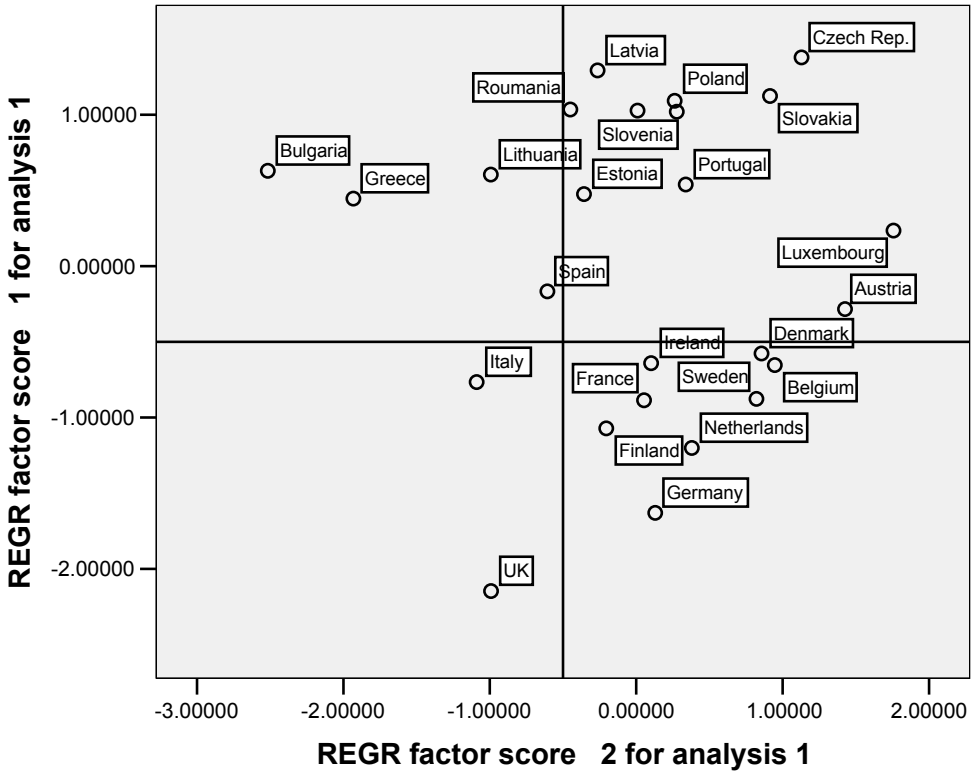

Fig. 4. *The display of the countries on the two factorial axes, for 2007*

In a similar manner, we analysed the data for the international trade of the EU countries for 2009. From the results presented in Table 2, Fig. 5 and Fig. 6, we observe that:

- for the first axis, *Contribution to the WTO budget* and *Logistic performance index* are positively correlated with each other and negatively correlated to the first axis, and *Real growth in total trade* is positively correlated to the axis and negatively correlated to the two-variable group. For the second axis, the only variables that is correlated, positively, with the component is *Balance of the current account*;
- Luxembourg, Estonia, Latvia, Austria, Denmark, Belgium, Sweden have high values for *Real growth in total trade* and low values for *Contribution to WTO budget* and *Logistic performance index*;
- Bulgaria, Greece, Italy have high values for *Logistic performance index* and low values for *Real growth in total trade*;

- UK has, with Italy, high values for *Contribution to WTO budget* and, along with Germany, has low values for *Balance of the current account as a % of GDP*;
- Greece, Bulgaria, Romania, Portugal, Poland, Czech Republic, Slovakia, Slovenia have high values for *Balance of the current account (% of GDP)*.

Table 2. Correlation coefficients of the variables with the two factorial axes, for 2009

Component Matrix[a]

	Component	
	1	2
RG_09	.628	.150
WTO_contr_09	-.712	-.216
EU_E_09	.667	.465
EU_I_09	.458	.675
EDB_09	.660	-.452
LPI_09	-.732	.305
BCA (% GDP)	-.481	.716

Extraction Method: Principal Component Analysis.

a. 2 components extracted.

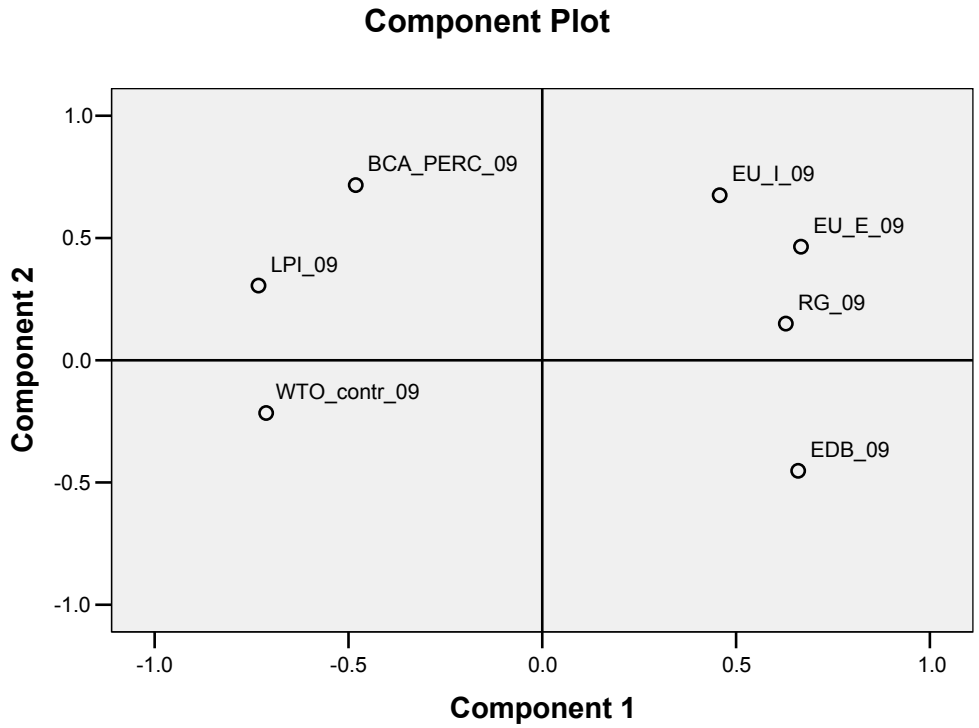

Fig. 5. *The display of the variables on the two factorial axes, for 2009*

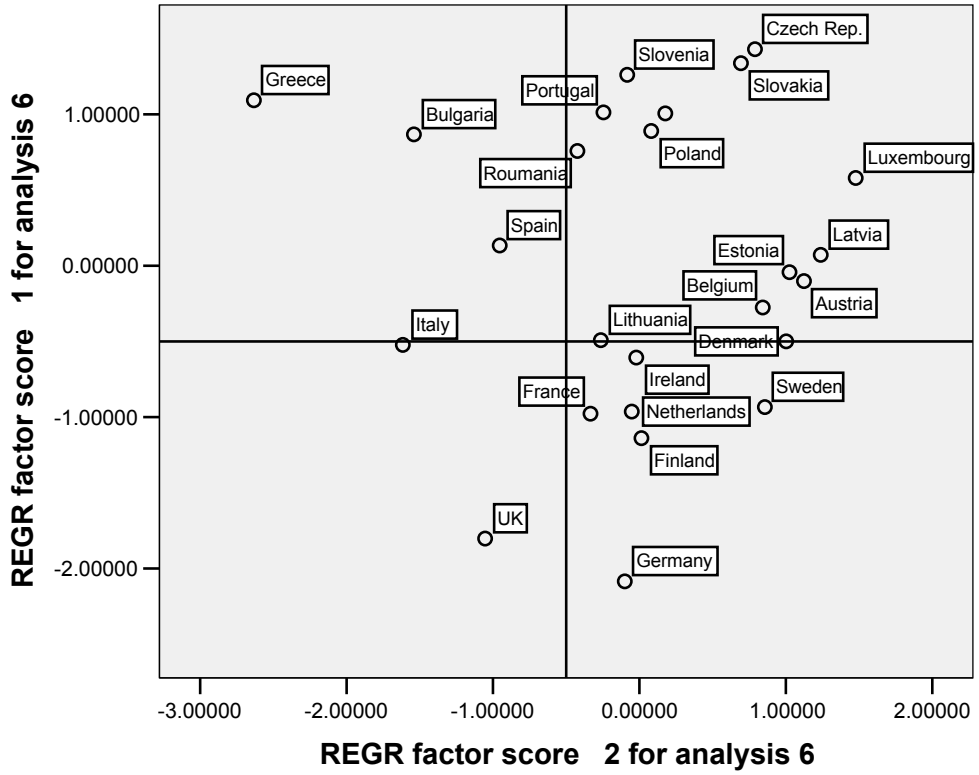

Fig. 6. *The display of the countries on the two factorial axes, for 2009*

Analysing the two years, comparatively, we see, as it is summarised in Table 3, that, in terms of variables, there are no changes in 2009 compared to 2007. The variables that correlate with the components and that determine the display of the countries are the same for the two years. Regarding the countries' display, we observe some differences, as the increase in the number of countries that associate with the correlated variables in 2009 compared to 2007. That situation could be explained by the anti-crisis measures that the governments enforced on external trade to protect their economies.

2007				2009			
First factorial axis		Second factorial axis		First factorial axis		Second factorial axis	
Variables	Units	Variables	Units	Variables	Units	Variables	Units
RG (+)	LU, AT, DK, BE, NL	BCA (+)	RO, LV, PL, CZ, SK, SI	RG (+)	LU, EE, LV, AT, DK, BE, SE	BCA (+)	GR, BG, RO, PT, PL, CZ, SK, SI
WTO (-)	UK, IT			WTO (-)	UK, IT		
LPI (-)	BG, GR, UK, IT			LPI (-)	BG, GR, IT		

In order to evaluate if the change in trade indicators' values in 2009 have significantly rearranged the situation that existed in 2007, we conducted a cluster analysis to determine the groups of countries with similar trade patterns. In Table 3 we presented the cluster membership for each country, in 2007 and 2009. A four-cluster solution was selected.

Table 3. *Cluster membership for EU's members, in 2007 and 2009*

Country	Cluster membership - 2007 -	Cluster membership - 2009 -
Austria	1	1
Belgium	1	1
Bulgaria	1	1
Cyprus	1	1
Czech Rep.	1	1
Denmark	1	1
Estonia	1	1
Finland	1	1
France	3	3
Germany	2	2
Greece	3	3
Hungary	1	1
Ireland	1	1
Italy	1	1
Latvia	1	1
Lithuania	1	1
Luxembourg	1	1
Malta	1	1
Netherlands	1	1
Poland	3	3
Portugal	3	3
Roumania	3	3
Slovakia	1	1
Slovenia	1	1
Spain	4	4
Sweden	1	1
UK	4	4

We can observe that the groups of similar countries that were identified using the cluster analysis, for 2007 and 2009, are identical in composition, confirming our hypothesis that the economic crisis did not significantly change the trade patterns or the hierarchies for the EU's member countries.

4. Concluding remarks

In this paper we analysed the change in the international trade patterns of the European Union's countries that the economic crisis that begun in 2008 might have brought. Our hypothesis was that the crisis, although it reduces the trade value and volume, did not significantly change the trade patterns or the countries' hierarchies. In order to verify the research hypothesis, we analysed, regarding the trade performances of each country, two significant years for the economic crisis: 2007, before the crisis burst, and 2009, the most affected year by the crisis, in terms of external trade. For that purpose, we identified the groups of EU countries that have similar characteristics regarding the international trade performance indicators, for 2007 and 2009, comparatively, and we evaluated the differences between the two moments and define profiles for the aforementioned years. We used multivariate analysis methods, such as factor analysis and cluster analysis.

The results confirmed our research hypothesis. A simple graphical analysis of exports and imports on the EU's countries during 2007-2010 showed that the trend did not change in shape, only in values, and 2009 was the year when both exports and imports were the lowest for that time period. Then, the factor analysis revealed that the variables that contribute significantly to the forming of the two components are exactly the same in 2009 compared to 2007, and they correlate to the components in the exact same manner. Furthermore, the countries' display on the two factorial axes did not suffer significant change, the only change worth mentioning is the slight increase in the number of countries that group around the significant variables. In conclusion, the economic crisis did not significantly change the trade pattern and hierarchies among the EU countries, it only decreased the trade performances.

References

World Trade Organisation (2010). *International Trade Statistics 2010*, Geneva, WTO Publications.

United Nations (2010). *International Trade After the Economic Crisis: Challenges and New Opportunities*, UN Publications.

Muskus, Keith E., and Reichman, Jerome H., (2003). *The globalization of private knowledge goods and the privatization of global public goods*, Journal of International Economic Law 7-2, 279.320.

Nanto, D.K. (coordinator) (2009). *The Global Financial Crisis: Foreign and Trade Policy Effects*, Congressional Research Services Report for Congress, CRS Publications

Sachs, J., Warner, A. (1995). *Economic Reforms and the Process of Global Integration*, Brooking Paper on Economic Activity, 1-118.

United Nations (2009). *Navigating Out of the Crisis: a Trade led Recovery*, Thailand, UN ESCAP.

Štěrbová, L. (2009). *Role of international trade rules in the current economic crisis*, E-Leader Tallinn

Coulibaly, B., Sapriza, H., Zlate, A (2011). *Trade Credit and International Trade during the 2008-09 Global Financial Crisis*, Board of Governors of the Federal Reserve System, International Finance Discussion Papers 1020.