

Application of Multivariate Analysis Methods in Ranking of the Example of Western Balkan Countries

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The aim of the paper is to analyze the regional integration processes in Western Balkan Countries (CEFTA) and their economical and political objectives and results. The European Union association processes for the countries of Western Balkan means the performance of numerous economical and political reforms in these countries, as well as the acceptance of the principles embraced in the European Union countries. Western Balkan countries have a lot of predefined goals in front of them to be achieved, with more or less success and with great support from different European Union agencies and institutions. On the basis of the estimate of the extent to which the predefined standards are adopted, the countries are progressing on their path towards „Europe“.

The data on economic flows in Western Balkan countries will be observed and analyzed in this paper. The data on achieved macroeconomic goals in observed countries, for the five year time period (from the year 2001 to 2005) will be used as the basis for their ranking. Multivariate statistical analysis method used in the ranking will be the I-distance. As the analysis will be based on a great number of variables, the step preceding I-distance determination will be the principal component analysis. The obtained I-distance value can be considered as the measure of the achieved degree in the transition process.

The data obtained in this analysis will be compared to those obtained in a similar analysis conducted for these same countries, however, for the period from 2000 to 2003. The changes in the ranks for the countries in the two analyses can be observed as the indicator of dynamics changes in economies of the Western Balkan countries.

1. Introduction

The integration into the European Union is the major objective for the Western Balkan countries, and in order that this be achieved, it is necessary that these countries conduct economic and political reforms and adopt the basic economic principles embraced by the European Union. The preparations for the accession of these countries into the European structure is becoming the major priority of the European Union. The path the Western Balkan countries follow in creating and joining other democratic market economies leads via the closer regional integration and the membership in the CEFTA Agreement – the integrated multilateral agreement on free trade in Southeastern Europe, the so-called CEFTA 2006. Originally, the CEFTA (the Central European Free Trade agreement) defined the agreement among the Central European countries, however today, it is the agreement that defines the integrated zone of free trade in South-East Europe. Today, the CEFTA is the trade agreement concluded among Albania, Bosnia and Herzegovina, Macedonia, Moldova, Serbia, UNMIK on behalf of Kosovo and Metohija, Croatia and Montenegro.

2. The integrated free trade zone agreement

The CEFTA was concluded by Poland, Hungary and Czechoslovakia, and at one time the CEFTA members

were also Slovenia, Romania and Bulgaria. The expansion of the European Union in 2004 and 2007 resulted in Poland, Hungary, the Czech Republic, Slovakia, Slovenia, Romania and Bulgaria abandoning this form of trade integration. The creation of the regional zone of free trade should aid the Western Balkan countries accomplish their political and economic objectives in a much easier way. The political objectives are reflected, primarily, in the possibility to fasten the process of integration into the European Union as well as integration into the international trade system. The economic goals are likewise numerous, the outstanding among them being: improving the regional cooperation, further liberalization and facilitation of trade in the region, raising the level of harmonization and improving transparency in business operations, reducing regional differences in the economic development of some economies in the region, attracting foreign direct investments into the Western European countries, etc. Regardless of the resistance to a closer regional cooperation evident among the Western Balkan countries, the majority agree that the implementation of a multilateral agreement on free trade in South-Eastern Europe will foster the economic growth of the region and accelerate the process of integration of these countries into the European Union. The CEFTA 2006 Agreement offers vast opportunities and advantages to the countries in the region. The common

market that has so far operated on the basis of 31 bilateral free trade agreements the countries in the region concluded between each other in the past years, turns into an integrated Agreement characterised by [4]:

- Further liberalization and cancellation of any quantitative limitations (with the exemption of armament and military equipment);
- The non-discrimination principle (which means that all the products are entitled to equal treatment);
- The principle of origin (which provides that the CEFTA product is treated as domestic when exported to export markets);
- Introduction of diagonal cummulation (meaning that the products manufactured in one member country of the Agreement are taken as domestic products, regardless of whether they are partially or fully manufactured in that respective country);
- The protection and compensation measures are defined in accordance with the World Trade Organization and national legislative regulations.

3. Economic features of the south-eastern Europe region

It is for quite a long time, the past fifteen years, that the SEC have been subjected to transitional changes in the European integration process. In this sense, they have created a market structure in their economies, they conduct structural and institutional reforms and strive for a macroeconomic stability. Four macroeconomic indicators are most frequently stressed in both the positive and the normative economies as most important in the assessment of the national economy progress:

1. A steady growth of the national scope of production;
2. A low inflation rate;
3. A high employment rate; and
4. A balanced balance of payment.

In order that the above quoted objectives be achieved a number of macroeconomic instruments is implemented. They offer the economic policy creators the opportunity to guide the economic trends in a desired direction. The basic macroeconomic instruments are: an active budget and tax policy, the crediting-monetary policy, the policy of income and prices and the international economic policy.

Each national economy, especially in the transition countries is faced with the problems of defining the economic policy and goals prioritizing. The Western Balkan countries are very similar in their features. These are small scope economies, insufficiently competitive due to an inadequate adjustment to the European and international standards and norms, with the trade balance and budget deficits and a certain, somewhere high, inflation rate, and especially high unemployment rate. They are characterized by an unsatisfactory infrastructure, the working capital is scarce, the grey economy share is high, the standard of living is rather poor.

The SEC macroeconomic indicators are presented in Table 1. The data are shown for the CEFTA member countries (Kosovo not included) for a five-year period, from 2001 to 2005, and on the following macroeconomic indicators:

	Albania	B&H	Croatia	Macedonia	Moldova	Montenegro	Serbia
GNP01	6.50	4.50	3.80	-4.10	6.10	-0.20	4.80
GNP02	4.70	3.80	5.20	0.90	7.80	1.70	4.20
GNP03	6.00	3.30	4.50	2.80	6.60	2.30	2.40
GNP04	6.00	6.00	3.80	4.10	7.30	3.70	8.40
GNP05	5.50	5.50	4.30	4.00	7.10	4.10	6.20
IRC01	3.50	1.90	4.90	5.50	9.80	28.00	91.80
IRC02	2.10	-0.20	2.20	2.30	5.30	9.50	19.50
IRC03	3.30	1.00	1.50	1.10	11.70	6.70	11.70
IRC04	2.20	0.70	2.10	-0.40	12.50	4.30	10.10
IRC05	2.00	3.60	3.30	0.50	13.50	1.80	16.50
URC01	14.60	42.70	22.30	30.50	1.70	19.50	12.20
URC02	15.88	42.00	22.50	31.90	6.80	21.60	13.20
URC03	15.00	42.00	19.50	36.70	7.90	22.90	14.60
URC04	14.60	43.10	13.80	37.00	8.10	22.40	18.50
URC05	14.20	44.10	12.70	37.30	7.30	17.00	20.80
BUDBAL01	-7.90	-5.80	-6.50	-7.20	-0.50	.	-1.40
BUDBAL02	-6.60	-4.00	-5.20	-5.70	-2.00	1.93	-4.00
BUDBAL03	-4.90	-2.20	-4.60	-1.10	0.20	3.16	-2.70
BUDBAL04	-4.90	-0.60	-4.90	0.00	0.40	2.10	-0.30
BUDBAL05	-3.80	0.90	-4.10	.	-0.70	3.10	2.00

GNP – the gross national product (the rate of change compared to the previous year);

URC – the unemployment rate (percentage of working age population);

BUDBAL – the budget balance (the gross national income percentage).

Table 1. *Macroeconomic indicators for the CEFTA member countries*

Although rather similar to one another, the economies of the observed countries do reveal some differences. In order that these be observed and presented and in order that the joint impact of the observed indicators upon the transition processes and economic growth be highlighted, a ranking of the countries was conducted using the square I-distance [1]. This statistical method is based on the need to establish a relation between/among the entities compared and for which the values of a number of indicators are given, all in the easiest possible way. In order to avoid a redundancy in the data and eliminate a mutual correlation of the characteristics observed, the first step in the analysis was the data reduction.

The technique implemented to examine the correlation between the variables and to eliminate the redundancy, besides the factor analysis, is the principal components analysis (PCA) [2]. The original data matrix is reduced in that the number of variables describing the unit for observation is reduced. The new variables are the principal components (PC), each PC representing the entire group of (highly intercorrelated) variables. Each unit of observation is then assigned its value for each principal component (factor scores). The new matrix still contains nearly all non-redundant information included in the original matrix. The principal components are distinguished as linear combinations of the original variables and are not mutually correlated. As many principal components can be distinguished as there are original variables, however, the analysis most frequently retains a smaller number in which a majority of original variance is contained. The principal components are arranged according to the falling percentage of variance they contain.

5. I-distance application in SEC countries ranking

In the analysis presented in this paper, and on the basis of 18 indicators from Table 1 (the budget balance data for the years 2001 and 2005 were not complete, therefore these variables were not included in the analysis), 4 main components are distinguished and retained, thus including the total of 96 percent of the original variance. The impact of each of the variables included in the analysis upon an individual specified principal component may be observed in the matrix of rotated factor

loading. The elements of this matrix are the coefficients of correlation between the original variables and the principal components retained in the analysis. The values of the matrix elements, higher in absolute values, signify a higher extent of the variable's impact upon the principal component.

On the basis of matrix of rotated factor loading for the data described and analysed in this paper, presented in Table 2, a conclusion can be drawn that in the first principal component, **PC1**, the unemployment rate indicator impact is predominant. The second main component **PC2** is dominantly affected by the indicators on the gross national product data, while the **PC3** is predominantly affected by the inflation indicators. The predominant impact upon the fourth principal component **PC4** is the one of the budget balance indicators (**BUDGBAL**).

	Component			
	1	2	3	4
BDP01	-.355	.733	-.096	-.361
BDP02	-.526	.745	-.262	-.183
BDP03	-.547	.461	-.621	-.269
BDP04	-.070	.882	.420	-.098
BDP05	-.235	.964	.075	.024
KSI01	-.116	.191	.967	.076
KSI02	-.271	.147	.922	.220
KSI03	-.523	.543	.502	.419
KSI04	-.557	.653	.357	.344
KSI05	-.299	.744	.543	.108
KSN01	.895	-.321	-.193	-.126
KSN02	.903	-.309	-.239	-.057
KSN03	.931	-.314	-.173	.041
KSN04	.973	-.194	-.038	.098
KSN05	.991	-.086	.019	-.010
BUDBIL02	-.193	-.079	.088	.902
BUDBIL03	-.011	-.138	.035	.988
BUDBIL04	.244	.076	.277	.917

Table 2. The factor loading matrix

The values of linear combinations (scores) for the countries subject to this analysis are calculated for each principal component. The values of the scores are presented in Table 3.

	Albania	B&H	Croatia	Macedonia	Moldova	Montenegro	Serbia
PC 1.	-0.62391	1.8154	-0.64151	0.87862	-0.99295	-0.37706	-0.0586
PC 2.	-0.00443	0.77483	-0.75765	-0.98362	1.43525	-1.15152	0.68713
PC 3.	-0.53567	-0.62875	-0.40962	-0.00204	-0.74846	0.19068	2.13387
PC 4.	-1.21536	0.00713	-1.03228	0.0618	0.91542	1.58492	-0.32163

Table 3. Scores for the principal components

The scores obtained in this step of the analysis served as basis for determining the value of the square I-distance for each country observed. The final result of this step is the ranking list presented in Table 4. The appropriate values of the I-distance are given in this same table. Both steps of the analysis described are conducted within the statistics package SPSS [6].

The obtained I-distance values represent the “measure” of similarities and differences between the countries observed, on the basis of the economic indicators presented in Table 1. The I-distance can also be viewed as an indicator of the transition level achieved. On the basis of the occasional sharp rise of the distance it is clear that the countries are classed into three groups. The lowest value of the distance is in the case of Croatia, followed by Albania. These two countries reveal a significantly lower value of I-distance compared to the other countries included in the analysis. Macedonia and Montenegro are characterized by the average I-distance values, whereas Moldova, Bosnia and Herzegovina and Serbia bottom the list, which indicates their lagging in the transitional processes.

Rank	Country	I-distance
1.	Croatia	0.42
2.	Albania	1.42
3.	Macedonia	5.69
4.	Montenegro	8.52
5.	Moldova	10.44
6.	Bosnia and Herzegovina	12.91
7.	Serbia	13.59

Table 4. *The ranking of the countries (2001-2005)*

An analysis similar to the one presented in this paper and based on the analogue indicators for the same region and the four-year period, from 200 to 2003 is described in [5]. The table with the ranks and I-distance values for the countries observed in that analysis is shown in Table 5. The comparison of the data from Table 4 with those from the Table 5 allows for an insight into the dynamics of the political and economic changes, expressed in the values of the observed macroeconomic indicators in the observed countries of the region.

Rank	Country	I-distance
1.	Bulgaria	1.13
2.	Romania	2.91
3.	Albania	3.49
4.	Serbia and Montenegro	4.74
5.	Croatia	5.16
6.	Bosnia & Hercegovina	5.25
7.	Macedonia	5.33

Tabela 5. [5] *Rang lista zemalja (2000-2003)*

Bulgaria and Romania have been the members of the EU since 2007, Serbia and Montenegro became two separate independent countries (2006), and the sequence in the ranking lists based on the square I-distance is changed. Macedonia, the last in the 2004 ranking, is now positioned immediately following Croatia and Albania, while Serbia is at the bottom of the list in 2007. On the basis of the above quoted changes we can draw the conclusion that Croatia and Macedonia had an “accelerated” transition path; Montenegro followed the pace it had while it was one country with Serbia, whereas Serbia slowed down its processes and, together with Bosnia and Herzegovina, came bottom of the list of the observed countries of the region.

The leading position of Bulgaria and Romania in the list in Table 5 and the fact that in the meantime these two countries became members of the European Union, as well as the high position of Croatia on the list in Table 4 may only highlight the importance of a successful conduct of economic reforms in the transition countries, accessing candidates for the European union.

6. The development prospects of the SECs region

With the establishment of the macroeconomic stability and the market economy, the SEC region that is a vast market of 55 million people is becoming all the more interesting for foreign investors, which will improve the economic structure of those countries as well as their economic growth. The new, integrated multilateral agreement helps create a common legal framework for investing into this region. The comparative advantages of this region are tourism and major lines of communication (transport). The largest foreign direct investments are realized in the industries of telecommunications, textile and leather, beer, tobacco, soft beverages, food and in the banking sectors. The region is expected to become an investment area for industries specialized in the production of machinery, equipment and automobile parts. Similarly, an increase in foreign direct investments is anticipated in the industries of food processing, tourism, construction works (infrastructure, communications, roads, railways, ...), public companies acquisition (electric power supply, oil, ...) and in building new towns. The evident problems are the FDI revenues being generally concentrated within the most attractive sectors as well as the scarcity of greenfield investments. The inflow of foreign direct investments in this region is mainly the consequence of the privatization process.

The free trade zone of the Western Balkans is expected to earn numerous favourable economic and political ef-

fects upon the economies of the countries of the region. The outstanding among them are the following: the free flow of goods, people, capital, and services among the countries of the region; the increase in the scope of exchange among the countries of the region and improved exports and imports; the increase in the productivity and efficiency of their economies due to higher competition; the improvement of production cooperation among the countries in the region towards the larger placements on the third markets; taking all the advantages of the extended scope of economy; attracting foreign direct investments, especially greenfield investments; fostering investments among the countries in the region and also joint investments of these countries in third countries; a considerably easier and less expensive customers' access to a higher quality products; harmonization of legislation in these countries; a prompter accession to the EU and the WTO (for the non-member countries – Bosnia and Herzegovina, Serbia and Montenegro); the political stability in the region and positive results concerning the safety of the Balkans, etc. [9]

7. Conclusion

Similar in characteristics as well as in goals, the transition processes under way in the CEFTA member countries, however, do reveal differences. The analysis described in this paper was meant to highlight these. It is important to get a deep insight into the political processes going on in these countries, in addition to the economic ones, as their impact can by no means be neglected. The European Union strongly supports the countries of the region, both in their individual efforts on the transition path and in the regional relations.

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