INTERACTION OF MACROECONOMIC AND BANKING INDICATORS OF SELECTED COUNTRIES - ANALYTICAL APPROACH

Prof. dr Vitomir Starčević⃰

Prof. dr Slobodan Subotić•

Mr Goran Mitrović⬥

Abstract: Consideration of the interdependence of macroeconomic and banking indicators requires the application of official statistical methods. Statistical methods are used to verify the existence or absence of interdependence. In this respect, the paper examines the interdependence of different macroeconomic and banking indicators (GDP, FDI, inflation, reference interest rate, passive interest rate, active interest rate, total placements and total deposits) in selected countries of the Western Balkans and the European Union using descriptive and correlative statistical analysis. Using these statistical analyses, their correlation and their mutual influence were determined.

Key words: selected countries, macroeconomic indicators, banking indicators, descriptive statistical analysis, mutual fund analysis

Introduction

Descriptive statistical analysis is a set of methods for calculating, presenting and describing the basic characteristics of the statistical series. Descriptive statistical analysis has the following tasks:

1. Grouping and sorting of statistical data
2. Displaying statistical data

⃰ University of East Sarajevo, Faculty of Business Economics Bijeljina, Republic of Srpska, B&H; ✉ vitomir.starcevic@fpe.unssa.rs.ba

• University of East Sarajevo, Faculty of Traffic Engineering in Doboj, Republic of Srpska, B&H; ✉ subotics@telrad.net

⬥ Drina Insurance AD Milići, Republic of Srpska, B&H;

✉ goran.mitrovic@drina-osiguranje.com

3. Determining basic statistical indicators.

Correlation is the relationship between different phenomena that are represented by the values in two or more random variables. This linkage means that if it is based on the known variable's value, it is possible to predict the value of another variable by a certain degree of likelihood. The obtained results (values) can be presented graphically (by shaping diagram) or by correlation coefficients.

In process with the application of descriptive and correlative statistical analysis, various macroeconomic and banking indicators have been observed and analyzed for several selected countries. The selected countries are: Bosnia and Herzegovina, Serbia, Croatia and Austria, where the following macroeconomic and banking indicators are analyzed:

1. Gross Domestic Product (GDP)
2. Foreign Direct Investments (FDI)
3. Inflation
4. Reference Interest Rate
5. Passive interest rate
6. Active interest rate
7. Total placements
8. Total deposits.

In addition to descriptive and comparative analysis, the analysis of mutual correlation and influence was performed. It was observed whether certain banking indicators have an impact on GDP changes, as the most significant macroeconomic indicator of a country's development.

1. Descriptive analysis of macroeconomic and banking indicators

The results of the descriptive analysis for each of the indicators, which are displayed by charts, clearly indicate the existence of differences between the EU member states and those which are not. The data of macroeconomic and banking indicators for the period from 2009 to 2016 for B&H, Serbia, Croatia and Austria, used for descriptive and correlative statistical analysis are downloaded from the World Bank website - http // data.worldbank.org / indicator .

Chart 1. Descriptive GDP indicators of the selected countries

Descriptive Statistics					
Gross Domestic Product (GDP)	N	Minimum	Maximum	Mean	Standard Deviation
B&H	8	16.21	18.64	17.5963	.88385
Serbia	8	37.16	46.46	41.8075	3.43088
Croatia	8	48.92	62.70	56.9438	4.96579
Austria	8	382.06	441.88	409.7550	22.24737

Source: Authors

**Interaction of Macroeconomic and Banking Indicators of Selected Countries -
Analytical Approach**

Chart 1. Represents minimum, maximum and average values of GDP for the observed countries. The smallest average of GDP has Bosnia and Herzegovina, followed by Serbia, and Croatia. The country with the largest GDP surplus is Austria, which is almost 10 times higher than Serbia's GDP, and more than 20 times than GDP of Bosnia and Herzegovina.

Chart 2. Descriptive indicators of inflation rates of selected countries

Descriptive Statistics					
Inflation rate	N	Minimum	Maximum	Mean	Standard Deviation
B&H	7	- 1.20	3.64	0.5929	1.98084
Serbia	8	1.12	11.13	5.6250	3.67921
Croatia	8	- 1.12	3.41	1.1875	1.62884
Austria	8	0.50	3.26	1.6750	0.92208

Source: Authors

Inflation rate indicators are measured by the Consumer Price Index (CPI) and are expressed in percentages. The results of the descriptive statistical analysis, which are displayed in Chart 2, show that the highest average inflation rate had Serbia (5.625%), while the lowest average inflation rate was recorded in B&H (0.5929%), followed by Croatia (1.1875%) and Austria (1.675 %). It is also important to note that the two countries had a negative minimum inflation rate (B&H and Croatia).

Chart 3. Descriptive indicators FDI selected countries

Descriptive Statistics					
Foreign Direct Investments (FDI)	N	Minimum	Maximum	Mean	Standard Deviation
B&H	8	0.14	0.55	0.3688	0.12800
Serbia	8	1.27	4.93	2.4400	1.11577
Croatia	8	0.60	3.96	1.8538	1.14562
Austria	8	28.68	65.55	45.8063	12.45048
Valid N	8				

Source: Authors

The data in Chart 3. represent the values of the descriptive statistical analysis of FDI placed in four selected countries. Based on the estimated values, there is a large difference and the amount of FDI in the countries of the Western Balkans and Austria. Among the Balkan countries, Serbia has the highest average FDI value ($ 2.44 billion), followed by Croatia ($ 1.85 billion and finally B&H ($ 0.368 billion).

Chart 4. Descriptive indicators of the Reference Interest Rates of the selected countries

Descriptive Statistics					
Reference Interest Rates	N	Minimum	Maximum	Mean	Std. Deviation
B&H	8	6.00	8.20	7.1750	0.77965
Serbia	8	4.50	16.50	10.1250	3.45119
Croatia	8	2.50	9.00	6.4875	2.37333
Austria	8	0.65	2.75	1.5563	0.86744
Valid N	8				

Source: Authors

Chart 4. represents minimum, maximum and average values of the reference interest rates of the selected countries. These data are about minimum, maximum and average values. Based on the presented data it can be noticed that Austria has a much lower reference interest rate than the other observed countries, but also that Serbia, except having the highest average value, also has the maximum value of 16.5% of the reference interest rate.

Chart 5. Descriptive indicators for the Passive Interest Rate of the selected countries

Descriptive Statistics					
Passive Interests Rates	N	Minimum	Maximum	Mean	Std. Deviation
B&H	8	1.60	3.60	2.7588	0.64936
Serbia	8	2.50	14.00	7.8125	3.37319
Croatia	8	0.00	3.20	1.3313	1.07269
Austria	8	0.20	1.50	0.9125	0.49117
Valid N.	8				

Source: Authors

Based on the data from Chart 5, it can be concluded that the lowest value of passive interest rates is in economically more developed countries (Austria and Germany). It is followed again by B&H, and the last one is Serbia with a drastically high average rate of passive interest rate (7.8125).

Chart 6. Descriptive indicators of the Active Interest Rates of the selected countries

Descriptive Statistics					
Active Interest Rates	N	Minimum	Maximum	Mean	Std. Deviation
B&H	8	5.30	8.00	6.9100	0.97199
Serbia	8	7.00	18.20	15.0125	3.87425
Croatia	8	6.90	11.54	8.9763	1.68243
Austria	8	4.60	5.10	4.8125	0.18077
Valid N	8				

Source: Authors

After the passive interest rate, a descriptive statistical analysis of the active interest rate was made, while the data were presented in Chart 6. As in the previous analyses, the data represent that the lowest value of the active interest rate has Austria, followed by B&H, then Croatia and, finally, Serbia. It is interesting to note that the average value of Active Interest Rate is lower in B&H than in Croatia, given the fact that the value of the CSP is in reverse.

Chart 7. Descriptive indicators of the Total placements of the selected countries

Descriptive indicators					
Total placements	N	Minimum	Maximum	Mean	Std. Deviation
B&H	8	7.75	11.18	9.6950	.98470
Serbia	8	14.11	30.31	23.4338	5.28305
Croatia	8	41.92	53.37	50.2414	3.76713
Austria	8	405.60	528.36	471.3775	40.69476
Valid N	8				

Source: Authors

Chart 8: Descriptive indicators of the Total Deposits of the selected countries

Descriptive Statistics					
Total Deposits	N	Minimum	Maximum	Mean	Std. Deviation
B&H	8	8.30	10.01	8.8625	.56035
Serbia	8	12.23	30.31	18.5788	5.93799
Croatia	8	30.11	36.14	33.6388	2.01495
Austria	8	400.43	468.30	424.9875	22.01698
Valid N	8				

Source: Authors

The last two descriptive statistical analyses refer to the total placements and total deposits of the selected countries, as presented in Charts 7. and 8. As in the previous analyses, there is a large difference in the values of indicators between Austria and the other observed countries.

2. Interdependence of macroeconomic and banking indicators of the selected countries

In this part of research, a correlation analysis that was carried out established links between observed banking and macroeconomic indicators. Since the observed data did not have normal distribution, Spearman's method of calculating correlation coefficients was applied.

Chart 9. Correlation coefficients of macroeconomic and banking indicators in B&H

		GDP	Inflation	FDI	Reference Interest Rates	Passive Interest Rates	Active Interest Rate	Total Placements	Total Deposits
					Correlations				
BOSNIA AND HERZEGOVINA		GDP	Inflation	FDI	Reference Interest Rates	Passive Interest Rates	Active Interest Rate	Total Placements	Total Deposits
Spearman's rho	GDP	1.000	0.429	0.452	0.410	0.262	0.381	0.347	-.167
	INFLATION		1.000	0.429	0.901**	0.714	0.929	0.072	-.714
	FDI			1.000	.313	-.143	0.024	0.659	.310
	Reference Interest Rates				1.000	0.723*	0.892**	0.091	-.422
	Passive Interest Rates					1.000	0.881**	-.024	-.595
	Active Interest Rates						1.000	-.120	-.619
	Total placements							1.000	0.575
	Total Deposits								1.000

Symbols: GDP – Gross Domestic Product; FDI – Foreign Direct Investments)

Source: Authors

Chart 9. gives data on the calculated correlation coefficients (rho) for macroeconomic and banking indicators of B&H, and on the basis of which it can be concluded that there are statistically significant correlated inflation and reference interest rate variables, as well as inflation and active interest rates (rho = 0.901 and rho = 0.929). The reference interest rate is in a statistically significant relationship with the passive interest rate and the active interest rate (rho = 0.723 and rho = 0.892). All of the above links are direct, indicating that with the growth of one variable, the growth of the other variable is felt. It is expected that there is a direct correlation between the passive interest rate and the active interest rate, which is also statistically significant (rho = 0.881).

Chart 10. Correlation coefficients of the macroeconomic and banking indicators in Serbia

		GDP	INFLATION	FDI	Reference Interest Rates	Passive Interest Rates	Active Interest Rates	Total Placements	Total Deposits
					Correlations				
SERBIA		GDP	INFLATION	FDI	Reference Interest Rates	Passive Interest Rates	Active Interest Rates	Total Placements	Total Deposits
Spearman's rho	**GDP**	1.000	0.786*	0.214	0.781*	0.707	0.381	-.143	-.476
	Inflation		1.000	0.333	0.952**	0.970**	0.619	-.429	-.810*
	FDI			1.000	0.366	0.323	-.429	0.286	-.143
	Reference Interest Rates				1.000	.982**	0.464	-.561	-.854*
	Passive Interest Rates					1.000	0.563	-.599	-.898**
	Active Interest Rates						1.000	-.476	-.619
	Total placements							1.000	0.762*
	Total deposits								1.000

Source: Authors

Chart 10. presents the correlation analysis of macroeconomic and banking indicators in Serbia. The results indicate that GDP is in direct and statistically significant correlation with inflation and the reference interest rate (rho = 0.786 and rho = 0.781). This analysis concludes that inflation is extremely strong in direct correlation with the reference interest rate and the passive interest rate (rho = 0.952 and rho = 0.970), while the relation with total deposits is inverse or negative, but statistically significant (rho = -0.810). The reference interest rate is in almost perfect positive correlation with the passive interest rate (rho = 0.982) and in the negative, statistically significant correlation with the total deposits (rho = -0.854). As expected, the reference interest rate is negatively correlated with the overall deposit, which is statistically significant (rho = -0.854). It should be noted that the passive interest rate and the total deposits are in a statistically significant negative correlation (rho = -0.898), and that there is a positive correlation between total placements and total deposits, which is also statistically significant (rho = 0.762).

Chart 11. Correlation coefficients of the macroeconomic and banking indicators in Croatia

CROATIA		GDP	Inflation	FDI	Reference Interest Rates	Passive Interest Rates	Active Interest Rate	Total Placements	Total Deposits
Spearman's rho	GDP	1.000	0.595	0.214	0.877*	0.683	0.881**	0.238	0.548
	INFLATION		1.000	0.071	0.717*	0.898**	0.762*	0.381	0.190
	FDI			1.000	-.099	0.108	0.119	0.262	0.286
	Reference Interest Rates				1.000	0.845**	0.964**	0.161	0.408
	Passive Interest Rates					1.000	0.922**	0.263	0.263
	Active Interest Rates						1.000	0.238	0.452
	Total placements							1.000	0.810*
	Total Deposits								1.000

Source: Authors

Data on correlation coefficients of observed indicators in Croatia are presented in Chart 11. Based on the presented results, it is concluded that GDP is in strong direct correlation with the reference interest rate and the active interest rate (rho = 0.877 and rho = 0.881). Direct and statistically significant correlation correlates with inflation and reference interest rates, and inflation and passive interest rate (rho = 0.717 and rho = 0.898). Inflation is also in direct correlation with the active interest rate (rho = 0.762). Based on past relationships, it was expected that the reference interest rate would be directly correlated with the passive interest rate and the active interest rate, which proved to be true (rho = 0.845 and rho = 0.964). The results also confirmed the relationship between total placements and total deposits (rho = 0.810), which is direct and statistically significant as previously stated.

Chart 12. Correlation coefficients of the macroeconomic and banking indicators in Austria

AUSTRIA		GDP	Inflation	FDI	Reference Interest Rates	Passive Interest Rates	Active Interest Rate	Total Placements	Total Deposits
Spearman's rho	GDP	1.000	.548	.619	.221	.419	.217	.548	.643
	INFLATION		1.000	.833*	.246	.395	-.337	.286	.143
	FDI			1.000	-.012	.156	-.084	-.071	-.071
	Reference Interest Rates				1.000	.963**	.292	.405	.172
	Passive Interest Rates					1.000	.327	.491	.252
	Active Interest Rates						1.000	.060	-.096
	Total placements							1.000	.857**
	Total Deposits								1.000

Source: Authors

The latest analyzed were the macroeconomic and banking indicators of Austria. The correlation coefficient values of the observed indicators are presented in Chart 12. Interestingly, GDP is not a statistically significant correlation with any of the observed indicators. Inflation is in direct correlation with foreign currency investments (rho = 0.833), suggesting that with the growth of foreign direct investment, inflation is growing. This relationship is quite logical, as with the growth of foreign direct investment, money growth is increasing, and thus inflation. The further analysis confirms the direct link between the reference interest rate and the passive interest rate (rho = 0.963). This connection is extremely strong, almost perfect. In addition to this correlative interdependence, the direct correlation between total deposits and total placements (rho = 0.857) was confirmed, as it was in the case in some of the previously analyzed countries.

Conclusion

The results of the descriptive statistical analysis indicate that there are significant differences between the observed indicators of the Western Balkans and the European Union. Differences are expressed not only in the macroeconomic indicators (GDP, FDI, inflation), but also in the banking indicators. Bearing in mind the fact that the Western Balkan countries are lagging behind in economic development of the European Union countries, they are expected to have lower GDP growing rates, lower FDI inflows and a higher inflation rate (excluding B&H). Similar is the situation with the movement of interest rates and total deposits.

Analyzing the results obtained using the Spearman's model on Bosnia and Herzegovina, it can be concluded that the movement of gross domestic product (GDP) in comparison with other banking and macroeconomic indicators does not have a strong direct relationship expressed in the correlation of coefficients. The reason for this is the controlled monetary policy of the Central Bank of Bosnia and Herzegovina, regarding a fixed course, (a percentage of the coverage of Foreign Direct Investments in circulation), which has a

negligible low inflation. In addition, a low correlation factor is also expressed in the FDI because GDP grew much faster than FDI growth due to very low levels in the previous period and low economic activity, so FDI has only initiating impact. The reference, passive and active interest rates also have a very small direct correlation with GDP, and this is the reason for keeping the monetary and Foreign Direct Investments of the Central Bank of Bosnia and Herzegovina. The very low correlation coefficient between GDP and total placements is the result of accelerated GDP growth due to the large share of public monopolistic companies, whose growth was not necessarily bank placements. At the same time, economic activity was significantly slower in other areas of the economy. The indirect correlation between negative GDP and total deposits is expected to be normal (total deposits decline affects GDP growth), but it is exceptionally low because GDP grew mostly because of the large share of public companies. On the other hand, small and medium companies and individuals did not withdraw their deposits due to adverse business conditions.

Inflation has a fairly high correlation with the reference, active and passive interest rate for completely realistic reasons (the growth of inflation is accompanied by interest rate growth) which correlation coefficients confirm. The high level of indirect correlation between the level of inflation and the total deposit is a completely normal and expected state (inflation growth is accompanied by falling deposits due to mistrust in the value of money, as well as the banking and monetary system and the constant suspicion that the passive interest rate may compensate for a fall in value expressed through inflation).

The evidently low level of correlation of foreign direct investment with reference, passive and active interest rates, as well as total deposits is a normal occurrence, besides a slightly larger direct correlation with total placements (0.659), which is the result of the initiating role of foreign direct investment to domestic economy, which, in order to keep foreign investments, has the need for increased new placements with banks.

The model analyzed in Serbia has a very similar correlation level as in Bosnia and Herzegovina. However, the ratio of GDP and inflation is shown in Serbia as a direct correlation of high level, which in principle is an unnatural ratio of indicators likely to be one-time large foreign direct investment in the period when relatively high inflation was expressed. (e.g. Fiat, Cement plants, alcohol manufacturing and Hesteel Smederevo). It should be noted that in Serbia, as well as in Bosnia and Herzegovina, a large number of unnatural correlations have been determined, pointing to a "shallow" market (high impact of individual economic events), unconsolidated macroeconomic politics and significant influence of non-economic and political categories.

Unlike Bosnia and Herzegovina and Serbia, which have not completed the transition process, by analyzing correlation coefficients in Croatia, it can be concluded that there are less unnatural correlation links and fewer high correlations of direct and indirect nature, indicating the elasticity of the economic financial system. This implies that the individual banking and macroeconomic factors cannot influence or significantly affect the GDP and the overall economic system.

In support of this, the results of the analysis of the correlation coefficient on the example of Austria, as an obviously developed economy with a well-differentiated and synchronized economic and financial policy. The applied model in the example of Austria shows no virtually unnatural correlation and there is no direct and indirect correlation between the high levels between and within macroeconomic and banking indicators.

This indicates the existence of elastic and rigid economies that can (or cannot) absorb larger oscillations of particular economic and non-economic phenomena by macroeconomic indicators.

References

Lovrić, M., Komić, J., Stević, S., 2017., *Statistička analiza-metodi i primjena,* II izmijenjeno i dopunjeno izdanje, JU Narodna i univerzitetska biblioteka Republike Srpske, Banja Luka.

Malešević, Đ., Starčević, V., 2010., *Poslovna analiza,* Univerzitet u Istočnom Sarajevu, Fakultet poslovne ekonomije, Bijeljina.

Mikić, Đ., Ralević, N., 2006., *Statističke metode u menadžmentu,* Panevropski Univerzitet Apeiron, Banja Luka.

Svjetska banka, http//data.worldbank.org/indicator

http://www.bg.ac.rs/files/sr/studije/studije-uni/Uvod_statisticke_metode_istrazivanja.pdf

http://www.ef.uns.ac.rs/Download/statistika/

http://www.e-statistika.rs/Article/Display/korelacija-i-regresiona-analiza

INTERAKCIJA MAKROEKONOMSKIH I BANKARSKIH INDIKATORA IZABRANIH ZEMALJA - ANALITIČKI PRISTUP

Rezime: *Razmatranje međuzavisnosti makroekonomskih i bankarskih indikatora zahteva primenu zvaničnih statističkih metoda. Statističke metode se koriste za potvrđivanje postojanja ili odsustva međuzavisnosti. S tim u vezi, u radu se ispituje međuzavisnost različitih makroekonomskih i bankarskih indikatora (BDP, SDI, inflacija, referentna kamatna stopa, pasivna kamatna stopa, aktivna kamatna stopa, ukupni plasmani i ukupni depoziti) u odabranim zemljama Zapadnog Balkana i Evropske unije korišćenjem deskriptivne i korelativne statistička analize. Koristeći ovu statističku analizu utvrđena je njihova korelacija i njihov uzajamni uticaj.*

Ključne reči*: izabrane zemlje, makroekonomski pokazatelji, bankarski indikatori, descskriptivna statistička analiza, korelativna statistička analiza*