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Macroeconomic and Specific Banking Determinants of Nonperforming loans in Bosnia and Herzegovina

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***Abstract**: The aim of the research is to identify the macroeconomic and specific banking factors affecting the rate of nonperforming loans in the banking sector of Bosnia and Herzegovina (BiH). The authors assume that the three macroeconomic and five specific banking factors influence the quality of the loan portfolio. Aggregate data were used, which are taken from the Central Bank of BiH, Agency for Statistics of BiH and Labour and Employment Agency of BiH, and analyzed by descriptive statistics, correlation and regression analysis in the period from the first quarter of 2006 to the end of the fourth quarter of 2016. The empirical results show that there is a correlation between nonperforming loans and unemployment rate, inflation rates measured by the growth rate of consumer prices, return on assets and credit growth rates, while the impact of the growth rate of real gross domestic product, capital adequacy ratio, return on equity and active interest rates is not statistically significant.*

***Keywords:** nonperforming loans, macroeconomic factors, specific banking factors, banking sector of BiH*

Makroekonomske i specifične bankarske determinante nekvalitetnih kredita u Bosni i Hercegovini

***Apstrakt**: Cilj istraživanja je identifikacija makroekonomskih i specifičnih bankarskih faktora koji utiču na nekvalitetne kredite u bankarskom sektoru*

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Bosne i Hercegovine (BiH). Autori polaze od pretpostavke da tri makroekonomska i pet specifičnih bankarskih faktora dominantno utiče na kvalitet kreditnog portfolia bankarskog sektora. Korišteni su agregatni podaci koji su preuzeti od Centralne banke BiH, Agencije za statistiku BiH i Agencije za rad i zapošljavanje BiH, a analizirani su putem deskriptivne statistike, korelacione i regresione analize u periodu od prvog kvartala 2006. do kraja četvrtog kvartala 2016. godine. Empirijski rezultati pokazuju da postoji korelacija između nekvalitetnih kredita i stope nezaposlenosti, stope inflacije mjerene stopom rasta potrošačkih cijena, prinosa na aktivu i stope kreditnog rasta, dok uticaj stope rasta realnog bruto domaćeg proizvoda, koeficijenta adekvatnosti kapitala, prinosa na akcijski kapital i aktivne kamatne stopa nije statistički značajan.

***Ključne reči**: nekvalitetni krediti, makroekonomski faktori, specifični bankarski faktori, bankarski sektor BiH*

1. Introduction

In transition countries, such as Bosnia and Herzegovina (BiH), the banking sector has a very important role, primarily because of the insufficiently developed capital market, alternative forms of financing are also not developed; primarily because of the inability to raise capital by issuing shares on stock exchange. This is exactly why the stability of banking sector is of the utmost importance for the overall economy in BiH. Considering the fact that loans are usually the most important source of income for commercial banks, the quality of loan portfolio is a very significant indicator of situation in banks. Quality of loan portfolio of banks worldwide was quite stabile until mid-2007 and then it rapidly fell due to global financial crisis that had hit many countries. The global financial crisis did not spare BiH, and one of its main negative effects was the increase of nonperforming loans (NPL) within the banking sector assets. The connection between economic activities and loan performances of banks is often a topic in economic circles, and *Beck, Jakubik & Piloiu* (2013) stressed that the fall of global economic activity is the most important risk for the quality of banks' assets.

Deterioration of loan performances of banks was uneven among countries, as was the recovery of consequences of crisis. According to the World Bank data, the share of nonperforming loans in the total loans of BiH banking sector was 11,4% at the end of 2016. At the same time, NPL in the EU were 4,8%, in the Euro zone 4,4%, while in the countries of the region they reached even 20,9% (Serbia). The high share of NPL in BiH and neighboring countries is a consequence of slow economic recovery in these countries. As already stated, the overall economy in BiH depends on the stability of banking sector,

thus it is necessary to identify factors that impact the occurrence and growth of NPL, as they lower the income of banks while the disharmony between maturity of receivables and liabilities creates a liquidity risk, lowers the overall credit rating, including the bank's image (*Badar & Javid, 2013*).

The bibliography on NPL is relatively wide, as there were many researches dealing with this problem. However, the conducted researches mainly relate to developed world's economies, and the research results differ in a way that it is not possible to generalize facts about factors that influence the NPL. Looking into the empiric bibliography one can notice differences in results, so in one country a certain factor does not have a statistically significant impact to NPL, while it has in another, and it often happened that the impact of that factor in one country is positive and in other negative. But even if the impact of that factor was the same in the developed countries, it would surely differ in less developed countries or countries in transition. Therefore, the goal of this research was to identify the most significant macroeconomic and specific banking factors that impact the NPL in the banking sector of BiH. In the research aggregate data on NPL (in the period of 1st quarter of 2006 to the end of 4th quarter of 2016) were used published in publications of the BiH Central Bank, since the data of individual banks are not publicly available and banks mostly consider them a business secret.

2. Literature review

Over the last years, more precisely, since the break of global financial crisis, the academic circles increased their interest in NPL, and the overview of empiric bibliography gives precious information on factors that impact them. Nevertheless, the research results should be taken with caution, and they are difficult to compare as an NPL definition used in all, or at least, in most of the countries does not exist. Although there is no internationally agreed definition, mostly used definitions are those given by the International Monetary Fund (IMF) and the Basel Committee for Bank Supervision (BCBS).

According to the definition given by the IMF, the NPL is a loan where the debtor is late at least three months (90 days) with payment of the principal and/or interest in relation to the term defined in the loan contract; and a loan where the interest amount of three months (90 days) or more was capitalized (reinvested into the principal amount), refinanced, or its delayed payment had been agreed (IMF, 2006). According to the definition given by the BCBS, it is also recommended to observe the '90 days' rule, i.e. it is considered that there is a failure to meet the obligation if the debtor is late with its liabilities towards the bank for more than 90 days (*BCBS*, 2006).

The most often used criteria for differentiating national definitions of the NPL is delaying number of days in meeting the liabilities towards the bank, but it is not the only criteria. Besides this, it is also used the criteria of financial ability of the debtor and the fact whether a court procedure has been initiated against the debtor, whether the NPL was presented in Gross or Net amount, and often the criteria of guarantee and collateral. However, majority of conducted research relates to the factors that impact the NPL, while only a few researches dealt with the definition itself.

Dealing with the definition of NPL, *Barisitz* (2013) analyzed the primary (delay of principal and/or interest for 90 and more days, or existence of well-defined loan weaknesses) and secondary elements (treatment of restructured loans, impact of guarantees and collateral, marking the complete loan or just a portion of it as NPL, and treatment of multiple loans of the same debtor) of national definitions of NPL, and the analysis showed that the rule of '90 days' or more is respected and secondary elements are different in the countries of Central, East and South-East Europe. *Rottke & Gentgen* (2008) stress the problem of inexistence of universal definition of NPL and believe these loans can be looked at in wider and narrow sense. Looking at it in a narrow sense, it is about the loans that matured and were not repaid for over 90 days, in a wider sense, those are all loans with bad performance. *Bexley & Nenninger* (2012) agree with them and say that those are the loans that are late for 90 or more days according to matured principal and/or interest, and are considered as bad assets in banking books.

Most implemented researches dealing with this problem divide factors that impact the NPL to macroeconomic and specific banking factors. Researches were made in different ways and different levels, thus there are studies that were made at the level of one or more countries, i.e. at the level of individual banks or banking sectors. This research was made at the level of a banking sector of a country, and further in the text is an overview of researches that were also conducted at the level of individual countries.

Keeton & Morris (1987) were among the first who analyzed factors that impact the NPL. Their results showed that local economic factors and bad results of particular economic sectors are the main causes of growth of NPL in 2470 of insurance commercial banks in the period 1978 to 1985. *SInkey & Greenawalt* (1991) were dealing with NPL in commercial banks in the USA, and they showed that excessive crediting and high interest rates were the main factors of NPL growth, while banks with adequate capital have lower rates of loan losses. *Gambera* (2000) also showed, analyzing quarterly data in the period from 1987 to 1999, that dynamics of macroeconomic factors may point to potential growth of NPL in the USA. One more research in the banking sector of USA, in the period 1985 to 2010, was made by *Saba, Kouser and Azeem*

(2012), and their results show that total loans have positive, while the growth rate of real GDP and active interest rate, negative impact to the NPL.

Salas & Saurina (2002) showed, analyzing the NPL in Spanish commercial banks and saving institutions in the period 1985 to 1997, that growth of real GDP and indebtedness of subjects, expansion of loans, size of the bank, Net interest margin, adequacy of capital and market strength were the factors that explain the credit risk. *Jimenez & Saurina* (2006) showed, also analyzing the NPL in Spanish banking sector in the period 1984 to 2002, that growth of real GDP and fast loan growth lead to increase of, while fall of interest rates lead to decrease of NPL.

Louzis, Vouldis & Metaxas (2010), analyzing mortgage, economic and consumer loan portfolio in nine largest banks in Greece in the period 2003 to 2009, showed that macroeconomic factors, and particularly growth of real GDP, unemployment and active interest rates, have a strong impact to NPL of all categories, although the least impact was on non-quality loans. The authors believe that level of non-quality loans depends on the quality of management in a bank.

Swami (2012) analyzed the NPL in banking sector in India, in the period 1997 to 2009 and concluded that beneficial macroeconomic factors impact the lowering of low-quality bank assets. The author also concluded that large private banks, due to better risk management, have more quality assets.

Ahmad & Bashir (2013) conducted a research on NPL in commercial banks in Pakistan, and they analyzed the impact of nine macroeconomic factors of NPL in 30 to 34 commercial banks in the period 1990 to 2011. The results showed that the growth rate of real GDP, active interest rate, inflation rate, export rate and industrial production have statistically significant impact onto the NPL, while the impact of unemployment, real effective exchange rate and direct foreign investments was not statistically significant.

Otasevic (2013) analyzed the impact of macroeconomic factors to the realization of credit risk, where credit risk is measured with the ratio of reserves for credit losses compared to total gross loans. He analyzed data for 33 commercial banks in Serbia, in the period from Q3 of 2008 to Q2 of 2012, with particular interest in loans given to companies and citizens. The results showed that decline of business cycle and depreciation of domestic currency impact to worsening of the loan portfolio quality. Also, the results showed that inflation impacts the quality of loans issued to companies and citizens, while the loan quality for citizens is additionally sensitive to the situation with short term interest rates.

Pradhan & Pandey (2016) analyzed macroeconomic and specific banking factors that impact the NPL in commercial banks in Nepal. The analysis enclosed individual data for 21 commercial banks in the period 2008 to 2014.

The results showed that the growth rate of real GDP, growth of financial mass, inflation, size of a bank, relation between loans and deposits, return on assets, return on equity and ratio of capital adequacy have an impact to NPL in these commercial banks.

Ganic (2014) analyzed the impact of specific banking factors to the credit risk of commercial banks in the period 2002 to 2012. The results showed that there is statistically significant relation between the credit risk and inefficiency, credit growth, return on equity and rate of deposits, while the relation between loans and deposits, market power, return on assets and rate of reserves for credit losses were not statistically significant in terms of credit risk. *Alihodzic* (2014) also analyzed the situation with NPL in BiH banking sector in the period 2006 to 2013 and its impact on profitability. The research results showed that the quality of assets have decreased in the observed period, which was a consequence of increased NPL in the loan portfolio. Also, the results showed there is statistically significant relation between low-quality assets and indicators of profitability of banking sector, i.e. return on assets and return on equity. Alihodzic & Plakanovic (2016) analyzed the determinants of credit growth of the nonfinancial sector of BiH in the period 2007-2015. The authors emphasized that the nonfinancial sector in BiH is mainly financed through bank loans because it does not have enough of its own resources for sustainable development. The research results show that there is a strong correlation between credit growth and NPL.

Based on the all aforementioned, it may be concluded that many researches have been made about determinants of NPL in particular countries. The results of the researches showed that both macroeconomic and specific banking factors impact the NPL. It can also be noted that very few researches were conducted in BiH, which still have quite high share of NPL in the overall loans of the banking sector, so the understanding of this problem is of utmost importance for managing the credit risk of commercial banks in the future period. Vuković & Domazet (2013), analyzing NPL and systemic risk in Serbia and other transition countries, have shown that NPL is the main generator of systemic risk in both financial and real sector.

3. Data and Research methodology

The goal of research is to identify the factors that impact the NPL in the BiH banking sector. In this kind of research can separate data be used (at the level of particular banks) and aggregate data (at the level of a banking sector). This research used aggregate data, and *Boudriga, Taktak & Jellouli* (2009) believe these data are more representative and more reliable than individual bank data.

The authors researched the factors that impact the NPL in BiH banking sector, where NPL are considered loans whose matured principal and/or interest was not paid for more than 90 days from the agreed day of maturity, or loans where liabilities per interest that was not collected in that period had been capitalized. In the empiric bibliography, there are two groups of factors identified that impact the NPL (macroeconomic and specific banking factors), and the results of conducted research were different. Thus general conclusions about the impact of these factors on NPL cannot be made. That is why it is necessary to conduct a research for each country separately, while the results of previously conducted researches may serve as a starting point for predicting the impact of independent variable to a dependent variable.

Dependent variable in this research is a variable that shows the share of NPL in the total loans of a banking sector. The research included eight independent variables, among which the first three were macroeconomic and the remaining five were banking specific. Independent variables included in the research are:

- GDP – growth rate of a real GDP,
- UNEMP – unemployment rate,
- ICP – rate of growth of retail prices,
- CAR – capital adequacy ratio,
- ROA – return on assets,
- ROE – return on equity,
- IR – active interest rate,
- CG – rate of credit growth.

It is necessary to stress that IR was included into the group of specific banking factors, unlike most conducted researches where it was placed in macroeconomic factors. The bearer of monetary power, the BiH Central Bank, is limited in sense of realization of monetary policy goals due to its system of Currency Board, so that it does not set the discount rate and does not impact the level of interest rates that are freely set in BiH commercial banks.

Table 1. Variables in the research

Symbol	Explanation	Sign	Data Source
GDP	growth rate of a real GDP	-	Agency for Statistics of BiH
UNEMP	unemployment rate	+	Labour and Employment Agency of BiH
ICP	rate of growth of retail prices	+	Central bank of BiH
CAR	capital adequacy ratio	-	Central bank of BiH
ROA	return on assets	-	Central bank of BiH
ROE	return on equity	-	Central bank of BiH
IR	active interest rate	+	Central bank of BiH
CG	rate of credit growth	+	Central bank of BiH

Source: Authors' research

The expected prefix of a relation between dependent and independent variables, as well as sources of data, are shown in table1.

As can be seen from the table, the data for macroeconomic factors were taken from BiH Agency for Statistics, BiH Labour and Employment Agency and BiH Central Bank, while the data for specific banking factors were taken from BiH Central Bank. Data for dependent variable, i.e. data on the share of NPL in the overall loans of banking sector, were taken from BiH Central Bank.

The authors start from the premise that three macroeconomic factors impact the NPL in the BiH banking sector. Thereby, it is assumed that increase of economic activities increases the income of loan beneficiaries, so they would be in a position to meet their obligations towards the bank, which would lead to decreasing the NPL. On the other hand, in the case of unemployment increase, the loan users lose their income and their capacity to respect their liabilities towards a bank decreases, which leads to an increase of NPL. It is also assumed that the quality of credit portfolio of a banking sector is also impacted by inflation, measured with growth of retail prices. In theory, the increase of inflation should decrease the amount of debt and enable the debtor to repay the remaining liabilities more easily towards the bank. However, high inflation may impact to an increase of interest rates, which certainly makes repayment more difficult, and the situation further complicates when growth of prices is not accompanied with growth of salaries/income, so it leads to an increase of NPL.

The authors also start with the assumption that five specific banking factors impact the NPL in the BiH banking sector. It is assumed that well capitalized banks have loan portfolio of a better quality, since they are less prone to accepting high risks, i.e. they grant loans for which they are certain they will be returned. Further on, it is assumed that highly profitable banks have less incentive to get involved in risky activities, so that banks that have higher return on assets and return on equity have less NPL. It is also expected that an increase of interest rates used by banks for granted loans might impact the increase of NPL, since interest rate increases the overall debt of a client towards the bank. Lastly, it is assumed that the growth of granted loans might have a negative impact to the quality of loan portfolio.

Data used in the research were processed using statistical program *IBM SPSS Statistics version 20*, and they are related to the period Q1 of 2006 to Q4 of 2016. The data have been analyzed by means of descriptive statistics, correlation and regression analysis. Correlation and regression analysis were conducted aiming at determining whether there is a correlation and to determine which part of a variability of a dependent variable can be explained with independent variables. For that purpose, a model was developed and it may be presented as follows:

$$NPL = f\ (GDP, UNEMP, ICP, CAP, ROA, ROE, IR, CG) \quad (1)$$

The equation for used regression model is:

$$NPL=\beta_0+\beta_1 GDP+\beta_2 UNEMP+\beta_3 ICP+\beta_4 CAR+\beta_5 ROA+\beta_6 ROE+\beta_7 IR+\beta_8 CG+\varepsilon \quad (2)$$

Where β_0, β_1, β_2, β_3, β_4, β_5, β_6, β_7, β_8 are regression parameters whose value needed to be assessed, and ε was a random mistake.

Multiple linear regression, used in the research, is based on correlation, but enables more sophisticated researching of mutual relations between variables. In other words, with use of multiple linear regression it will be determined how well the independent variables forecast the dependent variable and what is the relative contribution of all individual variables within the model.

4. Research results

Results of descriptive statistics show the number of noticing (N), Minimum and Maximum value, Mean and Standard Deviation for all variables used in the research, and are displayed in table 2.

Table 2. Results of descriptive statistic

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
NPL	44	3.0	16.1	9.577	4.6715
GDP	44	-6.3	9.0	.375	3.1033
UNEMP	44	38.7	46.1	43.118	1.5688
ICP	44	-1.2	4.5	.416	1.3280
CAR	44	14.9	17.8	16.423	.7536
ROA	44	-.6	1.6	.623	.5361
ROE	44	-5.5	11.1	4.768	3.8864
IR	44	5.2	8.8	7.248	.8740
CG	44	-2.3	7.8	1.989	2.5771
Valid N (listwise)	44				

Source: Authors' research

44 notices were collected for each variable, so there are no missing data. Results of descriptive statistics show that the share of NPL in the total gross loans of BiH banking sector in the observed period (Q1 2006 to Q4 2016) was in the interval from 3.0% to 16.1%. The results also show that the highest rate of decline of real GDP was as high as 6.3%, while the highest rate of growth

of real GDP was 9.0%. During the observed period, the unemployment rate was in the interval 38.7% to 46.1%, and the growth rate of retail prices as a measure for inflation showed that the highest deflation was 1.2% and the highest inflation was 4.5%. Rate of capital adequacy of banking sector was in the interval 14.9% to 17.8%, and in the observed period it was above the legally prescribed minimum of 12%. Profitability indicators, measured by return on assets and return on equity, had minimum values from -0.6% and -5.5% (due to negative financial result of BiH banking sector for 2010), and their maximum value was 1.6% and 11.1% in that order. The lowest IR used by commercial banks for granted loans was 5.2%, while the highest was 8.8%. Loan activities in the banking sector of BiH were largest in mid-2008, when the growth rate of loans was 7.8%. On the other hand, credit activities were significantly decreased in the second half of 2009, when the rate of loan decrease was 2.3%.

Correlation analysis was conducted in order to draw conclusions on quantitative factors that impact the NPL in BiH banking sector, and the results are presented in table 3.

Table 3. Results of correlation analysis

Correlations

		NPL	GDP	UNEMP	ICP	CAR	ROA	ROE	IR	CG
NPL	Pearson Correlation	1	.127	.404**	-.317*	.038	.436**	.266	-.270	-.606**
	Sig. (2-tailed)		.411	.007	.036	.804	.003	.081	.077	.000
	N	44	44	44	44	44	44	44	44	44

**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).

Source: Authors' research

Using the *Pearson Correlation* ratio, we set the degree of dependence between analyzed variables, and with the help of *p value* we determine its statistical significance. The results of correlational analysis showed that variables UNEMP, ICP, ROA and CG have statistically significant impact to NPL in the BiH banking sector. In that, UNEMP and ROA are in postive, while ICP and CG are in negative correlation with NPL.

We also conducted a regression analysis in the aim of determining the regression equation which can help in forecasting the behavior of NPL in BiH banking sector in the coming period. Before implementing the regression analysis, we checked if the conditions for its application had been met, i.e. if all the conditions of normality and linearity were there and if there were any atypical points. Using the chart *Normal P-P Plot* and *Scatterplot* it was

concluded that criteria of normality and linearity were satisfied and it was noticed there were no atypical points as there were no cases with deviations less than -3,3 or higher than 3,3. Multi-collinearity check showed that profitability indicators (variables ROA and ROE) are mutually correlated. In order for regression analysis results to be correct, it is necessary to eliminate this problem, and it was done by eliminating the ROE variable from further analysis. Based on indicators *Tolerance* and *VIF* (table 6) it can be concluded that the problem of multi-collinearity is solved.

After checking the assumptions and solving the multi-collinearity problem, it was checked whether the used regression model was good, and the results were given in table 4.

Table 4. Results of regression analysis – Model Summary

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.786[a]	.617	.543	3.1595

a. Predictors: (Constant), CG, GDP, UNEMP, ROA, ICP, CAR, IR
b. Dependent Variable: NPL

Source: Authors' research

Indicator R shows high interconnection between dependent variable (NPL) and independent variables, while indicator *R Square* (determination ratio) shows that 61.7% of variability of NPL may be explained by means of analyzed independent variables. Indicator *Adjusted R Square* corrects the value of indicator *R Square* and gives better assessment of real value of determination ratio, and its value shows that 54.3% of variability of dependent variable may be explained by means of independent variables. Indicator *Std. Error of the Estimate* points to the precision of the model and its value is 3,1595.

Table 5. Results of regression analysis – ANOVA

ANOVA[a]

Model	Sum of Squares	Df	Mean Square	F	Sig.
Regression	579.009	7	82.716	8.286	.000[b]
Residual	359.368	36	9.982		
Total	938.377	43			

a. Dependent Variable: NPL
b. Predictors: (Constant), CG, GDP, UNEMP, ROA, ICP, CAR, IR

Source: Authors' research

After evaluating the model, the significance of regression relation was tested, i.e. it was checked whether the used independent variables are relevant to describe the behavior of dependent variable in the coming period. The results of testing are presented in table 5.

Based on *p value* (*Sig.* = 0,000) it is concluded that with certain macroeconomic and specific banking variables it is possible to predict the situation with NPL in the coming period. Considering the fact that the used regression model is practically usable, it was determined which variables exactly are there, i.e. the model ratios were assessed and independent variables were evaluated. Results of testing of significance of independent variables in the model were given in table 6.

Table 6. Results of regression analysis – Coefficients

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	-31.559	15.246		-2.070	.046		
	GDP	.070	.163	.047	.431	.669	.908	1.101
	UNEMP	1.211	.464	.407	2.610	.013	.439	2.280
	ICP	-.067	.417	-.019	-.159	.024	.756	1.322
	CAR	-.351	.862	-.057	-.407	.686	.551	1.816
	ROA	2.206	1.274	.253	1.731	.009	.498	2.010
	IR	-.676	.915	-.126	-.739	.465	.363	2.753
	CG	-.893	.227	-.493	-3.935	.000	.678	1.474

a. Dependent Variable: NPL

Source: Authors' research

Based on *p value* it was concluded that variables UNEMP, ICP, ROA and CG can be used to explain the behavior and to predict the value of NPL in the coming period. On the other hand, variables GDP, CAR and IR are not relevant for explaining the NPL in BiH banking sector. After conducted regression analysis, the regression equation was constructed:

$$NPL = -31{,}559 + 1{,}211 * UNEMP - 0{,}067 * ICP + 2{,}206 * ROA - 0{,}893 * CG \quad (3)$$

Based on *Beta* ratio it was concluded that the highest contribution in explaining the NPL lies with variable CG, and the lowest lies with variable ICP. *Beta* ratio also showed the number of units, i.e. percentage for which the value of dependent variable would change if the independent variable should change by one unit of standard deviation.

After conducted regression analysis it can be concluded that NPL in the BiH banking sector may be explained with two macroeconomic (UNEMP and ICP) and two specific banking variables (ROA and CG). Thereby, the unemployment rate has positive and statistically significant relation with NPL, so that increase of unemployment might negatively reflect on the quality of credit portfolio, and that was the result reached by *Gambera* (2000) i *Louzis, Vouldis & Metaxas* (2010). The results show that inflation rate measured by growth rate of retail prices has statistically significant and negative relation with NPL, i.e. the increase of inflation rate might impact to decrease of NPL, and the result was in line with results by *Ahmad & Bashir* (2013), *Badar & Javid* (2013) and *Pradhan & Pandey* (2016). Furthermore, the research showed that the ROA has statistically significant and positive relation to NPL, i.e. an increase of profitability of banking sector might negatively reflect to the quality of loan portfolio. *Swami* (2012), *Ahmad & Bashir* (2013) and *Pradhan & Pandey* (2016) came to the same results analyzing factors that impact the NPL. In the end, the rate of credit growth has statistically significant and negative relation with NPL, i.e. the increase of credit activities might positively impact the quality of loan portfolio of a banking sector. This result ws confirmed in empiric bibliography, and it was also reached by *Boudriga, Taktak & Jellouli* (2009) and *Ganic* (2014) i *Alihodžić & Plakanović (2016)*.

On the other hand, regression analysis showed that economic activities do not have statistically significant impact to NPL in the BiH banking sector, which is contrary to the expected, since economic growth impacts to the improvement of credit ability of debtors and thus to the decrease of NPL. Although the results of most conducted research showed that economic activities impact the quality of loan portfolio, *Swami (2012) and Pradhan & Pandey (2016)* showed that the growth rate of real GDP does not impact the NPL. Also, the capital adequacy of baking sector and the active interest rate do not have statistically significant impact to NPL, and the same result was also by *Swami* (2012).

NPLs are not only a problem in the banking sector of BiH, they are also a problem in the banking sectors of the countries in the region. This is also confirmed by *Jeremic (2014)* who states that the main problem in the banking sectors in the region is growth of NLP with stagnation of the loan activity, both in corporative part, as well as crediting the citizenship. Similar research was conducted in Serbia, and results show that worsening of business cicycle and depression which domastic values influence the quality of the loan *(Otašević, 2013)*. Countris from the region (Croatia, Serbia and Slovenia) were included in the study conducted by *Klein (2013)* where performaces of NLP and CSEE were analysed. The results of this study show that the inflation rate has a statistically significant and positive, credit growth rate and GDP growth rate have a statistically significant and negative impact on NPL, while the impact of unemployment rates is not statistically significant.

5. Conclusions

The research, using correlational and regression analysis, identified factors that impact the NPL in BiH banking sector. The analysis enclosed a total of eight factors, three of them macroeconomic (growth rate of real GDP, unemployment rate and growth of retail prices), and three specific banking factors (capital adequacy ratio, return on assets, return on equity, interest rate and rate of credit growth). The aggregate data were used since they are more desirable according to empiric bibliography, they lower the risk of having a non-representative sample.

Research results show that two macroeconomic and two specific banking factors may be used to explain the behavior and to forecast the values of NPL of BiH banking sector in the coming period. In that, the unemployment rate and return on assets have statistically significant and positive impact to NPL, while the growth rate of retail prices and rate of credit growth have statistically negative relation with NPL. The research showed that the growth rate of real GDP, ration of capital adequacy and interest rate do not have statistically significant impact to the NPL in BiH banking sector.

The research constructed a regression equation that may be used to forecast the value of NPL in the coming period using the independent values of unemployment rate, inflation, return on assets and rate of credit growth. In all that, 54.3% of NPL variability can be explained with the said variables, and the largest contribution in explaining the NPL behavior lies with the rate of credit growth. A regression equation has been constructed. According to the equation, based on arbitrary unemployment rates, inflation rates, asset contributons and credit growth rates, the NPL value in the forthcoming period can be predicted**.** The share of non-performing loans in BiH's banking sector's total loans is high, so addressing this problem needs to be approached as soon as possible. Unfortunately, there is no single model for its solution, but the model needs to be adapted to a particular bank or a specific banking system. In international practice, when solving NPL problems, two models are usually used. The first model relies on the assistance of the state that establishes a special bank or agency that redeems NPL and thus eliminates inadequate assets from banks' balances or bank sector balances. The second model implies creating the conditions that enable banks to independently solve the NPL problem through debt restructuring, write offs in the case of bankruptcy or selling these loans to third parties. By applying some of the above measures, banks would reduce losses and increase revenues (due to the decrease in receivables), the rate of return on equity and liquidity.

References

-Agency for Statistic of BiH. (2017). Gross domestic product by expenditure approach. Retrived from http://www.bhas.ba/saopstenja/2017/NAC_04_2008_Y8_0_BS.pdf

Ahmad, F., Bashir, T. (2013). Explanatory Power of Macroeconomic Variables as Determinants of Non-Performing Loans: Evidence from Pakistan, World Applied Sciences Journal, 22(2), 243 – 255.

Alihodžić, A. (2014). Analiza kretanja nekvalitetnih kredita i profitabilnosti na bankovnom tržištu u BiH, Ekonomske teme, 52(3), 341 - 359.

Alihodžić, A., Plakanović, N. (2016). Determinants of Credi Growth to Nonfinancial companies in B&H, Industrija, Vol. 44, No. 2, Ekonomski institut, 85 – 100.

Badar, M., Javid, A.Y. (2013). Impact of Macroeconomic Fores on Nonperforming Loans: An Empirical Study of Commercial Banks in Pakistan, WSEAS Transactions on Business and Economics, 10 (1), 13807 – 13814.

Barisitz, S. (2013). Nonperforming Loans in CESEE –An Even Deeper Definitional Comparison, Focus on European Economic Integration Q3/13, 67 – 84, Retrieved from: :https://www.oenb.at/dam/jcr:bef7ec58-d7de-4bf1-a39d-accf0d339f3e/feei_2013_q1_studies_ barisitz_ tcm 16253.pdf,

Beck, R., Jakubik, P. & Piloiu, A. (2013). Non-performing Loans: What Matters in Addition to the Economic Cycle?, ECB Working Paper Series, No. 1515, Macroprudential Research Network, European Central Bank, Frankfurt an Main, Germany.

Bexley, J., Nenninger, S. (2012). Financial Institutions and the Economy, Journal of Accounting and Finance, 12 (1), 42 - 47.

BIS: Basel II. (2006). International Convergence of Capital Measurement and Capital Standards: A Revised Framework – Comprehensive Version, Basel Committee on Banking Supervision, Basel, Retrieved from: http://www.bis.org/publ/bcbs118.pdf

Boudriga, A., Taktak, N.B. & Jellouli, S. (2009). Banking supervision and nonperforming loans a cross-country analysis, Journal of Financial Economic Policy, 4(1), 286 - 318.

-Central Bank of BiH. (2017). Statistics Web portal Panorama Necto. Retrived from http://statistics.cbbh.ba/Panorama/novaview/SimpleLogin_en.aspx

Gambera, M. (2000). Simple Forecasts of Bank Loan Quality in the Business Cycle, Emerging Issues Series, Supervision and Regulation Department, Federal Reserve Bank of Chicago.

Ganić, M. (2014). Bank Specific determinants of Credit Risk – An Empirical Study on the Banking Sector of Bosnia and Herzegovina, International Journal of Economic Practices and Theories, 4 (4), 428 - 436.

IMF (2006). The Financial Soundness Indicators Compilation Guide of March 2006., retrieved from: https://www.imf.org/external/pubs/ft/fsi/guide/2006/

Jeremić, Z. (2014). Bankarstvo u Srbiji u periodu 2000 – 2013. 130 godina Narodne banke Srbije - Ko je ko u finansijskom sektoru, 34 - 51.

Jimenez, G., Saurina, J. (2006). Credit Cycles, Credit Risk, and Prudential Regulation, International Journal of Central Banking, 2 (2), 65 – 98.

Keeton, W., Morris, C. (1987). Why Do Banks' Loan Losses Differ, Economic Review, retrieved from: http://www.kansascityfed.org/PUBLICAT /ECONREV/EconRevArchive/1987/2q87keet.pdf

Klein, N. (2013). Non-Performing Loans in CESEE: Determinants and Impact on Macroeconomic Performance. IMF Working Paper, 72/13.

-Labour and Employment Agency of BiH. (2017). Statistics. Retrived from http://www.arz.gov.ba/statistika/mjesecni/Archive.aspx?pageIndex=1&langTag=en-US

Louzis, D., Vouldis, A. & Metaxas, V. (2010). Macroeconomic and Bank-Specific Determinants of Non-Performing Loans in Greece: A Comparative Study of Mortgage, Business and Consumer Loan Portfolios, Bank of Greece Working Paper, No. 118.

Otašević, D. (2013). Macroeconomic determinants of the quality of banks' loan portfolio in Serbia,, Narodna banka Srbije, Retrieved from: http://www.nbs.rs/internet/english/90/90_0/2013_27_DO.pdf

Pradhan, R.S., Pandey, A. (2016). Bank Specific and Macroeconomic Variables Affecting Non-Performing Loans of Nepalese Commercial Banks, Social Science Research Network, Retrieved from: http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2793495

Rottke, N., Gentgen, J. (2008). Workout management of non-performing loans, A formal model based on transaction cost economics, Journal of Property Investment & Finance, 26 (1), 59 – 79.

Saba, I., Kouser, R. & Azeem, M. (2012). Determinants of Non Performing Loans: Case of US Banking Sector, The Romanian Economic Journal, 44, 125 - 136.

Salas, V., Saurina, J. (2002). Credit Risk in Two Institutional Regimes: Spanish Commercial and Savings Banks, Journal of Financial Services Research, 22 (3), 203 – 224.

Sinkey, J., Greenawalt, M. B. (1991). Loan – loss experience and risk – taking behavior at large commercial banks, Journal of Financial Services Research, 5 (1), 16 – 20.

Swamy, V. (2012). Impact of macroeconomic and endogenous factors on non performing bank assets, International Journal of Banking and Finance, 9 (1), 27 – 49.

Vuković, V., Domazet, I. (2013). Non-performing Loans and Systemic Risk: Comparative Analysis of Serbia and Countries in Transition CESEE, Industrija, Vol. 41, No. 4, Ekonomski institut, 59 – 73.

-World Bank. (2017). Statistics World Bank. Retrived from https://data.worldbank.org/indicator/FB.AST.NPER.ZS