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Effects of Macroeconomic Environment on Non-Performing Loans and Financial Stability: Case of Bosnia and Herzegovina

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Abstract: This paper analyses the impact of macroeconomic conditions on non-performing loans and financial stability in Bosnia and Herzegovina`s banking sector. The aim of this paper is to identify the effects of macroeconomic conditions on non-performing loans and the banking sector`s financial stability. To that end, data for the period 2006-2017 have been used. In order to detect the correlations between analysed variables, we performed the correlation analysis through Pearson coefficient of correlation. Results have confirmed the assumption about correlation between macroeconomic conditions, non-performing loans, and financial stability. Further, regression analysis was applied on data divided into two models: the impact of macroeconomic conditions on non-performing loans and the impact of macroeconomic conditions on the banking sector`s financial stability. Those two models point to the significance of macroeconomic environment for non-performing loans control and financial stability maintenance. Namely, the results have shown that improvement in macroeconomic conditions causes improvement in credit quality. Also, it was disclosed that better macroeconomic conditions ensure better conditions for maintenance of the banking sector`s financial stability.

Keywords: Non-performing loans, Bank, Financial stability, Macroeconomic, Impact

JEL classification: G00, G21

Introduction

Financial stability of a banking sector implies a condition where the system is able to absorb shocks without major distortions in its current and future functioning and without negative impacts on entire economy. Increasing turbulence in financial market leads to growing banking risks. In this environment, making a profitable business has become very heavy and challenging business process. The recent global financial crisis in Bosnia and Herzegovina and other neighbouring countries has caused difficulties in banking business. Since Bosnia and Herzegovina`s banking sector mainly consists of banks, it is expected that problems in this part of the financial sector could potential threaten financial stability of the entire financial sector. Since loans represent the greatest part of bank assets, their quality is one of the most meaningful determinants of stability and business performances. High level of non-performing loans (NPLs) in the banking sector and rising tendency leads to increase in allocated assets for those credits and, consequently, to potential decrease in profitability and capital adequacy of individual banks and the entire banking sector. Therefore, financial stability of the banking sector is the greatest concern of regulatory authorities and other financial participants in Bosnia and Herzegovina. The global financial crisis has opened a new chapter in observing the objectives of central banks. In fact, the question of the role of central banks in the prevention, management and resolution of crises arises. Namely, macroeconomic conditions becoming even more important and its effects more meaningful when non-performing loans and financial stability are observed. According to financial stability reports of central banks, the greatest threat to banking sector financial stability is non-performing loans. Therefore, this paper investigates effects of macroeconomic conditions described by usually indicators on non-performing loans and, followed by that, banking sector financial stability. Thus, the purpose of this paper can be defined as identification of macroeconomic conditions on non-performing loans and banking sector financial stability. For that purposes, adequate methodology was applied. The selection of this theme is guided by present financial crisis and problems in banking sectors all around the world, which requires more detailed analysis and understanding. This paper is organized as follows Second section gives an overview of existing literature regarding macroeconomic analysis, non-performing loans and financial stability. Third section presents situation in Bosnia and Herzegovina banking sector according to macroeconomic conditions, non-performing loans and financial stability. Fourth section includes methodological approach explanation. Fifth section gives presentation of results and last section presents conclusion, research implication and follow by that some recommendations.

Literature review

Analysis of the available literature and the works of other authors we gained a better insight into the state of research in this area. Existing literature mainly analyze macroeconomic determinants of financial stability. Namely, Jimenez and Saurina (2005) researched the effect of rapid loans growth on loan explosion, they found the empirical evidence that there was strong positive correlation between rapid growth in loans and increase in nonperforming loans. Further, authors have researched factors which have influence on level of non-performing loans in India banking sector. The primary data have been used and they are conducted from bank credit managers. It was shown that external factors are much more meaningful then internal (Sanjeev, 2007). Some authors observed non-performing loans from macroeconomic perspective. It was suggested that central banks needs to take more responsibility for the maintenance of pro-cyclicality and balancing the resulting imbalance (White, 2009.) Also, the influence of credit growth on bank risk in 16 countries was conducted. The relationship between asset risk, banking profitability and solvency was tested. It was disclosed that credit growth lead to growth in loan losses, interest revenue decline as well as lower capital. Thus, it was shown that credit growth has negative impact on risk weighted interest revenue. Also, it was proven that credit growth positively correlates with loan loss provision, and negative with profitability and solvency (Foos, Noorden & Weber, 2010).

The following study demonstrated a strong correlation between banking crises and unlimited default through economic history of many countries. Three hypotheses were tested: private debt contributes to the banking crisis, banking crisis goes along with the debt crisis, public debt is much more significant impact on the banking crisis, compared with private debt (Reinhart & Rogoff, 2010). Further, research was conducted in Croatia where authors have researched level of non-performing loans as well as level of single as well as portfolio risk in Croatia banking sector. The correlation between ascertain variables and macroeconomic indicators was conducted. (Šverko, et.al. 2010) Further, Gaganis et al. (2010) collected the factors effecting banking stability under four general categories: Regulations, Other Banking and financial sector attributes, Institutional Environment, and Macroeconomic Conditions. Authors have also analyzed spillover effects of credit risk between banks in Mexico banking sector. It has been proven existence of spillover effect as well as its double-direction between small and big banks. Then, authors have define a model whose subject is the cumulative effects of macroeconomic shocks in a time horizon of three years and their impact on non-performing loans. Therefore, they have applied VAR model on panel data in order to test settled model (Espinoza & Prasad, 2010). Than the connection

between credit growth and asset quality and ascertain external and internal factors in developing countries has been tested. It was proved that slowdown in economic growth, the weakening of the exchange rate and fast credit growth are independently connected with higher level of non-performing loans (De Bock, & Demyanets, 2012). The following research focused only on the financial system in general and its correlation with global imbalances. It was shown that the global imbalance has only a weak correlation with the financial imbalance, in comparison with the indicators obtained from the financial system (Taylor, 2013). Further, research showed a significant negative impact of export and industrial production on non-performing loans. With increase of export and industrial production, economy also increase and level of non-performing loans decrease (Fawad & Taquadus, 2013). Analysis of non-performing loans in Central Eastern Southeastern Europe countries has shown that non-performing loans have increased since the financial crisis outbreak. Also, it was disclosed that a sharp rise occurred a year later, when the GDP in most CESEE countries experienced contractions (Klein, 2013). Also, it was disclosed that following variables have a significant impact on level of non-performing loans: GDP growth, stock prices, exchange rates and interest rates. Direction of exchange rate impact depends on volume of lending in foreign currencies to uninsured clients. When it comes to stock price, there is a bigger impact in countries with higher stock market/GDP ratio (Beck et. al., 2013).

The authors analyzed the effects of the financial crisis on the stability of the banking sector through a series of indicators of the banking sector, including the number of banks, banking intermediation, concentration, foreign ownership and liquidity. Based on the analysis of data showed that the Croatian banking sector, despite exposure to the financial crisis, remained stable (Živko & Kandžija, 2013). Further, authors' recommendations imply creating a healthy macroeconomic environment in order to reduce level of non-performing loans in Pakistan commercial banks. The emphasis is also on adequate credit culture and lending policy designed in accordance with appropriate economical and financial factors (Mehamood et. al., 2013). Using the Granger causality test, authors disclosed that inflation and exchange rate cause non-performing loans. In addition, financial stability in 14 countries of Asia from 2003 to 2010 and the impact of banking competition, concentration, control and state institutions on the likelihood of bankrupt banks were analyzed (Xiaoqing et. al., 2014).The last found paper has shown development of an aggregate index for measuring financial stability in the Balkans. This index combines some of the International Monetary Fund Financial Soundness indicators and macro prudential indicators with World Bank`s Development Indicators and also measures of world economic climate. Also, this paper compares the evolution of two sub-indices for two groups of countries

depending on its European Union status. (Karanovic & Karanovic, 2015). Further, the authors found out that macroeconomic variables have a limited effect on non-performing loans during periods of extreme macroeconomic and financial conditions. Also, it was found that banks small-enough-to-fail are more inclined to follow procyclical lending policy in the long-run (Milani, 2017). On the other hand, some authors have found out that prompt corrective action have a major impact on banking sector stability and decrease in level of non-performing loans (Jiang et al., 2018). A paper by Koju, Koju, & Wang (2018) examines macroeconomic and bank-specific determinants of non-performing loans in the Nepalese banking system using static as well as dynamic panel estimation. Results have shown that low economic growth is the primary cause of high non-performing loans. A research by Asanović (2018) concludes that banking system factors have higher impact on probability of systematic banking sector crisis occurance than macroeconomic factors in Southeast European countries. Also, it finds that the banking systems of these countries are significantly exposed to global trends.

Further findinings showed that economic growth, inflation, economic freedom, return on asset, return on equity, regulatory capital to risk-weighted assets, non-interest income to total income have negative impact on non-performing loans. Unemployment, public debt, credit growth, lagged values of non-performing loans, the cost to income ratio and financial crises have positive effect on non-performing loans (Bazar, 2019).

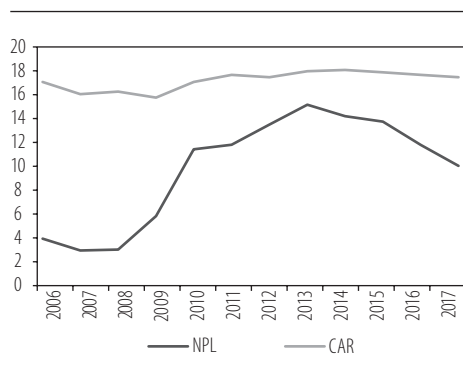## Bosnia and Herzegovina banking sector

The banking sector of Bosnia and Herzegovina has changed significantly from its beginning to today. First of all it is necessary to emphasize the significance of the growth of banks in the overall economic system. Furthermore, indicators point to growth of assets in the gross domestic product. Until the beginning of the crisis, and even during the crisis, there was a huge credit growth. Current capital adequacy of banks is mainly at a satisfactory level and well above those required by the Basel principles. Also noticeable is the reduction of domestic capital in the banks since they are now in the majority foreign ownership. Increase in the share of foreign banks tends to increase the concentration of banking sector assets. This leads to the fact that 7 banks control about 60% of total assets of the banking sector of Bosnia and Herzegovina.

Table 1: Main characteristic of Bosnia and Herzegovina banking sector

		2016	2017
Adequate capitalization	- Regulatory capital, millions KM	2,889	3,123
	- Total weighted risk, millions KM	18,255	19,909
	- Capital adequacy ratio	15.8%	15.7%
Better quality of the loan portfolio	- Non-performing loans, millions KM	1,982	1,813
	- Non-performing loans to total loans	11.8%	10%
Significantly higher result	- Net profit / loss, millions KM	219	336
	- Return on shareholders' equity	7.3%	10.2%
High liquidity	- Liquid to total assets	27.2%	28.4 %
	- Liquid assets to short- term financial obligations	44.1%	44.3 %

Source: Financial Stability Report, 2017, Central bank of Bosnia and Herzegovina

Negative economic trends in most markets in recent years and a slow economic recovery have greatly affected financial stability of the banking sector of Bosnia and Herzegovina. Weak economic growth, problems in the real sector as well as the natural disasters that have affected businesses and Bosnia and Herzegovina's population have impacted the banking sector. However, despite all this, the banking sector remained stable and recorded positive trends in terms of growth in total assets, loans, deposits, retail savings and profitability. It is also important to point out that the banking sector is adequately capitalized. When we talk about the risks to financial stability of Bosnia and Herzegovina`s banking sector, first of all it is necessary to highlight the level of non-performing loans. These loans are the main cause of increased systemic risk, but there is no adequate solution for this problem. Non-performing loans continue to represent the greatest threat to the health of the banking system and financial stability in Bosnia and Herzegovina. Compared to 2016 there was significant improvement in 2017 in terms of the movement of some indicators. The share of non-performing loans in total loans in the banking system at the end of 2017 amounted to 10%. Graph 1 shows movements of the non-performing loans ratio and the capital adequacy ratio for the period 2006-2017 in Bosnia and Herzegovina`s banking sector.

Graph 1: Non-performing loans ratio and capital adequacy ratio

Source: World Bank data

As of end-2014 non-performing loans have been on a downtrend. This started with the sale of a part of non-per-

forming assets of Hypo Bank in the amount of approximately 112 million KM KM and significant permanent write-offs (E category) at the system level in the amount of approximately 85 million KM. The level of capitalization of the banking sector at the end of 2017 was satisfactory.

Research methodology

In accordance with the practice of scientific research, different scientific methods were used in the research for and writing this paper, including the formulation and presentation of the research. Methods of analysis and synthesis, inductive and deductive, as well as the method of generalization and specialization were used during the desk research. Secondary data were used for empirical part of the research. Namely, in order to identify the impact of macroeconomic conditions measured by inflation rate, unemployment rate and GDP growth on the level of non-performing loans and banking sector financial stability, macroeconomic data for period 2006-2017 from Bosnia and Herzegovina were used. This time series is representative because it covers both the pre-crisis and the crisis period. Thus, it was possible to detect moment of NPLs appearance as well as their growth and movements. Banking sector financial stability is measured by the banking sector capital adequacy ratio and non-performing loans are measured as the ratio of non-performing loans to total loans in banking sector. Primarily, in order to test correlations between analysed variables correlation analysis through Pearson coefficient of correlation was employed (Somun-Kapetanović, 2008).

$$r = \frac{SSxy}{\sqrt{SSxx \cdot SSyy}}$$

Where :

$$SSxy = \sum (Xi - \overline{X})(Yi - \overline{Y})$$

$$\text{and} \tag{1}$$

$$SSxx = \sum_{i=1}^{n}(Xi - \overline{X})^2$$

$$\text{and}$$

$$SSyy = \sum_{i=1}^{n}(Yi - \overline{Y})^2$$

Further, in order to measure the impact of macroeconomic variables on non-performing loans and banking sector financial stability, the ordinary least squares model (OLS) was used. Before carrying out the econometric analysis, descriptive data analysis has been provided as well as the verification of normality and symmetry distribution and the existence of multicollinearity problem. Since the model involves time series, the problem of autocorrelation may exist, but previous studies have shown that this approach is suitable for NPL time series analysis, as long as the problem of autocorrelation is solved. Therefore, in statistical literature linear regression model is defined as follows (Somun-Kapetanović, 2008):

$$y_t = \alpha + x_t^{'}\beta + \varepsilon_i \qquad (2)$$

Where y is the explained variable and in this case we will have two models with two different dependent variables: non-performing loans and banking sector financial stability. α is constant term and x is nxp matrix of independent variables, in this case: inflation, unemployment and GDP growth, and ε is error term. Data have been derived from the Central bank of Bosnia and Herzegovina reports and World Bank indicators. GDP growth is expected to have negative relationship with non-performing loans as increase in GDP represents an additional source of liquidity at the market what should allow the borrowers to repay their debts. Otherwise, these indicators should have positive relation with financial stability. Next, independent variable – unemployment - should cause an increase in the level of non-performing loans since an increase in this predictor should be associated with the number of borrowers who become unemployed and cannot repay their debts. This indicator should cause deterioration in financial stability since the increasing number of jobless people potential causes difficulties in banking business. Positive relationship was expected for inflation since as inflation increases, the cost of borrowing increases which in turn causes deterioration in loan quality. On the other hand, negative relation is expected with financial stability since non-performing loans increase with inflation uptrend, therefore financial stability can be jeopardized.

Research results

At the beginning of analysis, Pearson coefficient of correlation between analysed variables was deployed. Namely, the purpose of this part of analysis is to detect a potential correlation between macroeconomic variables such as inflation, unemployment rate and GDP growth and non-performing loans and financial stability. If the correlation is confirmed, then we will be able to employ regression

analysis in order to model the relation between these variables. The correlation analysis results are presented in Table 2.

Table 2: Pearson coefficient of correlation

	Non-performing loans	Financial stability	Inflation	Unemployment	GDP growth
Non-performing loans	1				
Financial stability	-.625*	1			
Inflation	.216*	-.567*	1		
Unemployment	.991*	-.580*	.111*	1	
GDP growth	-.046*	.294*	.684*	-.100*	1

Source: Authors calculations   * confidence level 0.05

In Table 2, correlation is visible as well as its direction and intensity between variables. Therefore, extremely strong correlation between financial stability, non-performing loans and unemployment is also noticeable. Actually, the table provides for a conclusion that better financial stability leads to a decrease in non-performing loans and vice versa, since there is a negative correlation between the two. Further, increase in inflation leads to increase in non-performing loans since credit users become less able to repay their debts. Namely, there is positive correlation between these two variables. Also, increase in unemployment rate leads to increase in non-performing loans, which is expected since jobless persons are not able to repay their debts. GDP growth has positive impact on non-performing loans since higher GDP growth leads to decrease in non-performing loans. However, this correlation isn't so strong and thus its impact is not so strong either. Also, financial stability negatively correlates with inflation and unemployment rate since these two variables cause increase in non-performing loans and that represents threat to financial stability. Same as with non-performing loans, GDP growth has positive impact on financial stability, since better macroeconomic circumstances enable better financial stability. Since correlations between the analysed variables were detected, regression analysis between the same groups of variables was employed.

Regression analysis requires meeting some assumptions regarding variables included in the analysis. Therefore, these assumptions were tested before running regression analysis. Firstly, Kolmogorov – Smirnov test was conducted. Its value shows that all variables are normally distributed with significance less than 0.05. Then the analysis of multicollinearity was implemented. Obtained results show the absence of multicollinearity and that model is good. The assumption of homoscedasticity was also tested. It was done by Whites' test which has shown that

this assumption is satisfied. Outliers have been checked with the help of standard deviation and histograms. The results of this analysis did not show any special outliers, so there was no need to cope with them. The regression results are given in Table 3.

Table 3: Regression results

	Non-performing loans	Financial stability
GDP growth	-.014 *	.204*
Inflation	.257*	-.420*
Unemployment	.729*	-.635*
R-squared	59.2	62.3

Source: Authors calculations   * confidence level 0.05

As it can be seen from the table, regression analysis was used to measure the impact of macroeconomic variables on non-performing loans and banking sector financial stability separately. From the R-square for the first model it can be concluded that with this model we explain 59.2% changes in non-performing loans. Durbin Watson test is 2.09, which is acceptable value. Also F–test shows us that the model is good. As we can see from Table 3, the greatest contribution to the model gives unemployment with 72.9% explained. Namely, this means that increase in unemployment rate for one unit leads to increase in non-performing loans for 0.729 units. Further, inflation contributes with 25.7% and GDP growth with 1.4%. Thus, increase in inflation for one unit leads to increase in non-performing loans for 0.257 units. However, increase in GDP growth for one unit leads to decrease in non-performing loans for 0.014 units. Therefore, we can conclude that unemployment has the greatest influence on level of non-performing loans. From the R-square for the second model it can be concluded that with this model we explain 62.3% changes in banking sector financial stability measured by the capital adequacy ratio. Actually, it can be seen that variables included in this analysis are more efficient in explaining changes in banking sector financial stability then those in non-performing loans. However, both models have adequate R-square and it can be concluded that they are good models. Durbin Watson test for this model is 2.02 and this is acceptable value. Also F–test shows us that the model is good. As we can see from table above, the greatest contribution to the model gives unemployment with 63.5% explained. Namely, this means that increase in unemployment rate for one unit leads to decrease in financial stability for 0.635 units. Further, inflation contributes with 42% and GDP growth with 20.4%. Thus, increase in inflation for one unit leads to decrease in financial stability for 0.420 units. However, increase in GDP growth for one unit leads to increase in financial stability for 0.204 units. Therefore, we can conclude that unemployment has the greatest influence on both analysed indica-

tors since less jobs lead to deterioration of population`s ability to repay their debts, which further leads to increase in non-performing loans and, ultimately, it could threaten financial stability.

Conclusion

Banking is risky business activity since risk is accentuated category in modern banking operations. Thus, leading and managing banking business has never been an easy task. Moreover, in recent time, this task has been compounded due increasing uncertainties in business environment. The recent financial crisis, caused by uncontrolled borrowing, emphasized the significance of loans and their quality management. Namely, because of existence of interdependencies between risks and synergy effect, increasing exposure to one risk can significantly increase the impact of other risks. Therefore, non-performing loans can threaten banking sector financial stability. Since the recent global financial crisis has caused disorder in the majority of big world countries, spillover effects were expected. Therefore, as one of the developing countries, Bosnia and Herzegovina was affected by the crisis through the spillover effect. All this has led to destructions in macroeconomic environment in this country, followed by decrease in core macroeconomic indicators. Since these disorders have a great impact on local population that are credit users, this paper has analysed the impact of changed macroeconomic conditions on non-performing loans and financial stability in the country`s banking sector. Thus, this paper by the help of adequate methodology has confirmed the impact of macroeconomic conditions on non-performing loans and financial stability. Actually, it is shown that the unemployment rate and its movements due its connection with financial solvency of population have the greatest impact. Therefore, it can be concluded that regulatory authorities should focus on the development of real economy and the creation of new jobs in order to prevent potential disorders in the banking sector functioning. With the help of adequate regulation the regulators should be able to protect and maintain financial stability not just of the banking sector but the entire financial sector as well.

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