Review Article
UDC : 330.35 :658.88 :336.27(497-15)
DOI: https://doi.org/10.22598/iele.2023.10.2.6

THE IMPACT OF ECONOMIC GROWTH ON NON-PERFORMING LOANS IN WESTERN BALKAN COUNTRIES

Beka Artenisa [*]
Abazi-Alili Hyrije [**]

ABSTRACT

The banking industry is considered one of the most crucial to the economy's stability and growth. Moreover, the performance of the banking industry in developing countries is directly affected by non-performing loans (NPL). Using dynamic model estimation methods, this research aims to investigate the relationship between economic growth (measured by macroeconomic indicators) and non-performing loans in six Western Balkan countries during the period of 2010 to 2021. Non-performing loans (NPLs) rate may be mostly described by significant macroeconomic parameters, such as GDP growth (annual %), lending interest rate, central government debt, unemployment, and inflation. To measure this impact we employed OLS, OLS Robust, Fixed Effect (FE), Random Effect (RE), and Generalized Method of Moments (GMM), which turned out to be the most effective method through the results generated by applying the Sargan Test. Based on the results generated, GDP has a positive effect on the growth of non-performing loans, the lending interest rate, and the central government debt, all of which have a significant positive effect on the growth of NPL. Additionally, this research provides management. and policymakers with prompt insight into the elements that contribute to non-performing loans. Further, management may take corrective actions and policymakers may examine the relevance of the macroeconomic situation.

Key words: *GDP, lending interest rate, central government debt, unemployment, inflation.*

[*] Faculty of Business and Economics, "Southeast European University", Tetovo, North Macedonia, ab30496@seeu.edu.mk
[**] Faculty of Business and Economics, "Southeast European University", Tetovo, North Macedonia, h.abazi@seeu.edu.mk

1. INTRODUCTION

The financial system is crucial to the economic prosperity of a country; even today, the banking system dominates the financial system. As one of the most important institutions in an economy, the banking system faces a variety of risks. The financial system influences individuals' saving and investment decisions by offering alternative investment options that are appropriate to their needs, mobilizing savings, reducing risk, and effectively directing funds to the best uses[1]. Indicators that can be used to measure non-performing loans in terms of the macroeconomy are considered in the study's framework. With the worldwide economic downturn and the subsequent slowdown in economic activity, concerns over the stability of the banking system and financial markets have emerged as one of the primary topics of discussion in many areas of economic analysis and policy debates. In other words, the financial crisis and the recession that followed it brought attention to problems within the banking sector and the larger financial system, and policymakers and economists have been working to better understand and address these issues. This attention has been brought about by the financial crisis and the recession that followed it. Several monitoring and detection systems have been put into place for authorities on both the national and international levels to keep track of events and identify early warning signals of economic imbalances and potential problems. They can increase the industry's resilience to shocks using several different regulatory mechanisms at their disposal. When evaluating the stability and health of the banking system and the governments of the countries in which it operates, the study, which uses a comparative methodology, shows how central banks should expand their monitoring framework to include prudent macroeconomic indicators like the GDP and inflation rate. These two are the most important indications for determining credit risk when evaluating a bank's lending activities. Non-performing loans are in default because the borrower has stopped making principal and interest payments consistently. There is some variation in the standards that are used to determine whether or not a loan is non-preforming, but non-performing loans, are generally any loans for which principal or interest payments have not been received in the last 90 days[2].

Nonperforming loans are regarded as a measure of financial stability, specifically of the soundness of the banking system[3]. Non-performing exposure can

[1] Kjosevski, J., Petkovski, M.: Non-performing loans in Baltic States determinants and macroeconomic effect, *.Baltic Journal of Economics,* 17(1) 2014, pp. 25-44.

[2] Baristiz, S.: Non-performing loans in Western Europe-A selective comparison of countries and national definitions, *Focus on European Economic Integration*, Q1 2013, pp. 28-47.

[3] Prasanna, P. K.: Determinants of non-performing loans in Indian Banking System'dalam, *Behavioral Sciences and Economics Issues*, 2014, pp. 11-12.

be defined differently depending on several elements such as the applicable accounting system, the perspective being used (whether internal or external), and the country in question. Increases in non-performing loans (NPLs) can cause deterioration in the operation of banks by compromising their liquidity and profitability. This issue has a detrimental impact on the volume of business conducted in the nation's various industries whenever there is an increase in the ratio of non-performing loans. When a crisis has progressed to its final stages, this can even cause banks to fail and a banking crisis to happen. Therefore, the reduction of NPLs is one of the regulators' and policy-makers top priorities. It is vital for parties interested in the reduction of NPL to understand the elements that contribute to NPL, to assess the effects of various policies on NPL, and to monitor NPL. This is because understanding the reasons that contribute to NPL is the first step towards reducing NPL. The health of commercial banks and the economy will be negatively impacted by NPLs in the long run[4]. The causes of non-performing loans, which make it difficult to collect interest payments, restrict investment opportunities, and cause liquidity issues in the financial system, must be determined to reduce the amount of non-performing loans and to achieve a stable financial position and economic goals[5].

The assumption that systemic risk resulting from a bank's exposure to macroeconomic risk factors has an impact on the quality of a loan portfolio can be used to explain the connection between non-performing loans and the macroeconomy, this can be done by suggesting that systemic risk has an impact on the quality of a loan portfolio[6].

2. LITERATURE REVIEW

In many researches that have been conducted for non-performing loans based on macroeconomic variables, it has been observed that the proportion of non-performing loans is linked to the cycle of the economy, these studies looked at the relationship between the economic cycle and non-performing loans. Most of the research that has been done is on macroeconomic variables, including the increase in the GDP, inflation, unemployment, interest rate, and

[4] Souza, G. J., Feijo, C. A.: Credit risk and macroeconomic interactions: Empirical evidence from the Brazilian banking system, *Modern Economy*, 2(05) 2011, p. 910.

[5] Stijepovic, R.: Recovery and reduction of non-performing loans-Podgorica approach, *Journal of Central Banking Theory and Practice*, 3(3) 2014, pp. 101-118.

[6] Sheefeni, J. P.: The impact of macroeconomic determinants on non-performing loans i Namibia, *International Review of Research in Emerging Markets and the Global Economy,* 1(4) 2015, pp. 612-632.

public debt, among other things. Interest rates increase non-performing loans[7], but GDP decreases them. A study showed that there is a negative and significant relationship between GDP and non-performing loans, it also found that unemployment, inflation, and non-performing loans all have a positive and significant with each other.[8] Another study showed that there is a link between the growth of the GDP and the rise of the non-performing loans ratio that goes in the opposite direction.[9]. Dimitross et al[10] using the GMM model, found that macro variables such as unemployment have a strong influence on NPL. Louziis[11] a study was conducted between 2003 and 2009 on the nine major Greek banks to evaluate the relationship between GDP growth, unemployment, interest rates, nonperforming loans, and public debt, because of this, a rise in the rate of unemployment as well as interest rates has a positive impact on nonperforming loans, but a rise in GDP growth has a negative impact on non-performing loans, and the level of public debt has a significant impact on the amount of NPLs. Klein[12] discovers a favorable association between non-performing loans and lending as well as a favorable relationship between non-performing loans and inflation.

Szarowska[13] determined that unemployment was the most significant macroeconomic factor affecting NPLs. Since the relationship between the unemployment rate and NPLs is proportional, the findings also confirmed that inflation, economic growth, and exchange rates had a negative impact on NPLs, while the impact of lending interest rates had an expected and positive effect. Anglea et al[14] their research demonstrates that the real GDP growth rate and

[7] Ahmad, M. I., Guohui, W., Hasan, M., Ali, R., Rafiq, M. Y., Rehman, R.: Non-performing loans and economic growth, *Journal of Economics, Business and Management*, 66(4) 2016, pp. 584-586.

[8] Radivojevic, N., Jovovic, J.: Examining of determinants of non-performing, *Prague Economic Papers*, 26(3) 2017, pp. 300-316.

[9] Svetozar, T., Maja, J.: Macroeconomic and Institutional Determinants of non-perfoming loans, *Journal of Central Banking Theory and Practice*, 4(1) 2015, pp. 47-62.

[10] Dimitrios, A., Helen, L., Mike, T.: Determinants of non-performing loans: Evidence from Euro-area, *Finance research letters,* 18(August) 2016, pp. 116-119.

[11] Louzis, D. P., Vouldis, A. T., Metaxas, V. L.: Macroeconomic and bank-specific determinants of non-performing loans in Greece: A comparative study of mortgage, business and consumer loan portfolios, *Journal of Banking Finance*, 36(4) 2012, pp. 1012-1027.

[12] Klein, N.: Non-performing loans in CESEE: Determinants and Impact on Macroeconomic Performance, *International Monetary Fund*, 2013.

[13] Szarowska, I.: Effect of macroeconomic determinants on non-performing loans in Central and Eastern, *International Journal of monetary Economics and Finance*, 11(1) 2018, pp. 20-35.

[14] Angela, R., Irina, B.: An empirical analysis of the macroeconomic determinants of non-performing loans in EU28 banking sector, *Reviste Economica*, 67(2) 2015, pp. 108-127.

unemployment both have significant effects on the percentage of non-performing loans, about inflation, it is confirmed that the estimated coefficients between public debt and the ratio of non-performing loans are negative. The dynamic panel regression analysis results revealed that non-performing loans were negatively impacted by economic growth, inflation, economic freedom (institutional development), return on equity and assets, regulatory capital to risk-weighted assets, and non-interest income to total income, whereas they were positively impacted by unemployment, public debt, credit growth, lagged values of non-performing loans, the cost to income ratio, and financial crises[15]. Messai[16] used panel regression to examine 85 banks in Italy, Greece, and Spain between 2004 and 2008 to find what factors contributed to non-performing loans and discovered that economic development was detrimental to NPLs, although unemployment and the real interest rate were beneficial. Vasiliki et al[17] also investigated the factors that affect non-performing loans (NPLs) in 14 Euro area member countries between 2000 and 2008 using dynamic panel regression and revealed that economic growth, bank capital and reserves to total assets, return on equity, and public debt all harmed NPLs, unemployment, public debt, and one-lagged NPL prices did not. Anglesa et al[18] used panel regression to examine the macroeconomic factors influencing bank NPLs in the EU-28 between 2000 and 2013, and they discovered that while unemployment had a positive effect on the NPL ratio, economic growth and inflation had a negative effect. Future non-performing loan ratios are strongly predicted by higher GDP growth, lower inflation, and reduced debt[19]. To identify some key factors influencing non-performing loans, Beck et al[20] used an extensive dataset with annual data for 75 countries over the period 2000–2010, the paper considers both immediate and one-year delayed effects and discovers that the nominal effective exchange rate, share prices, GDP, and lending interest rate

[15] Bayar, Y.: Macroeconomic, .institutional and bank-specific determinants of non-performing loans in emerging market economies: A dynamic panel regression analysis, *Journal of Central Banking Theory and Practice*, 8(3) 2013, pp. 95-110.

[16] Messai, A. S., Jouini, F.: Micro and macro determinants of non-performing loans, *International journal of economics and financial issues*, 3(4) 2013, pp. 850-860.

[17] Vasiliki, M., Athanasios, T., Athanasios, B.: Determinants of non-performing loans: The case of Eurozone, *Panoeconomicus*, 61(2) 2014, pp. 193-206.

[18] Angela, R., Irina, B.: An empirical analysis of the macroeconomic determinants of non-performing loans in EU28 banking sector, *Reviste Economica*, 67(2) 2015, pp. 108-127.

[19] Staehr, K., Uuskula, L.: Macroeconomic and macro-financial factors as leading indicators of non-performing loans-Evidence from the EU countries, *Journal of Economic Studies*, 48(3) 2021, pp. 720-740.

[20] Beck, R., Jakubík, P., Piloiu, A.: Key determinants of non-performin loans: new evidence from a global sample, *Open Economies Review*, 26(3) 2015, pp. 525-550.

have explanatory power. In the instance of the Brazilian banking system, Tabak et al[21] discovered a significant but. favorable link between GDP and NPL and also Shingjergji[22] reached the same conclusion. Mazreku et al[23] concluded that unemployment has a negative impact on non-performing loans.

3. DATA AND ECONOMETRIC METHODOLOGY

The purpose of our research paper is to analyze the investigate the effects of increasing economic activity (macroeconomic indicators) on non-performing loans in selected Western Balkan Countries from 2010 to 2021. The objective of this research is to evaluate the connection between non-performing loans and macroeconomic variables. Furthermore, empirical literature was given top priority in the process of determining the variables; the availability of data for the sample also had an impact on the process of picking the variables and the study period.

3.1. DATA

The database of the World Bank, IMF, National Bank of Serbia, and the Central Bank of Kosovo provides the annual data that are included in our panel. Countries that are studied empirically are six Western Balkan Countries, namely Albania (ALB); Bosnia and Herzegovina (BIH); Maceonia (MKD); Montenegro (MNE); Serbia (SRB), and Kosovo (KV).

3.2. ECONOMETRIC METHODOLOGY

The following is a representation of the estimated model:

$$NPL_{it} = \alpha_i + \beta_1 NPL_{it} + 1 + \beta_2 UNE_{it} + \beta_3 IGDP_{it} + \beta_4 IN_{it} + \beta_5 LIR_{it} + \beta_6 CGB_{it} + \varepsilon_{it}$$

The ratio of bank non-performing loans to total gross loans is the dependent variable in the model. GDP growth (GDP), unemployment (UNE), inflation

[21] Tabak, B. M., Guerra, S. M., Lima, E. J., Chang, E. J.: The stability-concentration relationship in the Brazilian banking system *Working. Papers Series 145 Central Bank of Brazil Research Department*, 2015.

[22] Shingjergji, A.: The Impact of Macroeconomic Variables on the Non-Performing Loans in the Albanian Banking System During 2005.-2012. *Academic Journal of Interdisciplinary Studies*, 2(9) 2013, p. 335.

[23] Mazreku, I., Morina, F., Misiri, V., Spiteri, J. V., Grima, S.: Determinants of the level of non-performing loans in commercial banks of transition countries. *European Research Studies Journal*, 21(3) 2018, pp. 3-13.

(IN), the lending interest rate (LIR), and Central Government Debt(CGB), are macroeconomic indicators and other variables studied in this study Table 2 outlines the definitions of variables and their sources.

Table 1. Definition of variables

Variable	Definition	Measures	Source
NPL	Non-performing loans	% of total loans	World Bank, the National Bank of Serbia (NBS)
UNE	Unemployment	% of the total labor force	World Bank
GDP	GDP growth	annual %	World Bank
IN	Inflation, consumer prices	annual %	World Bank
LIR	Lending interest rate	%	World Bank, NBS, Central Bank of Kosovo (CBK)
CGB	Central Government Debt	% of GDP	IMF, Trading Economics

In this paper, a total of 5 econometric models were executed, the execution starts with two basic econometric models (OLS and OLS Robust). Meanwhile, since the data used in this paper belong to the panel data type, then 2 other preferred models for the panel data were executed as well; the fixed effects model and the random effects model.

Considering their ability to address specific challenges inherent in panel datasets, advanced econometric models such as Ordinary Least Squares (OLS), OLS with robust standard errors (OLSR), Fixed Effects (FE), Random Effects (RE), and Generalized Method of Moments (GMM) are preferred in panel data analysis. The Fixed Effects method is used to account for unobservable time-invariant entity-specific effects, whereas the Random Effects method assumes these effects are random. The resilience of OLS with robust standard errors to heteroscedasticity and possible bias in standard errors is used. In the face of endogeneity, GMM provides flexibility by allowing for instrument variables. This model combination allows researchers to deal with several sources of variation, test hypotheses, and select the best model for the specific properties of the data. For comparison, we use the Hausman test to select the most dependable model from the Fixed and Random Effects. In general, a proper estimating approach should be used to obtain reliable and effective estimates of this parameter. In addition, Arellano and Bover (1995) developed the system GMM estimator, which combines a regression in differences with one in lev-

els. We use the Sargan test for overidentifying restrictions to assess the general validity of the instruments. This test examines the sample equivalent of the moment conditions used in the estimation method, allowing the underlying assumptions to be validated.

At the very end, the Gaussian mixture models (GMM) model is executed. This model is a probabilistic model for representing the presence of multiple underlying subpopulations within a dataset. GMMs can also be used to detect anomalies by modeling a system's normal behavior and spotting deviations from the learned distribution. This model can be used for a variety of tasks, including clustering, density estimation, and classification. One more reason to use GMM is that they can model complex, multi-modal distributions, which may not be possible with other types of models, a GMM could be used to identify those groups and model their distribution separately. Another reason to use GMM is that they are flexible and can accommodate a wide range of data distributions. Since some variables of this research had bio-modal distribution, the results of this model are also presented.

3.3. DISCUSSION AND FINDINGS BASED ON EMPIRICAL RESEARCH

Descriptive statistics of the study's variables are shown in the table above, where we have 72 observations per unit, so six countries of the Western Balkans are included in 12 years, respectively 2010-2021. During the research period, non-performing loans made up 10.60% of all loans in the Western Balkans. This region has a high unemployment rate when compared to developed countries, where the average unemployment rate during the research period was 21.01%.In terms of economic growth, the countries are satisfactory at 2.51%. The average inflation rate is 1.99%, while Central Government Debt is 46.49% of the gross domestic product of these countries.

Table 2. Research variables' descriptive statistics

.	OBS	MEAN	STD DEV	MIN	MAX
NPL	72	10.60	5.95	1.93	22.24
UNE	72	21.01	7.10	9.01	41.4
GDP	72	2.51	3.66	-15.30	12.43
IN	72	1.99	2.18	-1.58	11.13
LIR	72	7.34	2.89	1	14.36
CGB	72	46.49	20.85	5.27	103.28

Source: Stata- The author's calculations using data from the World Bank, IMF, Trading Economics, the Central Bank of Kosovo, the National Bank of Serbia

Since the research period also includes the years of the pandemic, in which there were major economic disturbances, the economic growth-GDP variable has high deviations and can be considered outliers. This variable has a minimum of 15.30% in 2020, while its maximum is 12.43% in 2021, so there is a disproportion of growth from year to year during the pandemic period.

Table 3. Analysis of the correlation matrix

.	NPL	UNE	GDP	IN	LIR	CGB
NPL	1.00					
UNE	-0.10	1.00				
GDP	-0.14	0.04	1.00			
IN	0.21	0.02	0.10	1.00		
LIR	0.39	0.53	0.00	0.37	1.00	
CGB	0.37	-0.74	-0.24	-0.04	-0.28	1.00

Source: Stata- Author's calculations- using data from World Bank, IMF, Trading Economics, the Central Bank of Kosovo, the National Bank of Serbia

The correlation coefficient is examined in the table above. This coefficient is useful in demonstrating the connection between the variables under consideration. Based n he results obtained from this coefficient, here s a negative ratio of non-performing loans with unemployment (r =-0.10) and economic growth (r=-0.14), so the increase of these two indicators has an impact on the reduction of non-performing loans in the Western Balkan Countries. As for positive ratios with non-performing loans, we have inflation (r=0.21), lending interest rate (r=0.39), and central government debt (r=0.37), so the increase in these indicators has a positive impact on the increase in non-performing loans. Next, we will present the analysis of the regression results. Several models were run to make the coefficients more accurate and reliable.

The following table summarizes the regression results, which include five applicable econometric models such as Pooled OLS, Pooled OLS Robust, Fixed Effect, Random Effect, and GMM.

Table 4. The model summary results

Variables	OLS	OLSR	FE	RE	GMM
	Coefficient /t-stat	Coefficient /t-stat	Coefficient /t-stat	Coefficient /t-stat	Coefficient /t-stat
UNE	0.01	0.01	0.26	0.01	-0.01
	(0.08)	(0.07)	(1.81)	(0.08)	(0.04)
GDP	-0.03	-0.03	-0.01	-0.03	0.17
	(-0.24)	(-0.15)	(-0.15)	(-0.24)	(1.82)
IN	0.11	0.11	-0.61*	0.11	-0.37
	(0.41)	(0.4)	(-2.39)	(0.41)	(-1.16)
LIR	1.07***	1.07***	1.16***	1.07***	1.99***
	(4.15)	(4.25)	(3.64)	(4.15)	(2.65)
CGB	0.15***	0.15***	-0.02	0.15***	0.22***
	(3.52)	(2.64)	(-0.52)	(3.52)	(3.41)
L.NPL					0.45***
					(3.80)
Hausman Test = 0.00					
Sargan Test					47.00
Prob > F	0.00	0.00	0.00	0.00	0.00
N	72	72	72	72	66
R^2	41.86%	41.86%	57.70%	37.99%	

*Note: t-statistics are shown in parentheses; *p<0.1; **p<0.05; ***p<0.01*

Source:. Stata- Author's calculations using information from the World Bank, IMF, Trading Economics, the Central Bank of Kosovo, the National Bank of Serbia

The Hausman test prompts us to emphasize the impact of fixed effects on the overall outcome while ignoring the role of random effects in the outcome generation process. Nonetheless, we will interpret the results of the GMM model. Furthermore, when the instruments for the first difference equation have distinct variable values, the Sargan test for overidentification fails to reject the null hypothesis. This indicates the instruments' dependability.

The interpretation of the coefficient is done under the ceteris paribus assumption. The table above illustrates the summarized results of the five econometric models executed, according to the findings of the models, the most suitable model for the analysis of our data is the GMM model. The Sargan test for over-identification is found to not reject the null when the instruments for the

first-difference equation are different values of variables, indicating that the instruments are legitimate. Based on the results obtained from this model, the growth of non-performing loans impacts positive has GDP with a coefficient of 0.17, the lending interest rate, with a coefficient of 1.99, which is significant at the 1% level of importance, as well as central government debt, with a coefficient of 0.229, has a significant positive impact on the growth of NPL. These findings are consistent with the author (Louzis et al. 2012) and the variables they used namely, lending interest rate and central government debt also for the variable GDP, results are consistent with authors (Tabak et al. 2005), and (Shingjergji 2013), in contrast, with other authors universally accepted that GDP has impact negative on non-performing loans.

Meanwhile, the variables unemployment (0.01) and inflation(0.37), both of which are significant in the level of importance, have a negative impact on non-performing loans. Findings of the variable unemployment are consistent with the author (Tabak et al. 2005), in contrast with most of the authors that universally accepted that unemployment positively impacts non-performing loans.

According to this study, the effect of increased interest rates due to inflation, as well as the worsening economic conditions that are often associated with rising inflation, outweighs the beneficial effect that inflation may have on borrowers' debt servicing capacities. These findings are comparable for inflation to those of the authors Bilan, and Nkusu but not with Skarica that found a non-significant but positive link between the inflation rate and non-performing loans rate.

4. CONCLUSION

In this article, panel data models are estimated to investigate if various macroeconomic factors may serve as leading indicators of the non-performing loan ratio. This study provides significant data that may be utilized to monitor banking sector imbalances and to make policies that will make it less likely that the banking sector will be in trouble in the future. The findings of this study are, for the most part mainly consistent with the findings of research carried out by a great number of other authors. The macroeconomic factors in this study were assessed using the system GMM dynamic panel data estimator, that impacted NPL in Western Balkan nations from 2010 to 2021. The model used in this research article finds that the following variables, such as GDP growth (annual%), lending interest rate, and central government debt, have a positive impact on non-performing loans., while variables such as unemployment and inflation, have a negative impact on non-performing loans.

The paper shows how non-performing loans are affected by macroeconomic factors and how they might harm an economy. As a result, governments should

support banks in managing potentially defaulting loans. Because of the study's findings, it is advised that the macroeconomic environment be regularly examined because it is tied to the banking industry. This analysis, which we have been carrying out, in the near future we plan to expand by taking into account the characteristics that are unique to banks and have the potential to influence the quality of banks loans.

We provide the following recommendations based on the data provided:

– It is advised that the Central Banks of the Western Balkan countries control the commercial banks to prevent the interest rate from rising arbitrarily because the results show that the interest rate has a significant impact on the growth of non-performing loans where the variable was significant at the highest levels of importance.

– The second recommendation also has to do with the interest rate, although the recommendation goes in the context of the clients. Hence, consumers who want to receive a loan should also prepare for an increase in interest rates in the long run, so that the increase in interest rates will not influence the loan to become a non-performing loan.

According to the GMM model's findings, economic growth has a positive effect on the increase of non-performing loans, since, in countries with positive economic performance, lending is higher. So, it is recommended that banks carefully review the criteria for issuing loans, where the criteria should not be eased when the economic performance is positive.

LITERATURE

1. Ahmad, M. I. Guohui, W., Hasan, M., Ali, R., Rafiq, M. Y., Rehman, R.: Non-performing loans and economic growth, *Journal of Economics, Business and Management*, 66(4) 2016, pp. 584-586.
   – DOI: https://doi.org/10.21276/sjebm.2016.3.10.9

2. Angela, R., Irina, B.: An empirical analysis of the macroeconomic determinants of non-performing loans in EU28 banking sector, *Reviste Economica*, 67(2) 2015, pp. 108-127.

3. Baristiz, S.: Non-performing loans in Western Europe-A selective comparison of countries and national definitions, *Focus on European Economic Integration*, Q1 2013, pp. 28-47.

4. Bayar, Y.: Macroeconomic, .institutional and bank-specific determinants of non-performing loans in emerging market economies: A dynamic panel regression analysis, *Journal of Central Banking Theory and Practice*, 8(3) 2013, pp. 95-110.
   – DOI: https://doi.org/10.2478/jcbtp-2019-0026

5. Beck, R., Jakubík, P., Piloiu, A.: Key determinants of non-performin loans: new evidence from a global sample, *Open Economies Review*, 26(3) 2015, pp. 525-550.
   – DOI: https://doi.org/10.1007/s11079-015-9358-8
6. Dimitrios, A., Helen, L., Mike, T.: Determinants of non-performing loans: Evidence from Euro-area, *Finance.research letters,* 18(August) 2016, pp. 116-119.
   – DOI: https://doi.org/10.1016/j.frl.2016.04.008
7. Klein, N.: Non-performing loans in CESEE: Determinants and Impact.on Macroeconomic Performance, *International Monetary Fund*, 2013.
   – DOI: https://doi.org/10.2139/ssrn.2247224
8. Kjosevski, J., Petkovski, M.: Non-performing loans.in Baltic States determinants and macroeconomic effect, *Baltic Journal of Economics,* 17(1) 2014, pp. 25-44.
   – DOI: https://doi.org/10.1080/1406099X.2016.1246234
9. Louzis, D. P., Vouldis, A. T., Metaxas, V. L.: Macroeconomic and bank-specific determinants of non-performing loans.in Greece: A comparative study of mortgage, business and consumer loan portfolios, *Journal of Banking Finance*, 36(4) 2012, pp. 1012-1027.
   – DOI: https://doi.org/10.1016/j.jbankfin.2011.10.012
10. Mazreku, I., Morina,.F., Misiri, V., Spiteri, J. V., Grima, S.: Determinants of the level of non-performing loans in commercial banks of transition countries. *European Research Studies Journal*, 21(3) 2018, pp. 3-13.
   – DOI: https://doi.org/10.35808/ersj/1040
11. Messai, A. S., Jouini, F.: Micro and macro determinants of non-performing loans, *International journal of economics and financial issues*, 3(4) 2013, pp. 850-860.
12. Prasanna, P. K.: Determinants .of non-performing loans in Indian Banking System'dalam, *Behavioral Sciences and Economics.Issues*, 2014, pp. 11-12.
13. Radivojevic, N., Jovovic, J.: Examining of determinants of.non-performing,. *Prague Economic Papers*, 26(3) 2017,.pp. 300-316.
   – DOI: https://doi.org/10.18267/j.pep.615
14. Sheefeni, J. P.: The impact of macroeconomic determinants on non-performing loans in Namibia, *International Review of Research in Emerging Markets and the Global Economy,* 1(4) 2015, pp. 612-632.
15. Shingjergji, A.: The Impact of Macroeconomic Variables on the Non-Performing Loans in the Albanian Banking System During 2005.-2012. *Academic Journal of Interdisciplinary Studies*, 2(9) 2013,.p. 335.
   – DOI: https://doi.org/10.5901/ajis.2013.v2n9p335
16. Souza, .G. J., Feijo, C. A.: Credit risk and macroeconomic interactions: Empirical evidence from the Brazilian banking system, *Modern Economy*, 2(05) 2011, p. 910.
   – DOI: https://doi.org/10.4236/me.2011.25102

17. Staehr, K., Uuskula, L.: Macroeconomic and macro-financial factors as leading indicators of non-performing loans-Evidence from the EU countries, *Journal of Economic Studies*, 48(3) 2021, pp. 720-740.
– DOI: https://doi.org/10.1108/JES-03-2019-0107

18. Stijepovic, R.: Recovery.and reduction of non-performing loans-Podgorica approach, *Journal of Central Banking Theory and Practice*, 3(3) 2014, pp. 101-118.
– DOI: https://doi.org/10.2478/jcbtp-2014-0017

19. Svetozar, T., Maja, J.: Macroeconomic.and.Institutional Determinants of non-perfoming loans, *Journal of Central Banking Theory and Practice*, 4(1) 2015, pp. 47-62.
– DOI: https://doi.org/10.1515/jcbtp-2015-0004

20. Szarowska,I.: Effect of macroeconomic determinants on non-performing loans in Central and Eastern, *International .Journal of monetary Economics and Finance*, 11(1) 2018,.pp. 20-35.
– DOI: https://doi.org/10.1504/IJMEF.2018.090564

21. Tabak, B. M., Guerra, S. M., Lima, E. J., Chang, E. J.: The stability-concentration relationship in the Brazilian banking system, *Working Papers Series 145 Central Bank of Brazil Research Department*, 2015.

22. Vasiliki, M., Athanasios, T., Athanasios, B.: Determinants of non-performing loans: The case of Eurozone, *Panoeconomicus*, 61(2).2014, pp. 193-206.
– DOI: https://doi.org/10.2298/PAN1402193M