

DETERMINANTS OF NPL GROWTH IN MACEDONIA

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Abstract³

Non-performing loans are one of the most vulnerable categories in the balance sheet of banks. Their increase can affect banks' liquidity and solvency. That is why defining the main indicators that influence the development of non-performing loans is crucial for both bank performance and the financial system as a whole. This paper investigates macroeconomic and bank determinants of NPLs in Macedonia for the period 2006-2015, including descriptive and econometric analyses. The first analysis presents the correlation between NPLs and two macroeconomic indicators: GDP and Inflation. The second econometric analysis shows the correlation between NPLs and two bank indicators: Capital to Assets and Return on Equity. In these estimations, we also include the inflation as an independent variable. The analyses show that in a period of economic growth and higher inflation, non-performing loans are low and stable. The increase of the capital to asset and return on equity ratios reduces the level of NPLs as well. We conclude that as long as the economy is stable and banks are profitable and have adequate capital, nonperforming loans are on a level suitable for the banks.

Keywords: *non-performing loans, economic activity, inflation, capital to asset, return on equity*

JEL Classification: *C01, C31, C32, E51, G01, G21*

1. Introduction

Non-performing loans are one of the main indicators to identify the asset quality of the bank. Loans are classified as NPLs when payments of both principal and interest are past due by three months (90 days) or more, or interest payments equal to

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three months' (90 days) interest or more have been capitalized, refinanced, or rolled over (IMF Financial Soundness Indicators Compilation Guide, 2006). Although this definition is commonly used, each country has its own methodology of defining NPLs.

Non-performing loans are part of the balance sheet of each bank. If the bank has a high level of non-performing loans, then it is exposed to additional and unplanned expenses to cover its losses. In some cases, as a result of this, banks are facing liquidity and solvency problems. Non-performing loans are signals of the bank's exposure to credit risk. The share of non-performing loans in total loans is one of the main indicators of credit risk, contributing to the deterioration of bank assets. A higher ratio represents a higher credit risk, as a result of increased non-performing loans. According to the IMF, this ratio is a backward-looking indicator, which means that NPLs are identified when problems emerge. Research indicates that if the share of non-performing loans to total loans is above 10% then it is an alarming signal and higher bank exposure to risk. According to Demirguc-Kunt and Detragiache (1998), the banking crisis is defined as a crisis when the NPLs/Total loans ratio is above 10% and the cost of the crisis is above 2% from the GDP. However, this percentage is very arguable due to the fact that it is very hard to determine the optimal level of such indicator for a certain economy. History shows that the indicator is significantly dependent on various individual economic indicators for a certain country and thus, while for some countries 10% might mean a crisis, for other countries it might just mean an ordinary day.

This paper investigates the trend of non-performing loans in Macedonia, during the period 2006-2015. The analysis shows that non-performing loans are results of macro and bank determinants. The decline in economic activity in the country contributes to asset deterioration of the banks and an increase in non-performing loans. On the other hand, in the period of stable and positive economic trends, bank clients are financially capable of paying their debts and non-performing loans are stable or even decreasing. Also, the analysis shows a correlation between the inflation and non-performing loans, so in time of high inflation, non-performing loans are low and reverse. One of the explanations may be that when the inflation is increasing, the real value of loans is lower, so the non-performing loans are decreasing. In addition to macro determinants, this paper finds a correlation between bank determinants such as return on equity and equity to asset with non-performing loans. The econometric analysis in this part shows that when the bank is having higher profitability and capital, non-performing loans are lower.

The paper is organized as follows. Section II gives a short literature overview of the main findings regarding the determinants of non-performing loans. In Section III, we provide an analysis of non-performing loans in Macedonia. Section IV presents the main findings of the descriptive analysis of the correlation between GDP, Inflation and non-performing loans. Section V presents the main findings of the econometric analysis of the correlation between bank determinants such as equity to asset and return on equity with non-performing loans. Also, in this part we present the econometric analysis of the relation between the inflation and non-performing loans. Section VI gives the main conclusions.

2. Literature overview

Non-performing loans as an economic category are research focus of many economists. Most of them are trying to examine the influence of NPLs on economic growth and the feedback response from NPLs to economic growth. There is significant research on the influence of bank specific factors on the level of NPLs. However, most of the researchers are trying to include the influence of both bank-specific and macroeconomic variables. The findings of the research on determinants of NPLs across literature are similar, and in most cases, the GDP is one of the main factors that influence the path of NPL growth. Still, there are also other determinants that influence the growth of NPLs. Keeton W.R (1999) argues that an extremely high loans growth is one of the reasons for growth in NPLs. The behavior of loan growth and credit standards in the 1990s provides partial support for the view that faster loan growth leads to higher loan losses, because loan growth and credit standards behaved just as one would expect if supply shifts were driving the change in loan growth. Using a panel data on non-performing loans across 75 countries during the past decade, Beck et al. (2013) define the main macroeconomic determinants of NPLs. According to their dynamic panel estimates, the following variables were found to significantly affect NPL ratios: real GDP growth, share prices, the exchange rate, and the lending interest rate. The results also showed that real GDP growth was the main driver of non-performing loan ratio during the past decade. A drop in global economic activity remains the most important risk for bank asset quality. But still the economic activity is not able to fully explain the evolution of non-performing loans. The results of this research also showed that in the case of exchange rates, the direction of the effect depends on the extent of foreign exchange lending to unhedged borrowers, which is particularly high in countries with pegged or managed exchange rates. Furthermore, exchange rate depreciations might lead to an increase of nonperforming loans in countries with a high degree of lending in foreign currencies to unhedged borrowers (approximated by international claims which are mainly denominated in foreign currencies).

Jordan and Tucker (2014) also define that growth in economic activity tends to lead to a reduction in non-performing loans, and there is additionally a small but significant feedback effect from non-performing loans to output. Their research is based on the extent to which economic output and other variables affect non-performing loans in the Bahamas utilizing a vector error correction (vec) model. It also seeks to determine if there is a feedback response from non-performing loans to economic growth. Data utilized in the study spanned the period September 2002 to December 2011.

Tracy (2011) assesses the impact of non-performing loans (NPLs) on bank specific data - loan growth. In making lending decisions, banks are assumed to react differently to NPL ratios above or below a threshold, with NPLs above the threshold having an adverse effect on lending. This is also contingent on the level of Capital Adequacy Ratio (CAR) banks hold for regulatory standards or own internal capital ratio requirements. Tracy (2011) estimates the threshold range for the Loan-NPL relationship using regression analysis for two Caribbean countries. The results suggest a threshold range for NPLs as determining differential loan behavior of banks. An implication is that bank lending behavior could restrain economic activity, especially in periods of

stress when NPLs are high. In a study by Maggi and Guida (2009), which modeled the effect of NPLs on the cost structure of the commercial banking system, it was found that probability of an uncertain loan becoming non-performing is extremely costly to the banking system, effectively impacting the efficiency of the banking sector.

Mileris (2014) analyzes the macroeconomic factors and their impact on the percentage of non-performing loans (NPLs) in commercial banks of the EU countries, and the findings are in the same direction. The empirical research consists of three parts. First, the amount of non-performing loans in Lithuania and other EU countries has been analyzed with a certain magnitude of the NPLs problem in these countries. Second, the recent macroeconomic changes in Lithuanian economy were interrelated to the NPLs growth problem in commercial banks. Third, the impact of macroeconomic changes on the amount of NPLs in other EU countries has been analyzed. The analysis of Lithuanian macroeconomic indicators has proven the tight dependency of non-performing loans on changes of the economic environment in the country. The deterioration in GDP, exports, compensation of employees, final consumption expenditures of households, unemployment rate, the number of bankrupted companies and government expenditures highly increased the percentage of NPLs in Lithuanian banks. These business and economic indicators related to households and public finance may be considered as very important determinants of banks' loan portfolio credit risk level changes. The ability of debtors to repay credits is very sensitive to the business cycle fluctuations in Lithuania.

Beside the macroeconomic determinants, many researchers focus on bank performance indicators as determinants of NPL growth. Peyavali and Sheefeni (2015) assess bank-specific determinants of non-performing loans in commercial banks in Namibia. The study employed time-series econometric techniques on the quarterly data covering the period 2001 to 2014. Two models were estimated in which return on assets and return on equity were alternating as profitability measures, among other variables that explain non-performing loans. The results reveal that return on assets, return on equity, loan to total asset ratio, log of total assets are the main determinants of non-performing loans. In specific terms, a negative relationship between non-performing loans and return on assets, as well as return on equity was found. Furthermore, a positive relationship between non-performing loans and loan to total asset ratio was found. Lastly, the results revealed a positive relationship between non-performing loans and log of total assets.

Regarding the Republic of Macedonia, there are not many individual studies on this subject. In most of the cases, Macedonia is included in the group of countries for which the authors analyze the factors that influence NPLs. Klein (2013) in his paper investigates the non-performing loans (NPLs) in Central, Eastern and South-Eastern Europe (CESEE) in the period of 1998–2011, in which in addition to the countries from the region, the author includes Macedonia. The results of this research finds that the level of NPLs can be attributed to both macroeconomic conditions and banks' specific factors, though the latter set of factors was found to have a relatively low explanatory power. The examination of feedback effects broadly confirms the strong macro-financial linkages in the region. While NPLs were found to respond to

macroeconomic conditions, such as GDP growth, unemployment, and inflation, the analysis also indicates that there are strong feedback effects from the banking system to the real economy, thus suggesting that the high NPLs that many CESEE countries currently face adversely affect the pace of economic recovery. Curak et al. (2013) empirically investigate the determinants of non-performing loans in Southeastern European banking systems. The analysis is based on a sample of 69 banks in 10 countries (including Macedonia) in the period from 2003 to 2010 and a Generalized Method of Moments estimator for dynamic panel models. The research encompasses both macroeconomic and bank-specific factors. The results show that lower economic growth, higher inflation and higher interest rate are associated with higher non-performing loans. Additionally, the credit risk is affected by bank-specific variables such as bank size, performance (ROA) and solvency.

Vaskov et al. (2012) present the first empirical analysis of macroeconomic determinants of non-performing loans in the Macedonian banking system, based on panel estimation in a sample of 16 banks. The results show that variables with highest explanatory power are the inflation rate and the REER, with both having positive signs in the equations explaining the movement of the NPL ratio. They found weak explanatory power of the GDP coefficient and interest rates coefficient. Popovska (2014) observes the non-performing loans (NPLs) in selected developed and developing countries, with a certain focus on the trend and determinants of NPLs in the banking sector of the Republic of Macedonia. Popovska is using regression analysis with quarterly data from 2006 to 2014. The results indicate no support for any relation between NPLs and GDP growth. Significant relation was found between NPLs and: foreign currency spreads between reference lending and deposit rates, personnel expenses/non-interest expenses, equity and reserves/assets and liquid assets/total assets. Furthermore, the analysis shows that bank-specific variables like liquid assets/total assets, personnel expenses/non-interest expenses, capital adequacy; net interest income/gross income are the key factors influencing the level the NPLs in the banking sector in the Republic of Macedonia.

3. Non-performing loans in Macedonian banking system

The Macedonian banking system is based on a traditional banking model, where the basic source of funding for banks are the deposits, while their main activity is loan supply. Before the global financial crisis, Macedonian economy experienced a rapid credit growth, with a low increase in non-performing loans. But from the beginning of the crisis in 2008, the loan supply significantly decreased, credit conditions were tightened and non-performing loans started to increase. The main driver of non-performing loans is the corporate sector, with a share of around 80% in the total non-performing loans. Still, in the period 2008-2012, there was an increase in the share of non-performing loans to households (reaching the level of around 30% of total NPLs), as a result of a drastic growth of the exposure with poorer quality. Such developments were expected to a certain extent, especially because it is a relatively "young" portfolio and the income and household creditworthiness are particularly sensitive to potential negative changes in the economic surrounding. (NBRM, Report on the Banking

System and Banking Supervision of the Republic of Macedonia in 2008). With the slow recovery in the following years, the share of non-performing loans to households decreased, and at the end of 2015, it was on the level as before the global financial crisis. According to the last available data (NBRM, Report on the Risks in the Banking System), the highest credit risk exposure in 2015 was found in residential and commercial real estate loans, consumer loans and credit cards. In the corporative sector, the highest exposure was found in the industry, wholesale and retail trade and construction. Also, the construction sector is one of the fastest growing industries in terms of the volume of lending.

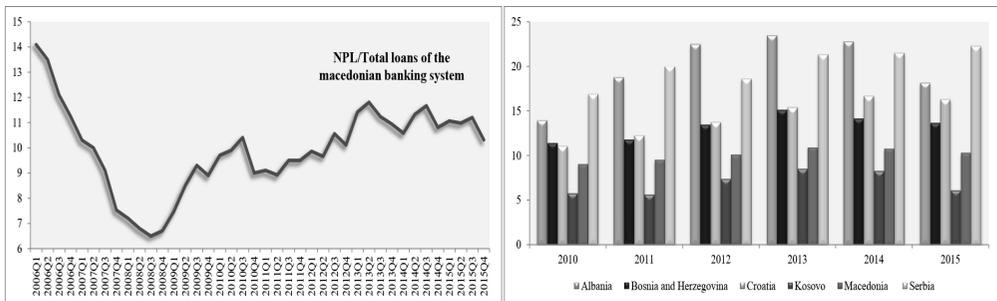
Table 1. Share of household and enterprise NPLs in total NPLs, in %

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Household NPL/Total NPL	16.3	22.8	32.2	37.2	36.0	30.9	27.5	23.4	22.1	20.9
Enterprise NPL/Total NPL	83.3	75.4	66.0	62.8	64.0	69.1	72.5	76.6	77.9	79.1

Source: NBRM, Monetary Statistic, Doubtful and contested claims

Compared with the other countries in the region, Macedonia has a relatively low share of non-performing loans to total loans. According to the last available data from 2015, the highest share of non-performing loans is registered in Albania and Serbia, at around 20%, and the lowest in Kosovo, at around 6%. The share of non-performing loans to total loans in Macedonia is around 10%, right after Kosovo.

Chart 1. NPLs/Total Loans



Source: NBRM, International Monetary Fund, Financial Soundness Indicators

4. Macroeconomic Determinants of Non-performing Loans

Non-performing loans⁴ and GDP

Andres C. and Bonilla O. (2012) are analyzing NPLs in Italy and Spain. According to their research, in both countries, GDP variable is significant, showing that when GDP growth is high, there is decline in the level of the non-performing loans. The descriptive analysis of the developments of non-performing loans in Macedonia during the period 2006-2015 shows their correlation with the performance of the economy. In the period of expansion and positive economic growth (2006-2008), non-performing loans are low and stable, with an average annual growth of around 4%, compared to the total credit growth of 33%. In 2007, real GDP registered the highest annual growth of 10.4%, while the non-performing loans registered the highest annual decrease of 6.3%. In this period, commercial banks eased their credit conditions and were more opened to the credit demand from the private sector. This was followed by the high credit expansion and annual growth rates of around 40% at the end of 2007. But this trend did not last too long. In the second half of 2008, the first effects of the global financial crisis were felt by the Macedonian economy. As a result of the decrease in the external demand and negative growth of the most significant trading partners, Macedonian economy witnessed a decline in export demand, decrease of capital inflow and consequently, a decline in the real economy. In 2009, similar to the other neighboring and European countries, the recession hit harder. As a result of the decreased demand and slow domestic growth, the private sector was faced with liquidity problems and inability to service their debts towards banks. As a result of decreased quality of their credit portfolio and worsened economic expectations in this period, banks tightened their credit conditions and became more careful in approving loans. The demand for loans in this period was not for investments, but most often for debt restructuring or covering basic expenses (NBRM Bank Lending Survey). In order to lower their credit risk, banks decreased their credit supply and focused on more secure investments such as investments in government securities and putting their assets in foreign banks. The difficult access to financial sources and worsening of economic performance in the country had a negative impact on the financial capacity of the private sector. Starting from Q4 2008, non-performing loans started to increase and reached their peak by the end of 2009, when the annual growth rate was around 50%. In 2010, a gradual recovery of domestic economic activities had started as a result of improvement in global economic conditions, which continued in the following years. The easing of credit conditions was gradual and banks were extremely cautious and careful. Slow improvement in the credit supply was registered as well, but still the annual credit growth rates were single digit. The favorable economic environment improved the payment capability of credit users, and the annual growth rate of non-performing loans started to slow down. By the end of 2015, the annual increase of non-performing loans was 5%, while the real GDP increased by 3.9%.

⁴ The data used are from the Monetary statistic of NBRM, Category "Doubtful and contested claims"

Chart 2. Non-performing loans and real GDP annual growth, in %

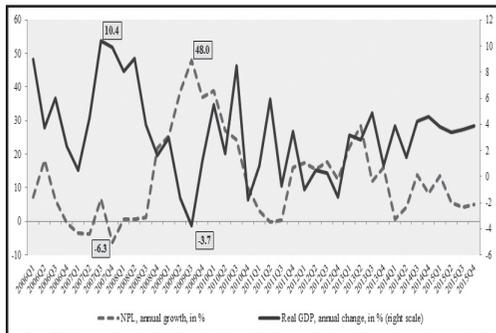
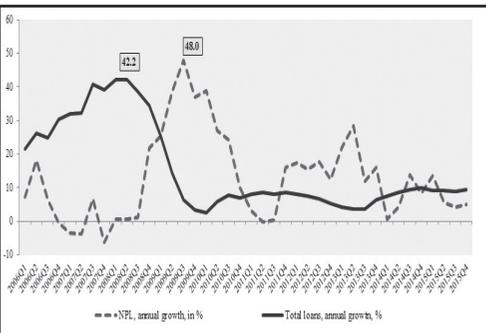


Chart 3. Non-performing loans and total loans, annual growth, in %

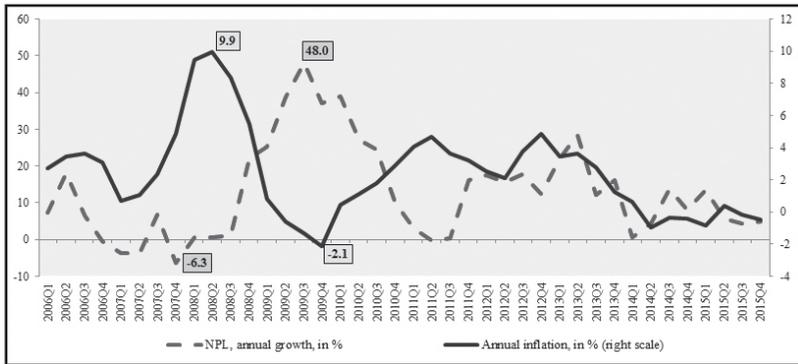


Source: NBRM, State Statistical Office

Non-performing loans and inflation

Many analyses confirm the correlation between the development of non-performing loans and other macroeconomic variables like the exchange rate, interest rates and inflation (as it mentioned in Literature Overview). The relation between non-performing loans and inflation can be positive or negative. Higher inflation can make debt servicing easier either by reducing the real value of outstanding loans or simply because it is associated with low unemployment as the Phillips' curve suggests (Nkusu, 2011). On the other hand, in order to reduce high inflation, central banks usually increase their policy rate, which gives a signal to the banks to increase their lending rates, which can alter the financial capability of borrowers in paying their debts. However, Andres C. and Bonilla O. (2012) conclude that there is now a relation between NPLs and inflation. The inflation and non-performing loans in Macedonia most often have an opposite direction. As data show in the period of low growth of non-performing loans (before the financial crisis), the inflation rates were high, reaching their highest level of 9.9% in 2008. During the first half of 2008, given the strong pressures from import prices, stronger domestic demand and high inflation expectations, inflation was kept at a level higher than usual. This is a period in which the prices of food and energy on the world markets were still registering upward trends, and the uncertainty about their future trajectory, the risk of secondary effects on wages and other prices in the economy and the possibility to open an inflation spiral were extremely high. (NBRM, Annual Report, 2008). In the following period, inflationary pressures significantly declined, but non-performing loans increased as a result of the slowing economy resulting from the global financial crisis. As data show, most of the time, the increase in inflation is followed by a decrease in non-performing loans and vice versa.

Chart 4. Non-performing loans and inflation, annual growth, in %



Source: NBRM, State Statistical Office

5. Bank determinants of non-performing loans

Specification of variables

This section studies the relationship between non-performing loans and bank variables, like Capital to Asset and Return on Equity. We use the econometric model with NPLs as a dependent variable, and Bank variables as independent variables. In the specification we also add the inflation rate as an independent variable.

Capital to Assets is the ratio of capital and reserves to total assets and it is one of the indicators of banks' capital adequacy. According to the IMF Guide, capital and reserves are the residual interests of owners in the assets of the sector after the deduction of liabilities. These data provide a comprehensive measure of capital resources available to the sector to absorb losses. This indicator provides an indication of the financial leverage—that is, the extent to which assets are funded by other than own funds. According to the IMF, indicators of asset quality and capital adequacy are correlated such that it shows the size of any reduction in capital that results from a deterioration in asset quality or increase of non-performing loans. The other indicator **Return on Equity** (net income to average capital) is intended to measure deposit takers' efficiency in using their capital and their profitability.

In the model specification, the following data are used:

Bank variables:	Time-frame	Source
NPLs	Quarterly 2006-2015	National bank of the Republic of Macedonia
Capital to Assets - CA	Quarterly 2006-2015	National bank of the Republic of Macedonia
ROE	Quarterly 2006-2015	National bank of the Republic of Macedonia

Real sector variables:		
I - Inflation	Quarterly 2006-2015	National Statistical Office of Macedonia
VIX - Index	Quarterly 2006-2015	

Where – GDP refers to the real Gross Domestic Product; I is the annual inflation in the Republic of Macedonia; VIX Index is a popular measure of the implied volatility of S&P 500 index options; NPLs are non-performing loans as a percentage of total loans; Capital to Assets is the Equity and reserves to Assets; ROE represents return on equity of the total banking sector.

Based on the theoretical framework, we use time series data to estimate Equation (1) using Ordinary Least Squares (OLS)

Equation

$$(1)NPL = c + B(1..)(\text{banking sector variables}) + D(1..)(\text{macroeconomic variables}) + E$$

Where NPL represents non-performing loans, B(1..) represents the coefficients of a bundle of banking variables and D(1..) is the coefficients of a bundle of macroeconomic variables. By using all these variables, the most appropriate model will be analyzed.

We can consider the given model as acceptable if we obtain the following results of testing and estimation:

- ✓ The regression is statistically significant (tested with F-test).
- ✓ All estimated parameters are statistically significant (tested with t-test) and have an appropriate sign.
- ✓ There is no autocorrelation in the model.
- ✓ There is no heteroscedasticity in the model.
- ✓ The residuals are normally distributed. T
- ✓ There is no indication of wrong specification of the model.

After testing and following this procedure, we can specify the BLUE model without the risk of spurious results.

Specification of the model and our expectations

With stationary data, OLS can be used without the risk of spurious results detailed in Granger and Newbold (1974). In addition, OLS is also the Best Linear Unbiased Estimator (BLUE) if the error terms are homoscedastic and are not serially correlated. We will test for heteroscedasticity and serial correlation following the estimations.

First we started testing with VAR model (Vector Auto Regression and error correction model); however, due to short time-series data (10 years and 40 observations), we couldn't obtain significant results. Then, we used Ordinary Least Square to estimate the best model for the equation (1). Our expectations for macroeconomic variables are as follows. The effect of inflation on growth is an intriguing topic in economics. On the one hand, inflation can be bad for NPLs or as the inflation grows, the expenses increase and NPLs should grow as well. The coefficient of the VIX Index should be

positive, or the higher the volatility of the implied S&P 500 Index options is, the higher the level of NPLs should be. Regarding the bank variables Capital to Assets and Return on Equity, our expectation is that there should be a negative relation, or the higher the Capital to Assets and ROE, the lower the NPLs should be.

Based on our test, we find the following model as BLUE model:

Dependent Variable: DNPL

Method: Least Squares

Sample (adjusted): 2006Q2 2015Q4

Included observations: 39 after adjustments

White heteroskedasticity-consistent standard errors & covariance

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.504222	1.231505	2.033466	0.0496
DROE	-0.041757	0.021303	-1.960196	0.058
EQUITY_TO_ASSETS	-0.21534	0.104819	-2.0544	0.0475
DINF	-0.161849	0.093449	-1.731951	0.0921
R-squared	0.18201	Mean dependent var		-0.078269
Adjusted R-squared	0.111896	S.D. dependent var		0.686893
S.E. of regression	0.647323	Akaike info criterion		2.064972
Sum squared resid	14.66595	Schwarz criterion		2.235594
Log likelihood	-36.26695	Hannan-Quinn criter.		2.126189
F-statistic	2.59593	Durbin-Watson stat		1.78235
Prob(F-statistic)	0.06789	Wald F-statistic		3.740311
Prob(Wald F-statistic)	0.01973			

$$DNPL = 2.5 - 0.04DROE - 0.2CA - 0.16DINF + E(t)$$

(-1.96)
(-2.05)
-1.8

With t-statistics provided below, to ensure that OLS is the BLUE, we tested the residuals in the OLS regressions for serial correlation and heteroscedasticity. Durbin-Watson (d) Statistics - if the estimated d value is significant (significantly different than 2), then one can fail to reject the hypothesis of model misspecification. In our model, $d=1.8$, which shows that there is no model misspecification. For multicollinearity we used the Lagrange Multiplier (LM) Test, where we got a value for chi-square which exceeds the critical chi-square value at the chosen 0.05 level of significance, hence we failed to reject the null hypothesis that there is multicollinearity. For residuals normality we tested through a histogram, where we obtained 3.01 for Kurtosis (measure of symmetry, or more precisely, the lack of symmetry) and 0 for Skewness (whether the data are heavy-tailed or light-tailed relative to a normal distribution). The homoscedastic and serially uncorrelated error terms prove that OLS is the BLUE, making it an appropriate estimation method.

Results and discussions

We were not able to find an econometric relation between GDP or similar macroeconomic variables and NPLs. Hence, the association between the NPL Index and GDP growth is not statistically significant in our analysis. The p value for this variable is greater than the 5% confidence level and therefore, we exclude it in order to analyze how the model changes. We got the same conclusion for unemployment. We can explain this with the fact that Macedonian banking sector is relatively strong with good regulation by the Central Bank and pretty conservative loan policies. However, macroeconomic variables in our model are represented by the variable inflation for which we found that it was statistically significant in explaining the variance of NPLs. As the descriptive analysis showed, the increase in the inflation rate causes a decrease in non-performing loans. More precisely, an increase of inflation by 1 percentage point will reduce the non-performing loans by 0.16 percentage points.

The explanatory power of the model (R^2) is 0.18 which means that our OLS model predicts that independent variables (bank variables and inflation) are explaining 18% of the fluctuations in NPLs. The signs for bank variables are the same as the expected ones. Namely, the increase in Equity to Assets and ROE is causing a reduction in NPLs. More precisely, an increase of ROE by 1 percentage point will reduce the NPLs by 0.04 percentage points. The statistical significance for this variable is 1.96, showing a strong relationship. Furthermore, an increase of Capital to Assets by 1 percentage point will reduce NPLs by 0.2 percentage points. The statistical significance for this variable is 2.0, showing a strong relationship as well. Data show that banks with higher profitability and adequate capital are better managed and have better quality of assets and therefore, low levels of non-performing loans.

Limitations of the study

One of the greatest challenges associated with this study is the limited availability of time series data. Data for Capital to Assets and ROE are available only after 2006 so we have only 40 observations. That is the main obstacle why we did not get significant results with VAR methods. In addition, the small sample size limits the ability to draw generalizations from the results of this study. Conclusions drawn from such a small sample may not always be generalized. Of course, one way to increase the number of observations is to increase the frequency of data, for example, using monthly data.

6. Conclusions

Determining the impact of macroeconomic and bank indicators on non-performing loans is very crucial for the banks, having in mind the importance of these types of loans and their impact on banks' liquidity and solvency. Our research of the linkages between NPLs and macroeconomic and bank performance for Macedonia attributes to NPLs a central role. The paper is based on descriptive and econometric analyses. According to our descriptive study, economic activity is highly correlated with the developments

of non-performing loans. As we saw from the data, in the period of expansion and positive economic growth 2006-2008, non-performing loans are low and stable. But, when the effects from the global financial crisis were felt by the Macedonian economy, the financial capability of the private sector declined and the non-performing loans started to increase. In 2010, a gradual recovery of the domestic economy started, and in the following period the annual growth of non-performing loans slowed down. As we can see, there is a strong connection between the economic prosperity and liquidity of the private sector and therefore, with non-performing loans. Unfortunately, we were not able to find econometric proof of this correlation. One of the explanations is that the Macedonian banking sector is relatively strong with good regulation by the Central Bank and pretty conservative loan policies. From the aspect of the macroeconomic indicator Inflation, we found descriptive and econometric correlation between the inflation and non-performing loans. From the aspect of bank indicators, the econometric results showed that higher Return on Equity and Capital to Assets contributes to lower and decreasing non-performing loans.

The main conclusion of our study is that when the Macedonian economy faces an economic boom and banks are profitable with proper capital adequacy, non-performing loans are low and stable. That is why macroeconomic stability with low inflation and stable economic growth is essential for a healthy financial system. As a recommendation to the policymakers, we can say that proper regulation and supervision of the banking sector is crucial even in good times as the possibility of making bad decisions by the banks is common during an economic boom. Furthermore, the policy of fixing the exchange rate, thus having a low and stable inflation, is appropriate in helping the banks to have a better credit policy with lower NPLs.

As future work, we can point out that this study analyzes only a few determinants of non-performing loans. There are many other macroeconomic and bank indicators that can influence the development of non-performing loans. The soundness of the financial system, proper regulations and adequate monetary policy should also be considered as one of the determinants of non-performing loans.

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