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THE RELATIONSHIP BETWEEN BANKS' PROFITABILITY PERFORMANCE AND BANKS RISK EXPOSURE IN THE CASE OF MACEDONIAN BANKS

Abstract

The subject of this paper is to determine the relationship between the profitability and the different types of risk in the Macedonian banking industry. We measure the profitability by the return on assets (ROA), net interest margin (NIM) and the profit. Panel VECM model is applied on the sample of 14 out of 15 banks in the Macedonian banking system in the period between the years from 2012 to 2016.

Our findings show that the credit risk, the interest rate risk and the liquidity risk have significant impact on the bank's profitability, while the currency risk indicator proved no statistical importance for the profitability of the Macedonian banking sector. According to the presented results, the credit risk has a positive, while the interest rate risk and the liquidity risk has a negative relation with the bank's profitability.

Keywords: Profitability, banks risks, risk model, panel VECM, Macedonian banks

JEL classification: C22, G01

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Introduction

The commercial banks are faced with different types of risks, with different magnitudes, which have influence on banks performance, such as credit risk, liquidity risk, currency risk, interest rate risk, operational risk etc.

A well-governed bank takes the amount of risk that maximizes the shareholder's wealth. This involves eliminating or mitigating of all bad risks to the extent that it is cost effective to do so. However, banks cannot succeed without taking risks. Consequently, taking actions that reduce the risk can be costly for the shareholders when lower risk means avoiding valuable investments and activities that have higher risk. So, the success of banks' system depends on how they take risks.

The relevant literature research revealed few studies that examine the determinants of profitability of Macedonian commercial banks Curak et al (2012), Iloska, (2014), Poposka and Trpkoski, (2013). According to the author's knowledge, there is no empirical research which analyzes the impact of bank's risks on bank's profitability in R. Macedonia. Thus, the aim of this paper is to analyze how different types of risks, such as the credit risk, liquidity risk, interest rate risk and currency risk, affect the profitability of banks in the Macedonian banking sector. The analysis is based on the sample of 14 banks in the period between the years 2012 and 2016.

Credit risk management is one of the bank's most important risk management segments. Well maintained credit risk management can increase banks profit significantly. Banks credit risk management presumes implementation of the credit risk system, designed and ruled by the banks desired credit risk averse.

Furthermore, we analyze whether banks' holdings of liquid assets have a significant impact on their profitability. It is well known that when a bank has inadequate liquidity, it cannot obtain sufficient funds, either by increasing liabilities or by converting assets promptly, at a reasonable cost, thereby affecting profitability. But, on the other hand, liquid assets generally have a relatively low return and holding them imposes an opportunity cost on a bank.

Interest rate considerably affects the banks interest income and expenses. Very often the change of markets loans and deposit interest rate can cause serious expenses for the banks. In this situations banks need time to evaluate the new situation and to act and respond properly to the new settings. Thus the interest risk management must be performed carefully and with the consideration of all factors of the interest risk.

Due to the growing process of the economic globalization, we should find that Macedonian commercial banks are impacted by the foreign currency movements as well. As a result, the profitability of the banks might be significantly affected by fluctuations in the exchange rates.

Foreign exchange rate movements could be an important source of risk for the banking institutions. If the movement of the exchange rates is in an undesired and unanticipated direction, it poses a threat to the bank's profitability.

1. DATA AND METHODOLOGY

This section identifies the sources of our data, presents the data, describes the dependent and independent variables and explains the regression model that we used to analyze the impact of different types of risks on the bank's profitability.

Bank's profitability is the ability of a bank to generate revenue in excess of cost, in relation to the bank's capital base. A sound and profitable banking sector is better able to withstand negative shocks and contribute to the stability of the financial system. In order to measure how well is a bank functioning in terms of profit, we use the profitability ratios. They are measurements of the success of the bank. In our study, we used three primary measurements of bank's profitability: the ratio of profits to assets, i.e. the return on assets (ROA), bank's profit and the net interest margin (NIM).

ROA has emerged as the key ratio for the evaluation of bank's profitability and has become the most common measure of bank's profitability in the literature. It is a financial ratio which measures the profitability achieved by the bank by investing its assets in various activities, and is calculated by dividing net income by total assets. This ratio reflects the ability of a bank's management to generate profits from the bank's assets. Different from ROA, the Net interest margin is the ratio of net interest income to invested assets.

Profit-loss values in bank's income statements directly present the profit or loss obtained by the banks for the previous year. However, the absolute values of profit or loss sometimes do not reflect the right level of profitability. In cases of similar values of profit or loss, the absolute values do not indicate the important aspect which should be considered during the profitability analysis. Hence, the values of profit or loss should be taken in consideration with other profitability factors and often included in various profitability ratios. The idea for the use of profit and loss in the context of this research is guided from the

construction of the direct relationship of the profit and loss function with the various types of the bank's risks. Besides this direct profit- loss function with the bank's risk factors, another profitability aspect of the bank's performance and risk factors is offered in the construction in other two models which include ROA and net interest margin.

The construction of the three models in the part of independent variables includes four types of risks to which the banks are exposed: credit risk, liquidity risk, interest rate risk and currency risk.

The Basel Committee on Banking Supervision (2001) defined the credit risk as the possibility of losing the outstanding loan partially or totally, due to credit events (default risk). It is an internal determinant of bank's performance.

Credit risk is considered as the most common and the most dangerous risk for banks, which can put them into deep trouble and bankruptcy. Therefore, it is extremely important to find the relation and impact of the credit risk on the profitability of the bank. Theory suggests that increased exposure to credit risk is normally associated with decreased bank's profitability and, hence, we expect a negative relationship between the profitability and the credit risk. There are a lot of empirical researches that find out a negative relationship between the credit risk and the profitability Kolapo et al.(2012), Ruziqa (2013) etc. However, there are researches that found out positive relationship between the credit risk and the profitability Hosna et al.(2009), and some which find a neutral effect of the credit risk on the profitability (Kithinji, 2010).

Our second independent variable is the currency risk. We investigate whether the profitability of analyzed commercial banks in Macedonia is affected by foreign exchange fluctuations over the last four years. We try to evaluate how the bank's earnings respond to changes in values of foreign currencies relative to the Macedonian national currency.

Macedonian commercial banks are exposed to foreign exchange risk, therefore, the profitability is related to the value of the denar relative to the foreign currencies. We have to take into account that if the Macedonian denar depreciates against the foreign currency in which our commercial banks have obligations, we could expect a deterioration in the quality of the credit portfolio with adverse consequences on profitability.

Another independent variable in our regression model is the liquidity risk. This is the risk of a loss for a bank resulting from its inability to meet its needs for cash. Therefore, the insufficient liquidity is one of the major reasons for the bank's failures. However, the liquid asset has a low liquidity premium and, therefore, a lower return relative to an illiquid asset.

In our empirical research, we try to answer whether the banks' holdings of liquid assets have a significant impact on their profitability. Many empirical researches found out that when banks hold adequate liquid assets, their profitability will improve. Adequate liquidity helps the bank to absorb any possible unforeseen shock caused by unexpected need for decreasing of the liabilities (Lartey et al., 2013).

However, there is a point at which holding further liquid assets diminishes the banks' profitability, *ceteris paribus* i.e. holding liquid assets imposes an opportunity cost on the bank given their low return relative to other assets, thereby having a negative effect on profitability, (Goddard et al., 2004), (Kosmidou et al., 2007).

The last variable which we used to explain the banks' profitability in the Macedonian banking sector is the interest rate risk. We analyze the impact of the interest rates' changes on the profitability of the commercial banks in Macedonia.

Net interest income remains one of the principal elements of bank's net cash flows. As a result, variations in the net interest income remain a key determinant of changes in profitability for commercial banks. It is well known that when the interest rates for the depositors decrease, it will discourage the savings and on the other hand, if the interest rate for the depositors increases, then it will badly affect the investment.

The impact of the interest rate changes on the profitability in the banking system has been a significant issue. As compared to other institutions, banks are more sensitive to the changes in the interest rate. Consequently, numerous researchers, have been interested in the impact of the bank profitability and interest rate fluctuations.

In our study, we used unbalanced panel VECM model with data used from the years from 2012 to 2016 for 14 out of 15 commercial banks in Macedonia. We used revised annual financial statement for the banks. The data were taken from the web site of the Macedonian stock exchange and the official websites of the banks. We excluded the Sparkasse Bank AD Skopje from our research, because of the lack of revised data.

2. MODEL, ESTIMATION AND RESULTS

The models in this research have an intention to determine the relationship between the profitability and the risk indicators values used in the banking industry. The secondary aspect of this paper aims to determine the banks' man-

agement performance and the capacity of the risk management on the banking sector level.

The model selection was based upon the desire to determine the dynamic relationship of the banks' specific risk indicator and its relationship with the profitability indicators. Hence, the selection of panel VECM model was the next logical step and primary option for the model methodology.

Model equation of the specified models, subject of this research, takes the following form:

$$(1) \\ Y_{it} = \beta_0 + \beta_1 * X_{1it} + \beta_2 * X_{2it} + \beta_3 * X_{3it} + \beta_4 * X_{4it} + \varepsilon_t$$

Where Y_{it} represents the bank's profitability represented with the net interest margin in model one, profit in model two and ROA in model three. Independent variables X_{1-4} are represented with the risk indicators. The impact of the dependent and the independent variables is to be determined from the ratio β_{1-4} . Note that i corresponds to the examined bank from the sample, t to the year and ε is the error term.

Table 1. Dependent and independent variables included in the specified models

Variables	Model 1 (Net interest income)	Model 2 (profit)	Model 3 (ROA)
Y	NIM	Profit	ROA
X1	Credit risk max exposure	Credit risk max exposure	Credit risk max exposure
X2	Currency risk net position	Currency risk net position	Currency risk net position
X3	Interest risk net position	Interest risk net position	Interest risk net position
X4	Liquidity risk maturity mismatch	Liquidity risk maturity mismatch	Liquidity risk maturity mismatch

Table 2 presents the descriptive statistic of the panel data for the included variables of the Macedonian banks included in this research.

Table 2. Descriptive statistic of the variables

	Credit risk max exposure	Currency risk net position	Interest risk net position	Liquidity risk maturity mismatch	NIM	ROA
Mean	26003469.00	2043360.00	693555.60	1252424.00	0.03	207730.30
Median	12333098.00	808820.00	284243.00	515741.00	0.03	87609.00
Maximum	99258152.00	12994949.00	8563719.00	11029313.00	0.05	1916699.00
Minimum	1227299.00	-570876.00	-6775105.00	-2340938.00	0.01	-492860.00
Std. Dev.	29178477.00	2824917.00	2432092.00	2668058.00	0.01	396807.60

Source: Own calculations based on statistical software

The values of the descriptive statistics suggest high volatility in the case of all variables included in the specified models. Exception is made in the case of the credit risk variable. This indicates a similar banks' attitude toward the credit risk management, and the different approaches to the currency, interest and liquidity risk in the case of the Macedonian banks and consequently this situation has resulted with different levels of net interest margin, profit and ROA.

For the purpose of the model data stationary assumption, in addition the following results of the unit root test are presented:

Table 3. Unit root test

	Levin, Lin & Chu t*	ADF - Fisher Chi- square	PP - Fisher Chi- square	Levin, Lin & Chu t*	ADF - Fisher Chi- square	PP - Fisher Chi- square
Stationary Unit root	At level	At level	At level	First diff	First diff	First diff
Credit risk max exposure	0	0	0	0	I(1)***	I(1)***
Currency risk net position	0	0	0	0	I(1)*	I(1)*
Interest risk net position	0	0	I(0)*	I(1)*	I(1)***	I(1)***
Liquidity risk maturity mismatch	0	I(0)**	I(0)***	0	I(1)***	I(1)***
NIM	0	0	0	I(1)***	I(1)***	I(1)***
Profit	0	I(0)*	I(0)**	I(1)	I(1)	I(1)***
ROA	0	I(0)***	I(0)***	I(1)***	I(1)***	I(1)***

*** significance of

1 %

** significance 5 %

* significance 10 %

Source: Own calculations based on statistical software

The results from the table provide evidence of the data stationary at level and at first difference which provide direction to continue with the panel VECM model. Other condition for the use of the VECM model is fulfilled with the co-integration test results obtained with the Kao panel co-integration test.

Table 4. Co-integration test

	Model 1 NIM	Model 2 Profit	Model 3 ROA
Probability (TestTypeKao)	0,0000	0.0000	0.0000

The results from the table above provide evidence of the data stationary at level and at first difference which provide direction to continue with the panel VECM model. Other condition for the use of the VECM model is fulfilled with the co-integration test results obtained with the Kao panel co-integration test.

Table 5. VECM estimations of the specified models

Coefficient	Model 1 (Net interest margin)	Model 2 (profit)	Model 3 (ROA)
X1	0.00000000671***	0.271944***	0.0001***
X2	0.00000000786	0.479043	0.000258
X3	-0.0000000201*	-1.135898***	-0.000436***
X4	-0.00000000668**	-0.42006***	-0.000174***
CoIntEq1 (t-statistics)	-0.015235	0.001455	-0.000135
R-squared	0.464611	0.821699	0.278721
Adj. R-squared	0.311642	0.770756	0.072642
Sum sq. resids	0.000874	1.09E+11	13.9561
S.E. equation	0.006451	71925.98	0.815215
F-statistic	3.037299	16.12974	1.352493
Log likelihood	105.5158	-348.8377	-29.98225
Akaike AIC	-7.036843	25.41698	2.641589
Schwarz SC	-6.703792	25.75003	2.974641
Mean dependent	0.000397	85692.71	0.274729
S.D. dependent	0.007775	150223.1	0.846542
Critical values t- stat two tail student t	0.10 (1.699)	0.05 (2.045)	0.01 (2.756)

*** significance

of 1 %
** significance

5 %
* significance

10 %

Source: Own calculations based on statistical software

According to the presented results in Table 5, the credit risk variable presented by X1 variable, from the long run perspective is highly significantly in all three specified models. The coefficient indicator has a positive sign, which indicates the strong relation and causality with the net interest margin, profit and ROA variables as dependent variables. This indicates that increased credit risk can highly contribute in the values of net interest margin, profit and ROA. This presents the fact that Macedonian banking sector's profitability in general, according to specified profitability indicators, is highly dependent on credit risk. This suggests that the profitability of banks on the long run is closely related to the banks' attitude toward credit risk.

The long-run parameter of the deposits currency risk presented by X2 variable is positive and not significant in all three models. This fact shows that the currency risk in the case of Macedonian banking sector has no statistical significance for the bank's profitability. This result is opposite to the importance of the currency risk management and it has practical implications for the banks' operative and profitability performance. However these findings may indicate high level of currency risk management on the banks' and sector's level which has resulted with statistical insignificance in the model. One of the factors considered for the currency risk insignificance may be currency peg of the Macedonian currency.

The long run coefficient X3 representing the interest risk variable indicates negative and significant relation in all three models. Interest risk parameter is negative and significant, showing that the increase of the interest risk will decrease the bank's profitability. The strong significance is presented in model two and three with the statistical significance of 1%, while in the model one the significance is at the level of 10%. All considered, the significance of all three variables in all three models suggests importance of the interest and interest risk in the banks' operative and profitability performance. This supports the previous papers (reference) claiming the importance of the interest income and interest risk as a part of the Macedonian banking sector.

Liquidity risk parameter presented by X4 variable is negative and significant, showing that the increase of liquidity risk will decrease the bank's profitability. This finding suggests the high level significance in all three models with the statistical significance of 5% in model one, and 1% in models two and three. This situation and the relatively high level of profitability present the solid liquidity risk management in banks and in the Macedonian banking sector.

Error correction coefficient in all three models is insignificant and indicates that the long run equilibrium cannot be determined. However, this does not exclude previously established long run relationship of the variables and their significance.

Table 6. Short run causality Wald test

	Model 1	Model 2	Model 3
Prob.	0.0159**	0.0008***	0.1999

*** significance of
1 %

** significance 5 %

The results from the short run causality tests of the models present the existence of short run relationship within the variables of the first two models. In the first model, the short run causality is with the significance of 5%, while in the second model the significance is 1%. Evidence of statistical significance of the short run causality among the variables in the third model was not found.

According to the values of Akaike and Schwarz information criteria, the best fit model is model one with the net interest margin as a dependent variable. This, one more time supports the thesis of high importance of the net interest income and its impact in banks' risks and profitability.

Conclusion

This paper analyzed the relationship between the profitability of the Macedonian banking sector and the different types of risks which the banks have been faced with, in the period between the years from 2012 to 2016, by using the panel VECM model. The bank's profitability is represented with the net interest margin in model one, profit in model two and ROA in model three. In all three models, we used four types of risks to which the banks are exposed as independent variables: the credit risk, liquidity risk, interest rate risk and currency risk.

According to our results, the profitability of the Macedonian banks is determined by the credit risk, interest rate risk and liquidity risk, which have high strong relation and causality with the dependent variables. The variables

interest rate risk and liquidity risk showed a negative statistical significance on ROA, NIM and profit, while the credit risk showed positive statistical significance on the same explanatory variables. This means that the banks with higher credit risk and lower interest rate risk and liquidity risk are more profitable.

The results directly suggest that the Macedonian banks' profitability is highly dependent on the credit, interest and liquidity risk management performance of the Macedonian bank management. This practically implies that the Macedonian bank's management must continuously perform at maximally accepted risk levels in the credit, interest and liquidity risk management in order to maintain the high level profitability.

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