Secondary Model for Bank Profitability Management – Test on the Case of Macedonian Banking Sector[1]

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Abstract

Banks' profitability is permanently a hot topic in banking circles. The relevance of this subject particularly increases in the periods of stagnation on financial services sector and growing rate of non-performing loans. Our research demonstrates that the dominant independent variables influencing profitability parameters ROA and ROE vary between different regions and economies, as well as between different banks operating on the same market. Establishing suitable internal bank models enables better management of statistically important variables on level on each individual bank which unfastens opportunities for enhanced and proactive management decisions.In the secondary model for profitability of Macedonian banks, we found capital adequacy ratio, capital and reserves/total assets, highly liquid assets/total assets, non-performing loans/total loans, net-interest income /gross income and personnel costs/non-interest expenses as statistically significant parameters for ROA and ROE. On the other hand, the independent variable GDP growth rate, loans to population/gross loans and business loans/gross loans were statistically insignificant for ROA and ROE.We consider that high positive statistical significance of the variable personnel costs/non-interest expenses (which according to our best knowledge wasn't tested on ROA and ROE in previous studies on bank profitability), presents that the usage of human resources in Macedonian banks in the observation period was rational i.e. the costs in this category adequately follow the dynamics of business development. The costs for optimization should be reaching in other non-interest cost categories.

Keywords: ROA, ROE, Macedonian banks, secondary model, profitability.

1. Introduction

Though affected by effects from the global financial crisis, the banking sector in the Republic of Macedonia maintained its stability without major difficulties. However, the global movements in recent years have negatively affected bank's profitability expressed over lower rates of ROA and ROE. The rates of these key profitability indicators are presented in Table 1 (in the Annexure).

Table 1, clearly shows that average annual return on average assets (ROAA) and equity (ROAE) are positive for Macedonian banks in the analyzed period. However, the return dynamics is significantly reduced in the period 2009-2011. These movements inevitably raise concerns and questions about:

1. Further movements of bank profitability of Macedonian banking sector?
2. Detection of potential stability issues?
3. Indentifying key variables that affect profitability indicators?
4. Adequately management of all parameters that determine ROA and ROE?
5. Which directions should be followed in order to achieve improved performance?

This paper attempts to reach the answers of some of these questions, by proposal of a secondary model for determination the key independent variables that affect ROA and ROE for Macedonian banking sector. The main focus of our research is connected to internal bank variables, which to some extent could be control by each bank, because our main goal is reaching a model practically applicable as an additional tool into regular bank management processes and decisions.

2. Literature review

The literature review on the research question analyzed in the paper is segmented into several sections.

2.1 Research papers for U.S. and Canadian banking sector

The analyzes of the determinants of profitability in U.S. banking industry show a strong negative relationship between capital and profitability e.g. an unexpected increase in capital tends to lead to a decrease in the bank

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[1] The attitudes expressed in this research paper present the personal perception of the writers on the subject and in no case can be related to the official positions of the institutions where the authors work.

profitability (Hoffmann, 2011). According to the research of this author, a higher capital ratio tends to reduce the risk on equity and therefore lowers the expected return on equity that investors seek, or in other words, a high capital ratio signifies that a bank is operating over-cautiously and ignoring potentially profitable trading opportunities.

Other authors present empirical evidence regarding the relationship between liquid assets holdings and profitability for a panel of Canadian and U.S. banks over the period 1997-2009. The results suggest that a nonlinear relationship exists, whereby profitability is improved for banks that hold some liquid assets. However, there is a point beyond which holding further liquid assets diminishes banks profitability, all else equal (Bordeleau & Graham, 2010).

2.2 Profitability studies on African banking sector

Empirical study of commercial banks in Kenya showed that capital adequacy, asset quality and management efficiency significantly affect the performance (Ongore & Kusa, 2013). These authors concluded that the effect of liquidity on the performance of commercial banks is not strong and that relationship between bank performance and capital adequacy and management efficiency is positive and for asset quality the relationship was negative. This indicates that poor asset quality or high non-performing loans to total asset related to poor bank performance. Another research for Kenyan banks finds that there are differential effects of the various measures of capital adequacy on the profitability of the Kenyan banks e.g. non-risk weighted capital adequacy measure (i.e., the equity capital ratio) is negatively related with the profitability of a bank i.e. ROA and ROE while there is a positive relationship between the risk-adjusted capital adequacy measure (i.e., tier 1 risk based capital ratio and core capital ratio) and bank profitability (Mathuva, 2009).

Research for Tunisian banks indicate that the coefficient of the ratio of equity capitals to assets was positively related to profitability and seems to be the most significant determinant of the profitability of the Tunisian national banks by giving support to the argument that well capitalized banks face lower bankruptcy costs, which reduces their investment cost (Ayadi & Boujelbene, 2012). According to these authors, the relationship between size and profitability was also positive since it shows the existence of economies of scale in the Tunisian banking sector, while the impact of the credit risk variables and the liquidity risk is not significant. Other researchers for Tunisian banking sector found that high net interest margin and profitability tend to be associated with banks that hold a relatively high amount of capital, and with large overheads (Naceur, Goaied, 2008).

Bentum (2012) in the research of the profitability of commercial banks in Ghana, found out that ratio of non-interest income to gross income, which relates to diversification of the commercial banks have had adverse effect on profitability as it increased in both pre and post financial crisis periods.

Ani, W. U., Ugwunta, D. O., Ezeudu, I. J. and Ugwuanyi, G. O. (2012) conclude that asset composition and capital adequacy are the major endogenous factors under the control of management that determines the profitability of banks in Nigeria.

The research results for the Ethiopian banks showed a positive relationship between capital strength and profitability with strong statistical significance, a negative relationship between operational efficiency and profitability with strong statistical significance, a positive relationship between income diversification and profitability with strong statistical significance and that the ratio of non-performing loans to total loans has a negative impact on ROA with statistical significance (Abera, 2012).

2.3 Determinants of bank profitability from Asian region

In India, the variables non-interest income, operating expenses, provision and contingencies and spread have a significant relationship with net profit. Among them, P&C and OE are found having negative relationship (Badola & Verma, 2006).

Xiaoxiao Han and Ji-Yong Seo (2012) found that there is no relationship between bank ownership type and lending behavior in Chinese banks as well as that the major determinants of Chinese banks' ROA are the asset concentration of a few banks and bank size.

Smaoui and Ben Salah (2012) in their research for countries in the GCC Region, find that capital strength, measured by the equity to assets ratio, is positively and significantly related to ROA and NIM. The research results of these authors show that the impact of liquidity on bank performance varies with the measure of profitability used i.e. liquidity is insignificantly related to ROA and ROE, but negatively and significantly related to NIM. The impact of asset quality, measured with loan loss reserves to gross loans, is positive and significant and positive on all profitability measures, except ROE.

Research fot banks in Turkey found a negative relationship between loans and profitability for Turkey banking sector (Alper & Anbar, 2011). As another bank specific variable, these authors mentioned the non-interest income/assets ratio which has a positive and significant effect on ROA i.e. greater bank activity diversification positively influence returns. On the macroeconomic variables, only real interest rate is found to having positive

effect on profitability, as measured by ROE e.g. when real interest rates are higher, ROE of banks rises. The remaining bank-specific factors (capital adequacy, liquidity, deposits/assets ratio and NIM) and macroeconomic factors (real GDP growth rate and inflation rate) have not important effect on bank profitability. Other studies of Turkish banking sector, showed that compared with internal factors, external factors have less impact on bank profitability (Kakilli Acaravci & Çalim, 2013).

Results of the studies provided from E.U. banks and U.S. contradict to each other in terms of diversification. Furthermore there are certain differences like credit periods between E.U. and Turkish banks. Hence for the diversification of credit portfolio applications may differ from region to region (Yilmaz Turkmen & Yigit, 2012). J.Wong, Fong, E. Wong, and Ka-fai Choi (2007) in their research about the Hong Kong banking sector, note that empirical evidence finds that market structure, as measured by market concentration and market share of banks, is either not a significant determinant of banks' performance, while cost efficiency is found to be positively correlated with banks' profitability and negatively correlated with loan prices.

Research for Indonesian banks demonstrate that loan to total assets, total equity to total assets, loan loss provision to total loan have positive effect on profitability, while inflation rate, the size of bank and cost-to-income ratio have negative effect on profitability. Moreover the economic growth and non interest income to total assets have no effect on bank profitability (Syafri, 2012).

F. Khan, Ahmad Anuar, Choo and H. Khan (2011) for Pakistani Banking Sector, find that variables: deposit to asset ratio, deposits to loan ratio, loan to asset ratio, loan growth, non-performing loans, net interest margin, tax, ROA and NIM are significantly impacting the profitability. Another research for Pakistani banks finds that on the micro independent variables front, profitability seems to have been positively affected by size, operating efficiency, portfolio composition, asset management and negatively by capital and credit risk in case profitability is measured by ROA. Profitability measured by ROE profitability seems to have positively affected by capital, portfolio composition and asset management and negatively by size, operating efficiency and credit risk. On the macroeconomic variables, GDP is found to having positive affect on profitability (i.e., ROA & ROE) (Khizer Ali et al., 2011).

Other research for banking sector in Pakistan, finds that non-performing loans represent the credit management have a negative insignificant impact on the ROA, but negative significant affect on ROE, capital ratio has significant association with ROE but insignificant with ROA and that higher growth rate of GDP seems to have a strong positive and significant impact on performance measure ROA and GDP has positive impact on ROE (Bilal, Saeed, Ali Gull & Akram, 2013).

Tafri, Hamid, Meera, and Omar (2009) in their research for Malaysian commercial banks, find that liquidity risk does not have an impact on the profitability of the banks, while the credit risk variable which is the ratio of the loan loss reserves to total assets have a negative impact on profitability measures and is statistically significant indicating that higher risks result in lower margin.

Study of Nepal commercial banks financial performance, find that the capital adequacy ratio positively influenced the ROE but the non-performing loan, credit to deposit ratio, interest expenses to total loan and NIM had no significant effect on ROE (Suvita Jha & Xiaofeng Hui, 2012).

2.4 Profitability determinants of European banks (EU and NON-EU Member)

Barrell, Philip Davis, Fic and Karim, (2011), show that bank behavior differs when they have larger proportions of Tier 2 capital, even with a similar level of total capital. These authors' found that the banks in OECD countries with higher proportions of Tier 2 have higher charge-offs and higher provisions. This underlines the poor qualities of Tier 2 in terms of possible adverse incentives it may generate (for example, moral hazard leading to risk taking on behalf of managers/shareholders at the expense of subordinated debt holders), as well as being a weaker protection against banking distress. Meanwhile, total capital appears to have a positive impact on bank performance, underlining the benefits of raising the level of regulatory capital (Barrell et al., 2011).

The empirical findings of bank profitability in the UK suggest that negative and positive effect of liquidity on bank profitability has been found with significant coefficient (Yuqi Li, p.67).

Research about banks in Switzerland, consider that better capitalized bank seem to be more profitable. These authors, looking at the effect of the share of interest income at total income, which is a variable that has not been considered before, find that banks with a higher interest income share are less profitable (Dietricha & Wanzenried, 2009).

According to Davydenko (2010), the Ukrainian banks that increase their equity have a lower cost of capital and thus are more profitable and administrative expenses as percent of total assets have a negative impact on banks' profits which indicates the lack of competence in expenses management.

According to the research of Trujillo-Ponce (2012), better capitalized banks tend to be more profitable when ROA is taken as the measure of profitability, but an increase in the equity-to-total assets ratio reduces the ROE

of the banks due to the fall in leverage. Consequently, the high level of capitalization of Spanish banks could have favored their ROA to the detriment of their ROE (Trujillo-Ponce, 2012).

2.5 Determinants of bank profitability in SEE Region and Republic of Macedonia

In the research, about the relationship between bank ownership and bank profitability in six South-Eastern European countries (SEE-6): Croatia, Bulgaria, Romania, Serbia, FYR Macedonia and Albania, analysis demonstrated only a limited differentiation between the performance indicators for foreign-owned banks and domestic banks across countries (except the statistically significance of net interest margin) (Košak and Čok, 2008). Other research for the SEE (Turkey, Romania, Bulgaria, Serbia, FYROM, Albania, Croatia and Moldova) region confirms that foreign ownership status is insignificant variable in bank profitability explaining (Vlastarakos, 2009). The same author in his research presents that state ownership is negatively correlated with bank profitability indicating that state owned banks in the region must focus on profit maximization rather than servicing governments' macroeconomic policies).

The econometric investigation of Košak and Čok (2008) found that capital strength, cost efficiency and credit risk exposure are associated with bank performance measures, while liquidity management and bank asset structure factors did not demonstrate any statistically significant link to performance indicators. That capital strength in important determinant of bank profitability in the region confirms the research of Vlastarakos (2009), suggest that well capitalized banks face lower costs of going bankrupt which reduces their costs of funding. This research also founds that credit risk, capital size and liquidity has a significant impact on bank profitability in SEE, all well as that in current global unstable environment, liquidity risks are higher. From the external variables, only interest rate spread and HHI index and to some extent GDP ratio growth rate and the growth rate of foreign exchange rate was found as statistically significant, while market share and stock market capitalization to GDP ratio as inconclusive (Košak& Čok, 2008). Vlastarakos (2009) confirms that banks profits in the region are significantly affected by GDP growth supporting the argument of the association between economic growth and the banking sector performance.

According to Giustiniani and Ross (2008), the competition in the banking sector in FYR Macedonia remains relatively weak with limited bank efficiency. After performing the Panzar - Rosse tests, these authors find that market structure in banking sector point toward a finding of monopolistic market structure.

Some authors findings show that the most significant variables to bank profitability are the equity to assets ratio and the total loss on loans, while that the operating expenses are significant only in the ROE profitability (Davcev & Hourvouliades, 2009). According these authors, other variables like bank size, inflation and loans to assets fail to prove significant, both in multiple and single regression models.

Regarding the research of Curak, Poposki and Pepur (2012), the most important determinant of bank profitability in R.M. is the operating expense management and suggest reducing of administrative costs as a direction for improvement of the cost efficiency. As other important variables of bank profitability these authors mention the solvency and liquidity risk from internal factors, while GDP growth from external variables, as a factor with highest importance.

The research of Boshkoska (2013) has shown that the high capital adequacy ratio of 17%, may serve to explain the low level of ROE in banking system of Republic of Macedonia.

3. Identification of the key variables affecting the profitability of Macedonian banks

Bank profitability measured through ROA and ROE, could be affected by many internal and external variables. Regarding the analyzed literature, we conclude that some variables have different effects in different economies so there's not global consensus about the actual effect of each individual variable on bank profitability.

In order to analyze the profitability of Macedonian banks we create an econometric model where ROA and ROE are dependent variables. In the tests of our hypotheses, 9 independent variables were used. According to our best knowledge, in the previous studies about the profitability determinants for the Macedonian banking sector made by other authors, the following internal independent variables were not used in order to determine ROA and ROE as dependent variables: **loans to population/gross loans, business loans/gross loans, personnel costs/non-interest expenses and highly liquid assets/total assets**. Although the external variables are important, in our models we gave the main accent on the internal parameters, which are divided into four groups:

1.   *Structure and asset quality*–loans to population/gross loans, business loans/gross loans, non-performing loans/gross loans;
2.   *Solvency* – capital adequacy coefficient (ratio)-CAR, capital and reserves/total assets;
3.   *Profitability* – net-interest income/gross income, personnel costs/non-interest expenses;
4.   *Liquidity*- highly liquid assets/total assets.

The independent variables that we consider should influence on the bank's profitability measures have the following meaning and expected effects:

1.   External variables:

a.   GDP growth rate – the real growth rate of Macedonian gross domestic product. It's expected that an increase of this variable should lead to an increase in the bank profitability i.e. ROA and ROE;

2.   Internal variables:

a.   Loans to population/gross loans to non-financial entities – the rate of loans to population in the amount of total loans to non-financial entities. It is uncertain how the trend of this variable would effect on ROA and ROE;

b.   Business loans/gross loans to non-financial entities – the participation rate of loans to companies in amount of gross loans placed in non-financial sector. It is uncertain how the trend of this variable would effect on ROA and ROE;

c.   Non-performing loans/gross loans – the rate of share of non-performing loans in the amount of gross loans. It's expected that an increase in the share rate of non-performing loans in gross loans amount will lead to decrease of ROA and ROE;

d.   Capital adequacy ratio (CAR)–Presents percentage of banks risk weighted exposures (Tier 1 Capital + Tier 2 Capital / Risk Weighted Assets). It's expected that an increase in the capital adequacy ratio should lead to higher rate of ROA and ROE;

e.   Capital and reserves/total assets– The ratio of bank capital to total assets. It's expected that an increase in the ratio of capital and reserves in total assets should lead to higher rate of ROA and ROE;

f.   Net interest income/gross income - participation rate of net interest income in the total amount of income of the banks. Net interest income represents interest income decreased for interest expenses. The gross revenues consist of: net interest income, fee and commission income (net) and all other regular income without extraordinary income. It's expected that an increase in the share rate of net-interest income in gross income will lead to decrease of ROA and ROE;

g.   Highly liquid assets / total assets – Highly liquid assets include cash and balances with central banks, treasury bills and correspondent accounts with foreign banks. The total assets were decrease for the assets in domestic banks. It's expected that an increase in the participation rates of highly liquid assets in the total assets should lead to an increase in the rate of ROA and ROE;

h.   Personnel costs/non-interest expenses – this variable presents the rate of share of employee costs in the total amount of non-interest expenses in the banking sector. It is uncertain how the trend of this variable would effect on ROA and ROE;

The expectations about the individual impact of the identified independent variables on ROA and ROE of the Macedonian banking sector would be confirmed through the application of regression analysis.

4. Subject of observations and specification of the model

To recognize the influence of the individual factors on Macedonian banks is presented and tested an econometric model on two dependent variables (ROAA and ROAE).

Subject of the observations are data for the banking sector in RM for the period Q42001 – Q32012 obtained from the web site of the NBRM. The model for both dependent variables (ROA and ROE) would be tested by applying the least square method and it could be presented with the following equation:

$y = b_0 + b_1 x_1 + b_2 x_2 + b_3 x_3 + b_4 x_4 + b_5 x_5 + b_6 x_6 + b_7 x_7 + b_8 x_8 + b_9 x_9 + u$

$b_0 - b_9$ - denote the coefficients of the variables used in the regression model,

$x_1 =$ GDP rate (GDP);

$x_2 =$ Retail loans/Gross loans to NFE (RL/GL);

$x_3 =$ Business loans/Gross loans TO NFE (BL/GL);

$x_4 =$ Non-performing loans/Gross loans (NPL/GL);

$x_5 =$ Capital adequacy ratio (CAR);

$x_6 =$ Capital and reserves/Total assets (CR/TA);

$x_7 =$ Net interest income/Gross income (NII/GI);

$x_8 =$ Highly liquid assets/Total assets (HLA/TA);

$x_9 =$ Personnel costs/Non-interest costs (PC/NIC);

$u =$ CTOCHASTIC ERROR – random error.

The results of the tests of the model are presented in the following section of this research paper.

5. Results from the tests

The multiple regression result about the impact of identified independent variables on Macedonian banks ROAA and ROAE are presented through Table 2 in the Annexure section of this paper.

According to the parameters presented in Table 2, the following equations should be devised:

$ROAA = -0.987696\,x_0 + 0.029038\,x_1 + 0.051279\,x_2 - 0.045818\,x_3 - 0.275272\,x_4 - 0.327700\,x_5 +$

$+ 0.883454\,x_6 - 0.142159\,x_7 + 0.175213\,x_8 + 0.140886\,x_9 + u$

$ROAE = 39.37473\,x_0 + 0.184528\,x_1 + 0.265965\,x_2 - 0.600883\,x_3 - 1.955908\,x_4 - 2.385937\,x_5 +$

$+ 5.730684\,x_6 - 1.209061\,x_7 + 1.168101\,x_8 + 0.873829\,x_9 + u$

The coefficients $b_1 - b_9$ represent the impact of independent variables on the dependent variables "ROAA" and "ROAE". Through their values it's obviously that both dependent variables have the same proportionality with the all identified independent variables.

In the both equations, the coefficients b_1, b_2, b_6, b_8 and b_9 have a positive impact and are directly proportional with dependent variables (ROAA and ROAE), while the coefficients b_3, b_4, b_5 and b_7 have a negative impact and are not proportional to ROAA and ROAE.

Through the values of coefficients of determination R^2 presented in Table 2 (0.905424 for ROAA and 0.886468 for ROAE), it can be concluded that the dependent variables are circa 90% determined by the presented independent variables.

The values of F statistics (23.40194 for ROAA and 19.08651 for ROAE) are greater than the critical values of Prob - F statistics (0.000000) which means that the independent variables have common statistical significant impact on ROAA and ROAE.

Regarding the values of t-statistics presented in Table 2, which determines the separate significance of the independent variables on the dependent one, we could see that the same variables are statistically significant for ROAA and ROAE i.e. the values of coefficients $t_{b4}, t_{b5}, t_{b6}, t_{b7}, t_{b8}$ and t_{b9}, are statistically significant for the

both dependent variables. Here could be mentioned that variables connected to coefficients t_{b4}, t_{b5} and t_{b7}, have

a negative effect while the variables connected to the coefficients t_{b6}, t_{b8} and t_{b9}, a positive impact on the

dependent variables "ROAA" and ROAE".

According to the results from *Breusch-Godfrey Serial Correlation LM Test* (Appendix 1) and *Breusch-Pagan-Godfrey Heteroskedasticity Test* (Appendix 2), we accept the null hypothesis for no serial correlation existence in the model with value of 0.2693 for ROAA and 0.1517 for ROAE and we accept the null hypothesis for no Heteroskedasticity presence with p-value of 0.6185 for ROAA and 0.7162for ROAE (which is bigger than the critical value of 5%) e.g. the variables in the model are homoscedastic. Via the results from the *Jarque – Bera test* (Probability 0.648522 for ROAA and 0.679453 for ROAE)*,* we could confirm that the sample data have a normal distribution. The values of Durbin-Watson statistics are 2.046714 for ROAA and 1.828280, for ROAE e.g. there is not significant auto-correlation in the models.

6. Conclusion

Based on studies related to the profitability of commercial banks, we conclude that these indicators vary depending on the movement of a number of variables from internal and external nature. At the same time, certain variables in a specific period of observation may have high statistical significance on ROA and ROE, while at other periods its influence may be reduced or no longer exists. As a result of the different effects of the individual variables, we cannot discuss about getting a universally acceptable model for profitability management based on identical parameters for all regions, markets and applicable for each individual bank.

Through our research on the profitability of the banking sector in Macedonia, we find that the key indicators ROA and ROE are determined by the same independent variables. At the same time the statistical significance of the solvency parameters on both indicators was confirmed, whereby it was determined that capital adequacy ratio has a negative impact while the capital and reserves share in total assets a positive impact on ROA and ROE. The increase in equity and reserves in total assets lead to an increase of banks own funds compares to borrowed amounts. Increased capitalization leads to higher profit expectations by shareholders' who inevitably have reflected in the increased rate of return on assets and equity.

Our research has confirmed the high statistical significance of the rate of non-performing loans/ gross loans on ROA and ROE, with a negative impact, which is in line with most previous studies in this area. Unlike some of previous models of profitability of commercial banks, in our model we have excluded the operating expenses as an independent variable and replaced them with the costs of employees and their share in total amount of non-interest expenses' as a individual independent variable. This variable showed a high and positive statistical

significance on ROA and ROE which was contrary to the influence of the total non-interest expenses' as a single (cumulative) variable on the same dependent variables. This means that higher costs of staff leading to improved profitability of commercial banks in the Macedonia. This result could due to the expansion trend of the banking sector in the period of analysis.

In terms of liquidity of the commercial banks, as an individual independent variable quick liquidity ratio was tested, which reflected with high positive statistical significance on the both profitability indicators (ROA and ROE). A quick liquidity ratio is a powerful determinant which instills confidence among users of banking services. As a result, banks that have such liquidity are able to borrow funds at lower costs which lead to their increased profitability.

The variable net interest income in total income of Macedonian banks showed a negative statistical significance on ROA and ROE which was in line with our expectations. This means that the banks with higher provisions and other charges income are more profitable. Here we could mention that the profitability of commercial banks in R.M. isn't depended of the clients' structure (retail customers or legal entities) e.g. banks have similar incomes and expenses' of both categories' of customers. In our model, tests of the significance of the growth of GDP did not presents statistical significance on the profitability of commercial banks in R.M., which was contrary to our previous expectations as well as on the results of previous researches for Macedonian banking sector profitability determinants.

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Annexure:

Table1 Profitability indicators of the Macedonian banks for the period 2007 – 2011

Profitability indicators	31.12.07	31.12.08	31.12.09	31.12.10	31.12.11
Rate of return on average assets (ROAA)	1,8%	1,4%	0,6%	0,8%	0,4%
Rate of return on average equity (ROAE)	15,2%	12,5%	5,6%	7,3%	3,4%

Source: National bank of the Republic of Macedonia - NBRM, Appendixes of the annual "*Reports for the banking system and supervision in Republic of Macedonia in the period 2007-2011*".

Table 2 Results of regression analysis of the independent variables impact on ROAA and ROAE

Dependent Variable: ROAA;ROAE

Method: Least Squares

Date: 03/16/13   Time: 16:31 (ROAA) Time:16:32 (ROAE)

Sample: 2001Q4 2012Q3

Included observations: 32

Variable	ROAA			ROAE		
	Coefficient	t-Statistic	Prob.	Coefficient	t-Statistic	Prob.
GDP	0.029038	0.985331	0.3352	0.184528	0.739009	0.4677
RL/GL	0.051279	0.678042	0.5048	0.265965	0.415062	0.6821
BL/GL	-0.045818	-0.542391	0.5930	-0.600883	-0.839525	0.4102
NPL/GL	-0.275272	-2.463160	0.0221	-1.955.908	-2.065603	0.0508
CAR	-0.327700	-2.057057	0.0517	-2.385.937	-1.767647	0.0910
CR/TA	0.883454	3.198385	0.0041	5.730.684	2.448615	0.0228
NII/GI	-0.142159	-3.037392	0.0060	-1.209.061	-3.048898	0.0059
HLA/TA	0.175213	3.140834	0.0047	1.168.101	2.471308	0.0217
PC/NIC	0.140886	3.661875	0.0014	0.873829	2.680584	0.0137
C	-0.987696	-0.140598	0.8895	3.937.473	0.661516	0.5152
	ROAA			ROAE		
R-squared	0.905424			0.886468		
Adjusted R-squared	0.866734			0.840024		
F-statistic	2.340.194			1.908.651		
Prob(F-statistic)	0.000000			0.000000		
Durbin-Watson stat	2.046.714			1.828.280		

Source: Individual calculations based on the time series data for the banking sector, published by National Bank of Macedonia.

Appendix 1 *Segment of the results from Breusch-Godfrey Serial Correlation LM Test:*
Dependent Variable: **ROAA**

F-statistic	0.893235	Prob. F(2,20)	0.4250
Obs*R-squared	2.623969	Prob. Chi-Square(2)	0.2693

Dependent Variable: **ROAE**

F-statistic	1.335922	Prob. F(2,20)	0.2854
Obs*R-squared	3.771155	Prob. Chi-Square(2)	0.1517

Appendix 2 *Segment of the results from Heteroskedasticity Test: Breusch-Pagan-Godfrey*
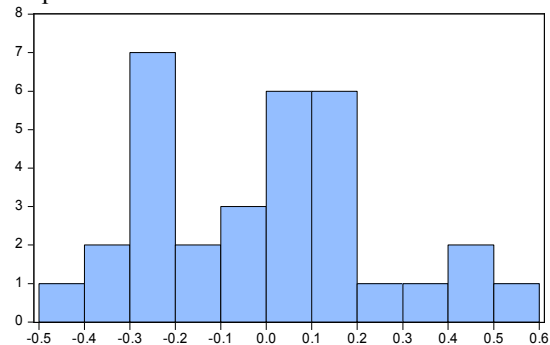
Dependent Variable: **ROAA**

F-statistic	0.707006	Prob. F(9,22)	0.6965
Obs*R-squared	7.178974	Prob. Chi-Square(9)	0.6185
Scaled explained SS	2.300965	Prob. Chi-Square(9)	0.9858

Dependent Variable: **ROAE**

|			
F-statistic	0.591489	Prob. F(9,22)	0.7902
Obs*R-squared	6.234543	Prob. Chi-Square(9)	0.7162
Scaled explained SS	1.910550	Prob. Chi-Square(9)	0.9928

Appendix 3 Results *from Jarque–Bera test:*

Dependent Variable: ROAA

Series: Residuals	
Sample 2001Q4 2012Q3	
Observations 32	
Mean	1.36e-15
Median	0.030842
Maximum	0.526621
Minimum	-0.433872
Std. Dev.	0.250294
Skewness	0.242458
Kurtosis	2.356227
Jarque-Bera	0.866117
Probability	0.648522

Dependent Variable: ROAE
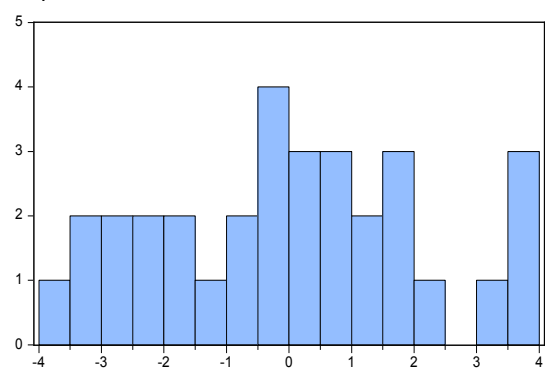
Series: Residuals	
Sample 2001Q4 2012Q3	
Observations 32	
Mean	1.18e-15
Median	0.048179
Maximum	3.943864
Minimum	-3.908802
Std. Dev.	2.120718
Skewness	0.145830
Kurtosis	2.296696
Jarque-Bera	0.772936
Probability	0.679453