

## Research Article

## BANK-SPECIFIC, ECONOMIC AND LEGAL DETERMINANTS OF PROFITABILITY IN THE REPUBLIC OF NORTH MACEDONIA

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### ABSTRACT

**Background:** Bank profitability is more than just a financial indicator; it is a reflection of the health and vitality of the banking sector and the economy as a whole. Profitable banks help to maintain financial stability by increasing resilience, facilitating capital formation and intermediation, promoting innovation and adaptability, and instilling confidence and trust. Hence, profitability is critical in the banking sector since it directly influences policymakers, regulators, and bank management. Therefore, the study will estimate the influence of specific bank and economic-legal determinants on return on assets in the Republic of North Macedonia. Thus, the study aims to estimate the influence of specific bank and economic-legal determinants on return on assets in the Republic of Northern Macedonia.

**Methods:** The study employs the methodology of the Vector Error Correction Model (VECM) and covers quarterly data from 2007 to 2022. To conduct the empirical analysis required to identify and assess the factors of bank profitability, quantitative data were gathered primarily from the National Bank of the Republic of North Macedonia, the International Monetary Fund (IMF), and the World Bank. Return on Assets was used as a dependent variable. The set of factors is composed into two groups: the first includes bank-specific (controlled) factors such as the sectors' size, credit risk, capital adequacy, liquidity, income diversification, efficiency of operations, and non-performing loans. The second group includes macroeconomic (uncontrolled) factors such as economic growth, inflation, and interest rates.

**Results and Conclusions:** Results reveal that the size of the banking sector, the risk of the credit, liquidity, income diversification and non-performing loans have a meaningful but negative influence on the response variable. However, capital adequacy, operational efficiency, GDP and interest rate have an important positive impact. Hence, based on the empirical analyses, to boost profitability, the Macedonian banking system should prioritise asset management as a size indication, raising the non-income ratio to diversify revenue, reducing credit risk and non-performing loans, and maintaining a good liquidity ratio.

*Furthermore, there is clear evidence that second-level banks should extend beyond national borders. Better loan portfolio management, greater technology with database processing and communication improvements, and expanded technology with database processing and communication improvements can strengthen the ability to deal with the next crisis. Additionally, banks should increase non-interest revenue by employing it as a risk outlet in banking and distributing it across many income-generating enterprises, enhancing profitability. These findings offer insights for bank executives and regulators interested in increasing bank profitability and stability.*

## 1 INTRODUCTION

It is widely acknowledged that a country's banking system substantially impacts economic growth and development. The importance of the banking sector for a country and its intermediation is crucial as it smooths and stabilises economic activity and promotes its growth. Hence, sound and profitable banks maximise shareholders' investments by further stimulating investment within the country. On the other hand, in case of exogenous shocks, unsustainable banks may face difficulty surviving, leading to a huge financial crisis.

Moreover, the complex way a country's economy works, taking into account the differences between developing and less developed states, has posed difficulties in pursuing monetary policy. Indeed, after the COVID-19 pandemic and in the upheaval of the Russia-Ukraine war, central banks all over the world are struggling to find an innovative approach to make the sector profitable. The research shows that their profitability serves to absorb the external shocks that affect the financial system. Additionally, they affect the distribution of capital, firms' expansion, industries' growth, and economic development. Indeed, the banking sector's profitability is determined by bank-specific and macroeconomic-legal factors. Endogenous factors are individual factors related to the bank itself due to the results reflected in the financial statements.

In contrast, external or exogenous determinants are not controlled by the bank and are related to a country's political, legal and economic environment. Also, in a profitable banking system, the banks will have confidence and settle a sound relationship among banks. In such a case, the question might arise: What are the determinants of bank profitability? There is vast literature on the field of bank profitability, which is focused on developed economies, while the work on developing countries, especially in South-Eastern countries such as the North Republic of Macedonia, is scant so far.

In developed countries, the system is more "progressed"; the institutions and the central bank collaborate to fulfil their responsibilities. In contrast, in developing economies, the banking system does not work appropriately, and there is always a gap between "shadow banking" and lack of financial regulations; also, in those countries, the banking sector has the dominant role in the whole financial system. The same is true in the Republic of North Macedonia, where the banking sector dominates. Hence, the profitability and soundness of

its banks are the backbone of the country.<sup>1</sup> At the end of 2022, it shows that the banking activity in the country supported 81.4 % of the financial sector while the lending activity composed 48.7 % of the country's GDP.<sup>2</sup> Thus, this shows the dependence of the country's financial system on its banking system's financial health.

Hoffmann and Fu state that in such countries, the importance of the banks is irreplaceable as they facilitate the process of the sources between the deficit and surplus sectors. This reveals that the soundness of the banking sector in less-developed countries is still traditional and backward, while it has a central role in allocating and providing resources to businesses and citizens. Therefore, following the prominent role of the banking sector, especially after the COVID-19 pandemic and the recent Russian-Ukrainian war, the study seeks to investigate the determinants of banks' profitability in the Republic of North Macedonia from 2007 to 2022. Moreover, the study seeks to examine how external and internal factors affect the banks.

This study adds to the ongoing theory by investigating how a set of external and endogenous factors affects a bank's profitability, measured through Return on Assets (ROA) through the lenses of error correction analysis. Second-level banks of a country must reveal their key determinants and how these factors have evolved through time. Identifying these factors provides essential information to stakeholders and, at the same time, to policymakers so that they can design the right policies for tackling external shocks. Therefore, the profits of the banking system are of vital importance for the traditional banking system of North Macedonia and the Southern- Europe area as a whole.

Hence, the paper will contribute to the prior state of the art by investigating how endogenous and exogenous factors affected the country's bank's profitability from 2007 to 2022. The findings reveal that the size, credit risk, liquidity, income diversification, and non-performing loans negatively and significantly influence ROA. However, capital adequacy, operational efficiency, GDP and net interest are significant and positive.

## 2 LITERATURE REVIEW

Profitability is a critical indicator for banks since it determines their long-term viability and ability to provide financial services/products to clients. Numerous studies have been conducted on bank profitability, and this literature review will look at some of the important findings and insights from those studies.

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1 Decree of the *Republic of North Macedonia no 07-2327/1 of 21 May 2007 'Banking Law'* (Consolidated text) <<https://www.mbdp.com.mk/Upload/Documents/banking-law-122-21.pdf>> accessed 22 October 2023.

2 National Bank of the Republic of North Macedonia, *Financial Stability Report 2022* (Banking Regulations and Resolution Department 2022).

Return on assets (ROA), computed by dividing a bank's net revenue by its total assets, is one of the most generally used metrics of bank profitability. A study by Berger et al. discovered that large banks had lower ROA, while smaller banks had higher ROA. This is due to the fact that larger banks often have higher operating costs and more risk exposure, which can impact their profitability.<sup>3</sup>

Interest rates are another major factor influencing bank profitability. Larger interest rates typically result in larger net interest margins (NIM) for banks, calculated as the difference between the income collected on loans and the interest paid on deposits. According to a study by Akhtar et al., higher interest rates favour bank profitability, especially for banks with higher levels of non-performing loans (NPLs).<sup>4</sup> Aside from interest rates, the quality of a bank's loan portfolio can affect its profitability. Banks with a larger proportion of NPLs have poorer profitability because they must set aside more funds for loan loss provision. According to one study, banks with a larger level of NPLs have lower ROA, but banks with a higher level of loan loss provisions have lower return on equity (ROE).<sup>5</sup>

The legal environment also impacts bank profitability. According to one study, banks with higher capital requirements and liquidity regulations had worse ROA and ROE. However, the study discovered that increased regulatory control can lead to greater stability in the banking sector, benefiting the whole economy.<sup>6</sup>

As an outcome, evaluating bank performance is a complex process involving internal and external operations. Indeed, bank and state factors influence banking sector profitability. Endogenous elements are individual factors relating to the bank itself as a result of the financial statements results.<sup>7</sup> External or exogenous variables, on the other hand, are not under the bank's control and are tied to a country's legal and economic environment. Both of these characteristics impact the structure and performance of banks, either positively or negatively.<sup>8</sup>

Numerous empirical studies relate to the drivers of bank profitability. Based on the existing literature, we developed several empirical research from various places throughout the world.

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3 Allen N Berger and Christa HS Bouwman, 'How Does Capital Affect Bank Performance During Financial Crises?' (2013) 109(1) *Journal of Financial Economics* 146, doi:10.2139/ssrn.1739089.

4 Shakeb Akhtar, Tasneem Khan and Parvez Alam Khan, 'Examine the Key Drivers Affecting Bottom Line: A Panel Estimation Study of Indian Commercial Bank' (2020) 7(9) *Journal of Critical Reviews* 1114, doi:10.31838/jcr.07.09.205.

5 Kamal Kishore, 'Risk Weighted Assets Density as a Parameter of Risk Profile of Bank Assets: A Study of Indian Banks' (2018) 15(2) *IUP Journal of Financial Risk Management* 62.

6 Asli Demirgüç-Kunt and Harry Huizinga, 'Bank Activity and Funding Strategies: The Impact on Risk and Returns' (2010) 98(3) *Journal of Financial Economics* 626, doi:10.1016/j.jfineco.2010.06.004.

7 Seyed Alireza Athari, 'Domestic Political Risk, Global Economic Policy Uncertainty, And Banks' Profitability: Evidence from Ukrainian Banks' (2021) 33(4) *Post-Communist Economies* 458, doi:10.1080/14631377.2020.1745563.

8 Agus Widarjono, 'Does the Volatility of Macroeconomic Variables Depress The Profitability of Islamic Banking?' (2020) 13(1) *JEJAK* 30, doi:10.15294/jejak.v13i1.19460.

Neely and Wheelock attempt to explain why banks perform differently across states, suggesting that the key predictor is state-level economic activity or state per capita, which statistically benefits bank profitability.<sup>9</sup> Menicuci and Paolucci demonstrate that internal factors are derived from bank financial statements such as balance sheets and profit/loss accounts. These elements are specific to the bank's management and its policies. Therefore, those factors refer to those under the bank's management's control and are influenced by the bank's policies.<sup>10</sup> Kosmidou focuses on external issues and demonstrates how the bank's environment influences its strategic position. These determinants are broad or broad-ranging for a country and are outside the company's control, such as the legal and economic environment. The outcomes differ depending on the country, the time frame, the availability of the data, and the country-specific outcomes.<sup>11</sup> Molyneux and Thornton examine a group of eighteen EU member states and conclude that increasing equity and interest rates enhance earnings. Their findings corroborate the Theory of Expenditures and the Theory of Expense Preference.<sup>12</sup>

Similarly, Goddard et al. used the Generalized Method of Moments (GMM) to assess the soundness of the banking system in six European Union countries. Their findings show a positive relationship between the bank's size and the capital-asset ratio.<sup>13</sup> Athanasoglou et al. studied bank profitability in South Eastern European countries from 1998 to 2002, focusing on specific bank and industry-specific and macroeconomic factors, and discovered a positive relationship that supports the Structure-Conduct Performance Hypothesis.<sup>14</sup> Dietrich and Wanzenried, on the other hand, classified European countries according to their income level: low, middle, and high. They used macroeconomic, bank, and industry-specific factors and concluded that the effects differed depending on income, sign, and magnitude.<sup>15</sup> Djalilov and Piesse use GMM to investigate the determinants influencing bank earnings in Central and Eastern Europe. Their findings indicate that economic and legal

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- 9 Michelle Clark Neely and David C Wheelock, 'Why Does Bank Performance Vary Across States?' (1997) 79(2) *Federal Reserve Bank of St Louis Review* 27, doi:10.20955/r.79.27-40.
  - 10 Elisa Menicucci and Guido Paolucci, 'The Determinants of Bank Profitability: Empirical Evidence from European Banking Sector' (2016) 14(1) *Journal of Financial Reporting and Accounting* 86, doi:10.1108/JFRA-05-2015-0060.
  - 11 Kyriaki Kosmidou, 'The Determinants of Banks' Profits in Greece During the Period of EU Financial Integration' (2008) 34(3) *Managerial Finance* 146, doi:10.1108/03074350810848036.
  - 12 Philip Molyneux and John Thornton, 'Determinants of European Bank Profitability: A Note' (1992) 16(6) *Journal of banking & Finance* 1173, doi:10.1016/0378-4266(92)90065-8.
  - 13 John Goddard, Phil Molyneux and John OS Wilson, 'The Profitability of European Banks: A Cross-Sectional and Dynamic Panel Analysis' (2004) 72(3) *The Manchester School* 363, doi:10.1111/j.1467-9957.2004.00397.x.
  - 14 Panayiotis P Athanasoglou, Matthaïos Delis and Christos Staikouras, *Determinants of Bank Profitability in the South Eastern European Region* (Working Paper 47, Bank of Greece 2006) doi:10.2139/ssrn.4163741.
  - 15 Andreas Dietrich and Gabrielle Wanzenried, 'The Determinants of Commercial Banking Profitability in Low-, Middle-, and High-Income Countries' (2014) 54(3) *The Quarterly Review of Economics and Finance* 337, doi:10.1016/j.qref.2014.03.001.

factors influence bank profitability.<sup>16</sup> Kosmidou et al. examined commercial banks in Greece and investigated how macro and micro-determinants influence their soundness. The findings show that equity strength benefits profitability, whereas size and cost-to-income ratio have a negative effect.<sup>17</sup>

Furthermore, macroeconomic drivers like economic growth and the consumer price index favourably impact earnings. Research analysis for Switzerland determined that Swiss bank operations and industry-specific drivers, in addition to macroeconomic determinants, have a major impact on bank earnings.<sup>18</sup> Saeed conducted regression analysis in the United Kingdom to confirm that certain bank determinants and macroeconomic factors such as economic growth, loans, equity, interest, and consumer price index impact bank earnings.<sup>19</sup> Albertazzi et al. looked at Italian banks from 2005 to 2015 and discovered that lower economic growth leads to poorer bank profitability and bad debts.<sup>20</sup>

In addition, Tan et al. focused on Chinese commercial banks and how their approach to risk, competitiveness, and cost efficiency affect their benefits, and the results reveal a favourable relationship.<sup>21</sup> Analysis of bank determinants using vector error correction by Zahariev et al. determined that macroeconomic factors have a neutral impact on bank profitability and that management efficiency, level of risk, capital, innovation, and competition should be prioritised.<sup>22</sup> Research for developing countries discovered that factors such as interest rate, credit growth, financial cycle, and fiscal politics directly impacted bank profitability.<sup>23</sup>

Another empirical study on profitability divides the effect of determinants into two terms: long and short term, and the results show that in the long term, size and GDP are significant determinants, whereas, in the short term, different factors from income statements are

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- 16 Khurshid Djalilov and Jenifer Piesse, 'Determinants of Bank Profitability in Transition Countries: What Matters Most?' (2016) 38 *Research in International Business and Finance* 69, doi:10.1016/j.ribaf.2016.03.015.
  - 17 Kosmidou (n 11).
  - 18 Andreas Dietrich and Gabrielle Wanzenried, 'Determinants of Bank Profitability Before and During the Crisis: Evidence from Switzerland' (2011) 21(3) *Journal of International Financial Markets, Institutions and Money* 307, doi:10.1016/j.intfin.2010.11.002.
  - 19 Muhammad Sajid Saeed, 'Bank-Related, Industry-Related and Macroeconomic Factors Affecting Bank Profitability: A Case of the United Kingdom' (2014) 5(2) *Research Journal of Finance and Accounting* 42.
  - 20 Ugo Albertazzi, Alessandro Notarpietro and Stefano Siviero, *An Inquiry into the Determinants of the Profitability of Italian Banks* (Bank of Italy Occasional Paper 364, Division of the Bank of Italy 2016).
  - 21 Yong Tan, Christos Floros and John Anchor, 'The Profitability of Chinese Banks: Impacts of Risk, Competition and Efficiency' (2017) 16(1) *Review of Accounting and Finance* 86, doi:10.1108/RAF-05-2015-0072.
  - 22 Andrey Zahariev, Petko Angelov and Silvia Zarkova, 'Estimation of Bank Profitability Using Vector Error Correction Model and Support Vector Regression' (2022) 28(2) *Economic Alternatives* 157, doi:10.37075/EA.2022.2.01.
  - 23 Emanuel Kohlscheen, Andrés Murcia Pabón and Julieta Contreras, *Determinants of Bank Profitability in Emerging Markets* (Working Paper 686, BIS 2018).

suggested. Revenue diversification is an important part of bank profitability; research conducted during the COVID-19 pandemic revealed that non-interest revenues positively improve bank profitability by minimising risk.<sup>24</sup>

Overall, the literature reveals that no commonly acknowledged conclusions on banking profitability exist, and the outcomes vary depending on the country. As a result, policymakers and academics are increasingly concerned, particularly in the aftermath of the Russian-Ukrainian war, with defining the primary determinants of the financial sector and addressing the ensuing crisis.

### 3 METHODOLOGY

#### 3.1. The Model

The study employs the VECM (Vector Error Correction Model) methodology approach. The method assumes that the model's application is accurate and that the relationship between the indicators can be determined.<sup>25</sup> The construction of a mechanism for error correction for modelling dynamic relationships outperforms the other methodological options in that VECM has cointegration relationships built into the specification, which limits the long-term behaviour of endogenous variables.<sup>26</sup> This tries to remedy any long-term faults at the methodology level by preparatory short-term changes. This makes VECM more beneficial in this scenario than other available models. Hence, (VECM) is applied to estimate the impact of bank-specific and economic-legal factors features on return on assets, as it will be appropriate to give necessary information for the long and short run.<sup>27</sup>

The model is indicated as below:

$$Y_{it} = \beta_0 + \beta_1 * SIZE_{it} + \beta_2 * CR_{it} + \beta_3 * XCA_{it} + \beta_4 * LQ_{it} + \beta_5 * RD_{it} + \beta_6 * OE_{it} + \beta_7 * NPL_{it} + \beta_8 * GDP_{it} + \beta_9 * INF_{it} + \beta_{10} * Netinterest_{it} + \epsilon_t$$

Y defines the response variable while  $\sum_{i=1}^{10} B_{t-1}$  indicates the explanatory variables,  $t$  is the time while to  $\epsilon$  is the error term.

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24 Xingjian Li and other, 'The Effect of Revenue Diversification on Bank Profitability and Risk During the COVID-19 Pandemic' (2021) 43 Finance Research Letters 101957, doi:10.1016/j.frl.2021.101957.

25 Dalina Maria Andrei and Liviu C Andrei, 'Vector Error Correction Model in Explaining the Association of Some Macroeconomic Variables in Romania' (2015) 22 Procedia Economics and Finance 568, doi:10.1016/S2212-5671(15)00261-0.

26 PK Mishra, 'The Dynamics of Relationship between Exports and Economic Growth in India' (2011) 4(2) International Journal of Economic Sciences and Applied Research 53.

27 Olugbenga A Onafowora and Oluwole Owoye, 'Can Trade Liberalization Stimulate Economic Growth in Africa?' (1998) 26(3) World Development 497, doi:10.1016/S0305-750X(97)10058-4.

As indicated in Table 1,<sup>28</sup> Return on Assets was used as a dependent variable. Independent variables are classified into two groups: the first group includes bank-specific (controlled) factors such as the sector's size, credit risk, capital adequacy, liquidity, income diversification, efficiency of operations, and non-performing loans, and the second group includes macroeconomic (uncontrolled) factors such as economic growth, inflation, and interest rates.

**Table 1. Exemplion of the determinants included in the specified models**

Dependent factor	ROA
Bank specific factors	Size
	Credit risk
	Capital adequacy
	Liquidity
	Income diversification
	Efficiency of operations
	Non-performing loans
Economic and legal factors	GDP
	Inflation
	Interest rate policies

### 3.2. Data

The research sample comprises data about banks in the Republic of North Macedonia, spanning quarterly observations from 2007 to 2022. Due to time constraints and data availability, the study is based on secondary data at the macroeconomic level. Data related to internal factors - bank specifics - are collected from the National Bank of the Republic of Macedonia Central Bank website, while external macroeconomic factors are obtained from the International Monetary Fund (IMF) and the World Bank.

## 4 RESULTS

The model was chosen to determine the long-run relationship between the bank's specific and economic-legal variables and the relationship between these variables and profitability. Before beginning the economic analysis of the data, the first step involves checking the model's validity by validating whether the VECM regression model's assumptions have been met amongst the required tests. As a result, the model specification should provide evidence

<sup>28</sup> Developed based on the literature.



for the key assumptions of stationarity, co-integration, normality, autocorrelation, and heteroscedasticity.

#### 4.1. Stationarity Check

The research applies the work of Dickey and Fuller to determine the stationarity of variables. This step is crucial as non-stationary data can produce erroneous results.<sup>29</sup> The results of the dependent variable tests indicated that ROA data series are stationary at the first difference in the Augmented Dickey–Fuller tests with probabilities less than 1%, except for the time series of the variable liquidity is stationary at a 10% margin. Table 1 shows the results of independent variables data series unit root testing.

**Table 2. Results of the ADF test**

Variable	Level	First Difference
Size	0.98	0.00***
Credit Risk	0.73	1.14E-09***
Capital Adequacy	0.33	0.01**
Liquidity	0.08*	0.06*
Income Diversification	0.39	0.00***
Operational efficiency	0.55	1.72E-15***
Non-performing loans	0.40	8.22E-13***
GDP	0.00***	0.00***
Inflation	0.09*	0.00***
Interest rate policies	0.00***	5.21E-07***
ROA	0.40	0.00***

\*\*\* significant at 1%

\*\* significant at 5%

\* significant at 10%

29 David A Dickey and Wayne A Fuller, 'Distribution of the Estimators for Autoregressive Time Series with a Unit Root' (1979) 74(366a) *Journal of the American Statistical Association* 427, doi:10.2307/2286348.

The results of Table 2<sup>30</sup> indicated that except for the time series of the variable loans to deposit, which is stationary at a 10% margin, all variables are significant at 1%.

## 4.2. Co-integration Test

The Unrestricted Co-Integration Rank Test defines the log-run correlation and investigates if there is a co-integration between the variables.<sup>31</sup> Hence, the main goal of the Johansen Co-integration test is to assess whether or not time series are co-integrated. In the case of co-integration, the VECM model is employed; otherwise, the VAR model is utilised. The results of Johansen testing using the Unrestricted Co-integration Rank Test (Trace) are as follows: Table 3<sup>32</sup> revealed that the variables in the models are cointegrated with 9-time series out of 10 picked. This demonstrates that variables walk together in the long term, allowing the estimation of a VECM model to determine the relationship between the collection of variables and profitability.

**Table 3. Johansen test results**

No. of CE(s)	Eigenvalue Test	Stat.	Trace Test	Prob.**
0*	0.94	785.94	285.14	0.00
1*	0.91	613.65	239.23	0.00
2*	0.86	466.04	197.37	0.00
3*	0.74	345.80	159.52	0.00
4*	0.72	263.46	125.61	0.00
5*	0.67	186.54	95.75	0.00
6*	0.48	119.35	69.81	0.00
7*	0.42	79.34	47.85	0.00
8*	0.37	45.96	29.79	0.00
9*	0.23	17.45	15.49	0.02
10	0.02	1.27	3.84	0.25

Trace test indicates 9 cointegrating eqn (s) at the 0.05 level

\* denotes rejection of the hypothesis at the 0.05 level

\*\*MacKinnon-Haug-Michelis (1999) p-values

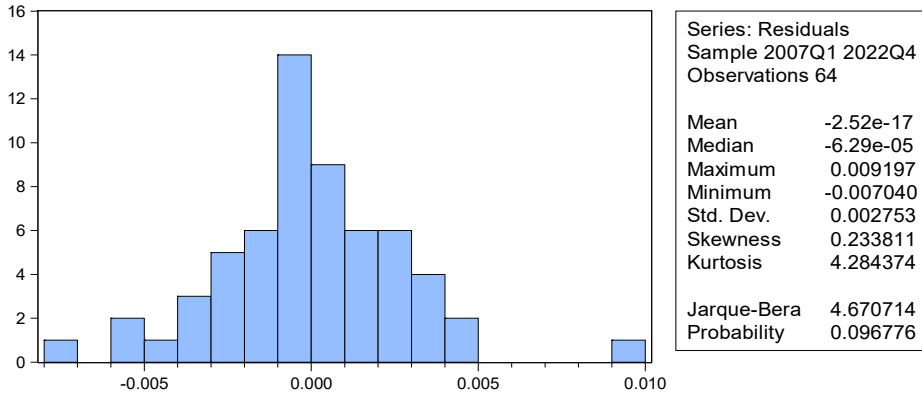
30 Authors' calculations.

31 Søren Johansen, 'Statistical Analysis of Cointegration Vectors' (1988) 12(2-3) *Journal of Economic Dynamics and Control* 231, doi:10.1016/0165-1889(88)90041-3.

32 Authors' calculations.

### 4.3. Normality Check

The assumption of normality is the following assumption of a regression model. The normality test examines how the regression model is spread out. This assumption should not be broken so that the model can be correctly described.



**Figure 1. Normality test**<sup>33</sup>

The histogram shows a normal distribution of the residual, with a probability of Jarque-Bera of 0.096776 less than 10%, affirming that the assumption of normality is not broken.

### 4.4. Autocorrelation

Another critical assumption that must not be violated is the presence of autocorrelation in the residuals of the developed model. For this objective, correlogram and Q statistics are employed to determine the presence of autocorrelation in residuals.

33 *ibid.*

**Table 4. CoRrelogram and Q statistics<sup>34</sup>**

Sample: 2007Q1 2022Q4

Included observations: 60

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
.* .	* .	1	-0.166	-0.166	1.7298	0.188
* .	* .	2	-0.160	-0.193	3.3745	0.185
* .	** .	3	-0.153	-0.231	4.8934	0.180
. .	* .	4	-0.006	-0.135	4.8959	0.298
. .	. .	5	0.061	-0.053	5.1475	0.398
* .	** .	6	-0.133	-0.222	6.3666	0.383
. .	* .	7	0.019	-0.109	6.3921	0.495
. .	* .	8	-0.003	-0.125	6.3925	0.603
. .	* .	9	-0.018	-0.170	6.4168	0.698
. * .	. .	10	0.154	0.046	8.1756	0.612
* .	* .	11	-0.085	-0.113	8.7303	0.647
. .	* .	12	-0.041	-0.126	8.8575	0.715
. .	. .	13	0.035	-0.018	8.9520	0.777
. * .	. .	14	0.101	0.056	9.7809	0.778
. .	. .	15	-0.029	-0.033	9.8489	0.829
* .	* .	16	-0.171	-0.130	12.313	0.722
. .	. .	17	0.072	0.002	12.759	0.752
. .	* .	18	-0.028	-0.117	12.828	0.802
. .	* .	19	-0.026	-0.138	12.889	0.844
. .	* .	20	-0.020	-0.148	12.924	0.881
. .	* .	21	0.057	-0.088	13.230	0.900
. * .	. .	22	0.096	-0.040	14.124	0.897
. .	. .	23	0.039	0.016	14.275	0.919
. .	. .	24	-0.040	-0.065	14.442	0.936
. .	* .	25	-0.064	-0.073	14.872	0.944
* .	* .	26	-0.070	-0.096	15.411	0.949
. * .	. .	27	0.147	0.045	17.855	0.908
. .	. .	28	-0.051	-0.063	18.156	0.922

#### 4.5. Heteroskedasticity Examination

34 *ibid.*

The Breusch-Pagan-Godfrey (BPG) test is a statistical test used in econometrics to determine whether or not a regression model contains heteroscedasticity. The likelihood of Chi-Square values of 0.2502 in this situation shows that the homoscedasticity assumption is not broken.

**Table 5. Heteroskedasticity Test<sup>35</sup>**

Breusch-Pagan-Godfrey Heteroskedasticity Test: Breusch-Pagan-Godfrey			
F-statistic	1.685867	Prob. F (44,15)	0.1358
Obs * R-squared	49.90784	Prob. Chi-Square (44)	0.2502
Scaled explained SS	14.22882	Prob. Chi-Square (44)	1.0000

Furthermore, the results of the VECM estimate on the developed model with ROA as the dependent variable and the collection of macroeconomic and bank-specific factors are shown.

## 5 ESTIMATION

Identifying bank and economic-legal factors that affect profitability is critical since the banking system encompasses more than 80% of the financial system, and a breach of this system creates a severe shock to the entire financial system in the Republic of North Macedonia.<sup>36</sup> Without a doubt, if the profitability of the country's commercial banks is jeopardised, the financial system as a whole and the country's economy are jeopardised. The results reveal that the size variable has a negative sign in the long run and is significant at a 1% confidence level. This suggests that an increase in assets in the banking system as a result of bad management could imply a low level of ROA. The findings are comparable to those of Barros et al., who explored European bank performance and found that larger banks are more diversified and thus have higher credit risk, influencing poor return.<sup>37</sup> Similarly to our findings, Kosmidou et al., Bace, E., and De Leon discovered that a greater credit risk ratio

35 *ibid.*

36 National Bank of the Republic of North Macedonia (n 2).

37 Carlos Pestana Barros, Candida Ferreira and Jonathan Williams, 'Analysing the Determinants of Performance of Best and Worst European Banks: A Mixed Logit Approach' (2007) 31(7) *Journal of Banking & Finance* 2189, doi:10.1016/j.jbankfin.2006.11.010.

indicates poor credit quality and, as a result, lower profitability.<sup>38</sup> Also, our results show a significant but negative impact on the bank's profitability.

Similarly to the work of Heffernan and Fu, Coccoresse and Girardone, and Nguyen, the sign of capital adequacy is positive and significant, showing that enough bank capital has a beneficial impact, and bank return leads to increased profits.<sup>39</sup> This shows that banks with a high capital-to-asset ratio are reasonably safe and profitable even in poor economic circumstances. This also reflects that banks must maintain a capital adequacy ratio of at least 8 %.<sup>40</sup> Furthermore, our investigation on the influence of liquidity on profitability concurs with Kosmidou et al., Vodova and Fungacova, and Turk and Weill, who also indicate the negative impact of liquidity on banks' profitability. This reflects the bank's management's ongoing need to have the highest deposit amount relative to the loan amount to be in a comfortable position to handle other operational aspects of banking management.<sup>41</sup> Our empirical findings confirm the work of Elsas et al. and Duho, Onumah, and Owodo, who state that income diversification hurts profitability.<sup>42</sup> The same is the case of the Macedonian banking sector, which is still traditional, and the majority of the sector's profits rely on interest income, and income diversification has a negative impact.

The operational efficiency variable appears to demonstrate a positive correlation with the dependent variable, indicating that improved cost management increases the efficiency and

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- 38 Kyriaki Kosmidou, Sailesh Tanna and Fotios Pasiouras, 'Determinants of Profitability of Domestic UK Commercial Banks: Panel Evidence from the Period 1995-2002' (Money Macro and Finance (MMF) Research Group Conference 2005) vol 45, 1; Edward Bace, 'Bank Profitability: Liquidity, Capital and Asset Quality' (2016) 9(4) *Journal of Risk Management in Financial Institutions* 327; Myra V De Leon, 'The Impact of Credit Risk and Macroeconomic Factors on Profitability: The Case of the ASEAN Banks' (2020) 15(1) *Banks and Bank Systems* 21, doi:10.21511/bbs.15(1).2020.03.
- 39 Shelagh Heffernan and Maggie Fu, 'The Determinants of Bank Performance in China' (*SSRN*, 25 August 2008) <<https://ssrn.com/abstract=1247713>> accessed 22 October 2023; Thi Hien Nguyen, 'Impact of Bank Capital Adequacy on Bank Profitability Under Basel II Accord: Evidence from Vietnam' (2020) 45(1) *Journal of Economic Development* 31; Paolo Coccoresse and Claudia Girardone, 'Bank Capital and Profitability: Evidence from a Global Sample' (2021) 27(9) *The European Journal of Finance* 827, doi:10.1080/1351847X.2020.1832902.
- 40 Decree no 07-2327/1 (n 1) art 65(1).
- 41 Kosmidou, Tanna and Pasiouras (n 38); Pavla Vodová, 'Liquidity of Czech Commercial Banks and its Determinants' (2011) 5(6) *International Journal of Mathematical Models and Methods in Applied Sciences* 1060; Zuzana Fungacova, Rima Turk and Laurent Weill, 'High liquidity Creation and Bank Failures' (2021) 57 *Journal of Financial Stability* 100937, doi:10.1016/j.jfs.2021.100937.
- 42 Ralf Elsas, Andreas Hackethal and Markus Holzhäuser, 'The Anatomy of Bank Diversification' (2010) 34(6) *Journal of Banking & Finance* 1274, doi:10.1016/j.jbankfin.2009.11.024; King Carl Tornam Duho, Joseph Mensah Onumah and Raymond Agbesi Owodo, 'Bank Diversification and Performance in An Emerging Market' (2020) 16(1) *International Journal of Managerial Finance* 120, doi:10.1108/IJMF-04-2019-0137.

profitability of the bank. This supports the findings of Hess and Francis.<sup>43</sup> Indeed, it reflects the nature of the banking sector in the Republic of Northern Macedonia, where the profits are generated through higher operative costs such as employee wages.

Our findings on the impact of non-performing loans (NPLs) on bank profitability are consistent with those of Ercegovac, Klinac, and Zdrili, who found that the bank's loan portfolio can significantly and negatively impact its profitability.<sup>44</sup> Also, research by Ozili and Uadiale revealed a similar relationship, indicating that larger levels of NPLs diminish bank profitability, which is consistent with our findings.<sup>45</sup>

Our empirical results on the impact of GDP on bank profitability are consistent with those of Bikker and Hu, Athanasoglou et al., and Garoui et al., who show that economic growth increases the level of consumption among economic agents and their willingness to invest, which can have a significant impact on bank profitability.<sup>46</sup> The same is the case of Macedonia's banking system, in which the country's economic development and legal interventions are linked to bank earnings. So, legal interventions aimed at maintaining price stability and fostering economic growth can have both positive and negative repercussions on bank profitability. Furthermore, our investigation into the impact of interest rates on profitability accords with Caliskan and Lecunab, who also emphasised the importance of interest rate policies in bank profitability. They hypothesised that greater interest rates would result in higher loan interest rates, improving bank profitability.<sup>47</sup> Last, the inflation and net interest variables determine a negative sign. However, the inflation is not significant.

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- 43 Kurt Hess and Graham Francis, 'Cost Income Ratio Benchmarking in Banking: A Case Study' (2004) 11(3) *Benchmarking: An International Journal* 303, doi:10.1108/14635770410538772.
- 44 Roberto Ercegovac, Ivica Klinac and Ivica Zdrilić, 'Bank Specific Determinants of EU Banks Profitability after 2007 Financial Crisis' (2020) 25(1) *Management: Journal of Contemporary Management Issues* 89, doi:10.30924/mjcmi.25.1.5.
- 45 Peterson Kitakogelu Ozili and Olayinka Uadiale, 'Ownership Concentration and Bank Profitability' (2017) 3(2) *Future Business Journal* 159, doi:10.1016/j.fbj.2017.07.001.
- 46 Jacob A Bikker and Haixia Hu, 'Cyclical Patterns in Profits, Provisioning and Lending of Banks and Procyclicality of the New Basel Capital Requirements' (2002) 55(221) *PSL Quarterly Review* 143, doi:10.13133/2037-3643/9907; Panayiotis P Athanasoglou, Sophocles N Brissimis and Matthaïos D Delis, 'Bank-Specific, Industry-Specific and Macroeconomic Determinants of Bank Profitability' (2008) 18(2) *Journal of international financial Markets, Institutions and Money* 121, doi:10.1016/j.intfin.2006.07.001; Nassreddine Garoui, Fatma Sessi and Anis Jarbouï, 'Determinants of Banks Performance: Viewing Test by Cognitive Mapping Technique (A Case of Biat)' (2013) 3(1-2) *International Journal of Contemporary Economics and Administrative Sciences* 22.
- 47 MM Tuncer Caliskan and Hale Kirer Silva Lecuna, 'The Determinants of Banking Sector Profitability in Turkey' (2020) 11(1) *Business and Economics Research Journal* 161, doi:10.20409/berj.2020.242.

**Table 6. VECM model**

ROA	Coefficient	t statistics
Size	-1.05E-07	[-2.72]***
Credit Risk	-0.04	[-2.80]***
Capital Adequacy	2.17E-07	[ 3.75]***
Liquidity	-0.06	[-5.05]***
Income Diversification	-0.09	[-17.67]***
Operational efficiency	0.05	[ 13.29]***
Non-performing loans	-0.04	[ -15.00]***
GDP	0.00	[ 6.47]***
Inflation	-1.12E-05	[-0.14]
Interest rate policies	0.00	[2.90]***
Error term	0.06	[ 0.10]
Critical- table values on 60 observation		
1%	5%	10%
1.658	1.980	2.617
R-squared	0.629063	Mean dependent var -6.85E-06
Adjusted R-squared	0.124589	S.D. dependent var 0.004521
S.E. of regression	0.004230	Akaike info criterion -7.802204
Sum squared reside	0.000447	Schwarz criterion -6.580503
Log likelihood	269.0661	Hannan-Quinn criter. -7.324330
Durbin-Watson stat	2.304496	

\*\*\* significant at 1%

\*\* significant at 5%

\* significant at 10%

The mode in Tabel 6<sup>48</sup> with bank profitability (ROA) as an independent variable has achieved an exploitability rate of 62.90%. The results of R-squared (Coefficient of Determination) indicate that the variables included in the study explain the variability of the dependent variable in the regression model to 62.90%. This percentage is adequate because the study does not consider numerous other internal and external factors that may

48 Author's calculations.



affect the profitability of the Republic of North Macedonia banking system. However, these results imply that the variables included in our study have relatively high explanatory power and are very representative. Furthermore, if we refer to the values that the Durbin-Watson index takes, which is 2.304496, the model does not suffer from autocorrelation.

## 6 CONCLUDING REMARKS

The article investigated the profitability of the Macedonian banking system defined by the return on assets as dependent variable for the period 2007 to 2022. The empirical results show that the size of the banking sector, the credit risk, liquidity, income diversification, and non-performing loans have a meaningful but negative influence on the response variable. However, capital adequacy, operational efficiency, GDP, and interest rate have an important positive impact. Therefore, to improve profitability, the Macedonian banking system should focus on asset management as an indicator of size, increasing the non-income ratio to diversify the income to reduce credit risk and non-performing loans and maintain a favourable liquidity ratio.

Moreover, there are apparent indicators that second-level banks should expand outside national borders, improve loan portfolio management, and increase technology with database processing and communication improvements, which can strengthen the ability to deal with the next crisis. Furthermore, banks can enhance their non-interest revenue by using it as an outlet for risk in banking and spreading it across different income-generating operations, thus increasing profits. Also, by navigating the legal landscape strategically, banks can enhance profitability. Hence, the study's findings provide significant insights for policymakers, regulators and bank management in the Republic of North Macedonia.

Future research could expand the breadth of economic and legal, industry, and bank-specific variables influencing bank profitability, providing a more detailed picture of bank profitability determinants in the Republic of North Macedonia.

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**Competing interests:** No competing interests were disclosed.

**Disclaimer:** The authors declare that their opinion and views expressed in this manuscript are free of any impact of any organizations.

## ABOUT THIS ARTICLE

### **Cite this article**

Kosumi A and Zharku L, 'Bank Specific and Economic: Legal Determinants of Profitability in the Republic of North Macedonia' (2024) 7(2) Access to Justice in Eastern Europe 212-33 <<https://doi.org/10.33327/AJEE-18-7.2-a000209>> Published 1 May 2024

Submitted on 2 Nov 2023 / 1<sup>st</sup> Revised 07 Jan 2024 /

2<sup>nd</sup> Revised 24 Jan 2024 / Approved 04 Mar 2024

Published: 1 May 2024

**DOI** <https://doi.org/10.33327/AJEE-18-7.2-a000209>

**Managing editor** – Mag. Yuliia Hartman. **Section editor** – Prof. Ganna Kharlamova.  
**English Editor** – Julie Bold.

**Summary:** Introduction. – 2. Literature Review. – 3. Methodology. – 3.1. *The Model*. – 3.2. *Data*. – 4. Results. – 4.1. *Stationarity Check*. – 4.2. *Co-integration Test*. – 4.3. *Normality Check*. – 4.4. *Autocorrelation*. – 4.5. *Heteroskedasticity Examination*. – 5. Estimation. – 6. Concluding Remarks.

**Keywords:** *Bank Profitability, ROA, VECM, internal factors, macroeconomic and legal factors.*

**JEL Classification:** F34, F43, F63, C01, C32, N17

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