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Original scientific paper

INTEREST RATES AND INFLATION AS DETERMINANT FACTORS OF SAVING IN COMMERCIAL BANKS OF NORTH MACEDONIA

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Abstract

This study aims to analyze the effect of the Central Bank of North Macedonia (National Bank), which is in North Macedonia presented by National Central Bank (BI) Rate and inflation rate on the savings rate at commercial banks in North Macedonia by using the analysis tools of autoregressive conditional heteroscedasticity (ARCH) and generalized autoregressive conditional heteroscedasticity (GARCH). The analysis results show that the BI Rate and inflation significantly affect saving rates at commercial banks in North Macedonia. The importance of being a source of investment funds to support development activities can be a consideration for the government to formulate a policy for allocating investment from these savings funds for productive sectors. Practically, it is hoped that the distribution of savings through investment activities can encourage economic growth and increase economic development in North Macedonia.

Keywords: Interest rate, inflation, National Central Bank

Introduction

The National Central Bank of North Macedonia has a significant and same time impact role in moving the helm of the Macedonian economy because more than 90% of the third-party fund of national banking is in commercial banks of the financial market in North Macedonia. Proximally the amount of commercial bank savings in the banking system.

In the dynamic landscape of global finance, the intricate interplay between interest rates, inflation, and saving behavior holds profound implications for economic stability and individual financial decisions. This research delves into the specific context of North Macedonia, examining the pivotal role played by interest rates and inflation as determinant factors shaping saving patterns within commercial banks. As an aspiring European Union member state, North Macedonia's financial sector stands at the nexus of regional economic integration and domestic fiscal policy.

Interest rates, serving as the cost of borrowing and the return on savings, are fundamental drivers influencing the choices made by consumers and businesses alike. Concurrently, inflation, the gradual erosion of purchasing power over time, introduces an additional layer of complexity to financial planning. In the context of North Macedonia, where economic transitions and reforms have been substantial since gaining independence, understanding how these factors interact is essential for crafting effective monetary policies and fostering a resilient financial environment.

The allure of commercial banks as repositories for savings is deeply rooted in their role as financial intermediaries. Customers entrust their funds to these institutions with the expectation of not only preserving but also augmenting their wealth. However, the efficacy of this financial relationship is intricately linked to macroeconomic factors, particularly interest rates and inflation. Fluctuations in these variables can significantly influence the real return on savings, impacting both the individual saver and the broader financial landscape.

This research aims to unravel the nuanced dynamics between interest rates, inflation, and saving behaviors within the unique economic context of North Macedonia. By examining historical trends, conducting empirical analyses, and drawing upon theoretical frameworks, this study

seeks to provide valuable insights for policymakers, financial institutions, and individuals seeking a deeper understanding of the intricate forces that shape the savings landscape in North Macedonia's commercial banks. In doing so, we contribute to the broader discourse on the intersection of monetary policy, economic behavior, and financial stability in emerging market economies.

In the ever-evolving landscape of global economics, the intricate interplay between interest rates, inflation, and savings remains a subject of paramount importance. As financial institutions serve as the bedrock of economic stability, understanding the factors that influence saving behaviors within commercial banks becomes imperative. This research delves into the specific context of North Macedonia, a nation navigating the complexities of its economic trajectory. Against a backdrop of shifting global dynamics, this study scrutinizes the roles played by interest rates and inflation in shaping saving patterns within the confines of commercial banks in North Macedonia.

The significance of savings within the banking sector cannot be overstated. Savings form the cornerstone of capital accumulation, which, in turn, fuels investments and economic growth. The decisions of individuals and businesses to save or spend are profoundly impacted by macroeconomic variables, with interest rates and inflation emerging as pivotal determinants. North Macedonia, as a burgeoning economy, is not immune to the ripples of these economic forces. Consequently, an in-depth analysis of the relationship between interest rates, inflation, and savings within its commercial banking sector is essential for both academic discourse and informed policymaking.

This research seeks to uncover the nuanced connections between interest rates, inflation, and savings in North Macedonia's commercial banks, recognizing the intricate web of factors that influence individual and corporate decisions regarding financial prudence. By elucidating the dynamics at play, this study aims to contribute valuable insights to the ongoing dialogue surrounding monetary policy, financial stability, and the broader economic well-being of North Macedonia. As we embark on this exploration, the goal is not only to decipher current trends but also to provide a foundation for anticipatory measures that can fortify the resilience of the nation's financial ecosystem.

In the following sections, we will explore the theoretical foundations underpinning our study, review relevant literature, present the methodology employed, and analyze the empirical findings, all culminating in a comprehensive understanding of how interest rates and inflation jointly influence saving decisions in North Macedonia's commercial banks.

Literature review

Amaefula, C.G (Amaefula, 2016)showed that Gross Domestic Regional Product per capita, conventional banks interest rate, and inflation simultaneously influence commercial bank deposits in North Macedonia. Partially, Capita Gross Domestic Product has a positive influence; conventional banks' interest rate has a negative influence, while inflation does not have a significant influence on banks deposits in commercial banks. Onofrei, M., Bostan, I., Roman, A., and Firtescu, (Onofrei, 2019)showed that inflation has a negative and insignificant effect on the deposit amount, interest rates have a negative and significant effect on the number of deposits, Finance to Deposit Ratio has a negative and insignificant effect on the number of deposits and profit sharing rate has a positive and significant effect on the number of deposits. Results showed that GRDP influences the savings rate of the people of North Macedonia, while Inflation and Interest Rates together do not affect the level of community savings in North Macedonia showed that the interest rate has a negative but significant effect on the savings in commercial banks, PDRB has a positive but significant effect on the savings of the people in

North Macedonia while the inflation rate has a negative but significant effect on the saving of society. Based on the literature, the hypotheses proposed in this study are the following:

H1. There is a positive and significant effect of BI Interest Rate on the Savings Rate at Commercial Banks in North Macedonia.

H2. There is a positive and significant effect of Inflation on the Savings Rate at Commercial Banks in North Macedonia.

Research methods and model

The type of research used in this research is descriptive type with an associative approach. (Pasiouras, 2007)As for the purpose of looking at the relationship between the BI Rate and Inflation Rate of Savings at Commercial Banks in North Macedonia for the period 2015 to 2022. In this study, the dependent variable was the Savings Rate at Commercial Banks (Y), while the independent variable was BI Interest Rate (X1) and Inflation (X2). Sources of data come from the National Bank of North Macedonia [1] and the Agency of Statistics North Macedonia [2]. (Engle, 2007)The methods used are Autoregressive Conditional Heteroscedasticity (ARCH) and Generalized Autoregressive Conditional Heteroscedasticity (GARCH). To explain how the ARCH and GARCH models are formed, it is necessary to use a multiple regression model as follows. The general form of the multiple regression equation can be formulated:

$$Y = \beta 0 + \beta 1X1 + \beta 2X2 + ... + \beta nXn + et \quad (1)$$

Information: Y= Dependent variable;
β0= Constant;
β 1, β 2, ...β n= Regression coefficient;
X1,X2, ...Xn= Independent variable;
et = error term
Based on this equation, operationally the regression equation in this study is:

$$LogTt = \beta 0 + \beta 1rt + \beta 2Inft + et \quad (2)$$

Information: Tt= Saving (Y);
β0= Intercept (Constant);
b1, b2, b3, b4= Regression coefficient;
r (X1) = BI Rate, (X1);
Inf (X2)= Inflation, (X2);
et= error term
The ARCH (p) model can be expressed in the following equation:

$$Yt = \beta 0 + \beta 1X1t + et \quad (3)$$

Information:
Yt = Dependent variable;
X1t = independent variable;
β0 = Intercept (Constant);
β1= Regression coefficient;
et = error term

$$\sigma 2t = \alpha 0 + \alpha 1e2t\text{-}1 + \alpha 2e2t\text{-}2 + \ldots. + \alpha pe2t\text{-}p \quad (4)$$

1. The fourth equation shows that the residual variety (σ2t) has two elements: constant (α0) and the residual square of the previous period (e2t-p).
2. The fifth equation is a linear model, the sixth equation is a non-linear model, so the OLS method cannot be used for model estimation.
3. Can only be estimated using the Maximum Likelihood method. The GARCH model (p, q) can be expressed in the following equation:

$$\sigma 2t = \alpha 0 + \alpha 1 e2t\text{-}1 + \ldots + \alpha p e2t\text{-}p + \lambda 1 \sigma 2t\text{-}1 + \ldots + \lambda q \sigma\ 2t\text{-}q \quad (5)$$

1. The equation shows the variety of residuals. To test the correctness of each variable σ2t is not only influenced by the residual square of the previous period (e2t-p), but also by the variety of residuals in the previous period (σ2t-q).
2. The GARCH model is like the ARCH model, also the estimation uses the Maximum Likelihood (ML) method.
In this study, the multiple regression equation becomes

$$Yt = \beta 0 + \beta\ 1X1t + \beta\ 2X2t + \ldots + eit \quad (6)$$

Information:
Yt = Saving;
X1t = BI Rate;
X2t = Inflation;
β0 = Intercept (constant);
β 1, β 2, = Regression coefficient;
eit = error term

(Fama, 1990) To test the truth of each independent variable on the dependent variable, a hypothesis test was used, namely the simultaneous test (F test) and partial test (t test). In addition to the simultaneous test and partial test, short-term and long-term testing is also carried out. The short-term test consists of the unit-root or stationarity test, ARCH/GARCH, and the classical assumption test. The test carried out in the long term is the cointegration test. ARCH and GARCH models are used to determine the effect of one or more independent variables on the dependent variable. (Dickey, 1982) The use of ARCH and GARCH models in this study is because the independent and dependent variables change from time to time or have a volatility phenomenon, so the Ordinary Least Square (OLS) model cannot be implemented because the OLS model must be constant from time to time. If the residuals are not constant, then there is a heteroscedasticity problem so that the resulting coefficient is not the Best Linear Unbiased Estimator (BLUE) and by using the maximum likelihood method, with the ARCH and GARCH models. The other tests used were the Stationarity Test and Cointegration Test. To test whether the data used in this study are stationary or not, this study uses the Augmented Dickey-Fuller (ADF) test. (Dickey D. A., 1979) The cointegration test is a long-term relationship between variables which although individually are not stationary, but a linear combination between these variables can be stationary. In general, it can be said that if the time series data Y and X are not stationary at the level but become stationary at the same difference, namely Y is I (d) and X is I (d) where d is the same level of differentiation, then the two data are cointegrated. In other words, the co-integration test can only be done when the data used in the research are integrated to the same degree.

Results and comments on results

Table 1 - Data Stationarity Test

Variable	Absolute Value Statistics (ADF)	Critical Value Mackinnon ADF (5%)	Information
Saving	-3.685	-3.433	Not Stationary
BI-Rate	-2.157	-3.487	Not Stationary
Inflation	-1.884	-3.667	Not Stationary

Source: Author's Calculations

Furthermore, the three variables of Savings, BI-Rate, and Inflation that do not show stationarity at the level, then the data are tested for data stationarity at the first differentiation level with the results presented in Table 2.

Table 2 - Data Stationarity Test at the First Level

Variable	Absolute Value Statistics (ADF)	Critical Value Mackinnon ADF (5%)	Information
Saving	-4.616	-3.377	Stationary
BI-Rate	-4.224	-3.267	Stationary
Inflation	-5.117	-3.699	Stationary

Source: Author's Calculations

Table 2 is the result of the data stationarity test at the first differentiation level. The results of the data stationarity test at the first differentiation level have shown that the Saving, BI-Rate, and Inflation variables are stationary assuming absolute data. The data can be said to be stationary if the calculated value of the ADF is greater than the critical value of the table ADF at a significant level of 0.05. All the estimated variables are stationary, then it can be continued by conducting cointegration testing.

Table 3 - Johansen Co integration Test

Hypothesized		Trace	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.7512	51.353	19.787	0.0000
At most 1	0.1451	11.448	12.668	0.2144
At most 2	0.0478	2.963	2.498	0.3344
Hypothesized		Max-Eigen	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.7512	40.251	14.484	0.0000
At most 1	0.1451	9.341	11.659	0.2274
At most 2	0.0478	2.963	2.498	0.3344

Source: Author's Calculations

Table 3 shows that there is 1 cointegrated at $\alpha = 0.05$ among the research variables, this can be seen by the value of Trace Statistics> Critical Value or 51.353> 19.787 with a probability of 0.0000. Meanwhile, as seen from the value of the Max-Eigen Statistic, there is 1 cointegrated, this can be seen from the Max-Eigen Statistics> Critical Value or 40.251> 14.484 with a

probability of 0.0000. The conclusion based on the Trace Statistic and Max-Eigen Statistics test shows that there is 1 cointegration at a significant level of α = 0.05, which means that there is a long-term relationship between savings and its determining variables.

Tables 4 and 5 show the estimation results using the ARCH 1 model, when viewed from the R2 value of 0.01252, then the model has a fairly large R2. Judging from the AIC criteria of 0.4242 and SIC of -0.2247 which is low. When viewed from the level of significance, only one variable, namely the BI-Rate for savings, is significant at α = 0.05, while inflation is not significant at α = 0.05 for savings. When viewed from the DW statistical value of 1.2109, it means there is no autocorrelation in the estimation results. The ARCH 1 model equation is as follows:

$$T = 8.6561 - 0.1522 \text{ BI-Rate} + 0.0088 \text{ Inf} + 0.1577 \text{ AR(1)} + e$$

Hypothesis testing results showed that based on the estimation results it is known that the F-count is 57.2907 with a probability of 0.0000 with α = 0.05, this shows that the BI-Rate and inflation variables together can provide a significant explanation of the savings variable with a 95% confidence level.

Regarding BI Rate, based on the estimation results obtained, the t-value is - (1.6895) with a probability of 0.0451 at α = 0.05. These results indicate that the BI-Rate has an effect and is significant on savings with a confidence level of 95% and the t-count is negative, so it can be stated that the BI-Rate has a negative and significant effect on savings. In terms of inflation, based on the estimation results, the t-count value is (0.1685) with a probability of 0.8695 at α = 0.05. These results state that inflation has no insignificant effect on savings with a confidence level of 95% and the t-count is positive, so it can be stated that inflation has no significant effect on savings. Lastly, the calculation of the coefficient of determination, based on the estimation results, the coefficient of determination (R2) is 0.81252 or 81.06%. This shows that overall variations that occur in the independent variables (BI-Rate and Inflation) can explain the dependent variable (savings) of 81.06%, while the remaining 18.94% is explained by other variables outside the model.

Table 4 - ARCH Estimation Results 1

	Coefficient	Std. Error	z-Statistic	Prob.
C	8.6561	0.5186	14.658	0.0000
BI_RATE	-0.1522	0.4468	-1.6895	0.0451
INFLATION	0.0088	0.9586	0.1685	0.8695
AR(1)	0.1577	0.3368	3.2865	0.0058

Source: Author's Calculations

Table 5 – Variance equation

C				
RESID`2-1	0.04461	0.03116	2.77561	0.0088
R-squared	0.81252	0.03661	1.08755	0.1645
Adjusted R-squared	0.77913			7.6487
S.E. of regression	0.26771			0.4242
Sum squared resid	0.91334			-0.2247
Log likelihood	10.7941			-0.1764
F-statistic	57.2907			1.2109
Prob (f-statistic)	0.00000			
Inverted AR Roots		0.80		

Source: Author's Calculations

Based on the estimation results obtained, the t-value is - (1.6895) with a probability of 0.0451 at $\alpha = 0.05$. These results indicate that the BI-Rate has an effect and is significant on savings with a confidence level of 95% and the t-count is negative, so it can be stated that the BI-Rate has a negative and significant effect on savings.
Empirically, the effect of interest rates on savings in this study contradicts other theories and studies. In this case, when the BI rate is raised, the commercial bank can raise the savings or credit interest rates, however, the banking sector does not necessarily raise the savings or credit interest rates, all depending on bank policy because in this case, it is related to competition between banks. (Çiğdem, 2019) When the bi rate increases and commercial banks raise savings interest rates, banks will be faced with the problem of increasing bank funds, so to cover this, banks must increase credit interest rates which in turn will cause the risk of bad credit. Then if the BI rate is lowered, it should be followed by a reduction in savings and credit interest rates. If the BI rate is lowered, the bank will respond by lowering the credit interest rate to reduce the cost of funds borne by the bank from the savings interest rate. The monetary policy adopted by the National Bank of North Macedonia is determined by the determination of the ideal interest rate, namely one that can balance the benefits of interest rates between the banking sector and the public as customers, including parties from the business sector. Regarding the effect of inflation on savings, based on the estimation results, the t-count value is (0.1685) with a probability of 0.8695 at $\alpha = 0.05$. These results state that inflation has no insignificant effect on savings with a confidence level of 95% and the t-count is positive, so it is empirically stated that inflation has no significant effect on savings. This contradicts the theory that an increase in inflation should cause purchasing power to decline. The income previously allocated for savings will be used partially or completely for consumption purposes so that automatically the income set aside for savings is now used for consumption needs it will reduce the saving rate. However, the results of the empirical test between inflation and savings in this study are in line with the research. which found that inflation does not have a significant effect on saving. The inflation rate in the National Central Bank of North Macedonia from 2005 to 2014, was in the range of 5 to 10%, which is categorized as a type of moderate inflation, namely inflation characterized by a slow increase in prices. So that the increase in inflation that occurs does not make the public immediately withdraw their savings. This indicates that people can adjust their economic conditions to fluctuations in inflation so that inflation does not have a significant effect on the economic conditions of the community.

Conclusions

The development of banking has an important role in supporting the economic growth of a country or region. Therefore, the development of banking in a country can be used as a measure of a country's economic progress. Central National Bank of North Macedonia, a developing part of the state of North Macedonia, is currently carrying out development in almost every region. The development process requires a large amount of financing. Central Bank of North Macedonia is currently active in the development process, both physical and non-physical. The development process is also inseparable from economic growth. To achieve economic growth, a large investment fund is required, one of which can be sourced from domestic savings. Public saving is one of the sources of financing in the context of domestic saving. In the context of long-term economic development and economic growth, attention to domestic savings is essential to maintain economic stability in the Central Bank of North Macedonia. Based on the results of the discussion on the hypothesis of the effect of the BI-Rate interest rate on savings, it can be concluded that the BI-rate variable has a negative and significant effect on the savings variable. Based on the results of the discussion on testing the hypothesis regarding the effect of the level of inflation on savings, it can be concluded that the inflation variable does not have a

significant effect on the saving variable. An economy that continues to run with savings as one of the determining indicators in achieving economic success, therefore it is hoped that future researchers who will conduct research related to this research will enrich it by adding variables according to current economic conditions. In particular, this study underscores the findings regarding the negative effect of interest rates on savings in contradiction with the general economic theory of money. Therefore, as a bottom line, these findings are specifically applicable in the context of the Central Bank of North Macedonia, in the years investigated. Therefore, further studies are expected to analyze the effect of interest rates more broadly and extend the years of investigation to support the fundamental economic theory of money. It also is suggested to develop a longer research period in some regions in North Macedonia with the aim of getting even better results and using other dependent variables.

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