

## The Impact of Macroeconomic Variables on Nonperforming Loans in Tanzania

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### Abstract

**Background:** The study examines the impact of macroeconomic variables on nonperforming loans for Tanzanian banking sector from 2013 to 2019. Macroeconomic variables include Gross Domestic Product growth rate, Money supply Rates, inflation rate, exchange rate, and interest rate. We have chosen the area under study due to the fact that, the research in this phenomenon is still at the preliminary level in Sub Sahara Africa in such a way that, no studies regarding the topic have done on the study area at that period regardless of the high economic growth of the country in the Sub Sahara Africa and Africa in general (World Bank 2017), whose economy (regarding business capital provision) depends most on commercial banks rather than the capital market (Dar es Salaam Stock Exchange) which until now the market has only 27 listed firms (Nyabakora, W. et. el. 2020). With this regard, the commercial banks have to be protected from the unknown harmful factors and this will be attained only if we know how the factors affect the banks' performance.

**Material and Methods:** Our study employed Tanzanian banking sector's secondary data from the central bank of Tanzania, the Dare es salaam stock exchange, and the empirical evidences from the works of other researchers, from 2013 to 2019, using Panel data regressions and correlation in the analysis.

**Results:** The results found a positive impact of macroeconomic variables proxied by interest rate, and exchange rate, on non performing loans. However, the results found a negative impact of gross domestic product growth rates, the rate of money supply, and inflation rates, to non performing loans.

**Key words:** Macroeconomic, Non-Performing Loan, Tanzania, GDP, Growth Rates

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### I. Introduction

In the country where the capital market is infant, the economy is stimulated by banking sector where lending and borrowing takes place. In such environment, the actors need to work very careful putting in mind the risk and return prevalence. The bank's role apart from many others is to use the depositors' fund efficiently while being effective that whenever the depositors' needs arise, their money will be available. While doing this, the bank uses the deposited fund to invest in lending for the expectation of getting interest as a reward for the principal amount borrowed, and here is where the performance of the banks can be measured. Others perform poorly while others flourish. For poor performers, there are internal and external factors which affect liquidity and profitability of banks. Among others are money supply, interest rates, exchange rates, inflation rate, and gross domestic product of the country.

The reaction of the factors leads to the crisis of nonperforming loan that covers all the dreams from widening the opportunity for others to get the loan, stimulating the economy and even getting rewards for their business goals, to illiquid and loss making. However, the economy of the country is led by a number of factors which if not smoothly operate, the market forces may shake the economy and the harmed are actors like banks and investors; that lead to disability in servicing the loan. The macroeconomic factors result from the economic situation of the country when using the factors to redress the economy. Example, Exchange rate is out of the bankers' decision due to the fact that, the rise or fall of the value of the currency depends on a number of unknown variables. The same to the money supply, sometimes the government use it as the tool to curb the inflation and deflation, so it is beyond the banks' reach. The same is for the interest rates charged by the banks. These factors are determined by the government when use them as open market operation tools. In this regard, when all the factors are not well controlled, they affect negatively the economic growth of the country which ends to poor performing of banking sector.

Regardless of the negative effects of the macroeconomic variables prevailing in the market, banks are the main source of the capital to many Tanzanians' small and medium enterprises. Banks as the providers of loan to investors are not supposed to shut doors for borrowers while escaping the factors, but the issue is to look for the hypothesized factors that may affect the banks' profitability and liquidity.

International Monetary Fund define nonperforming loan as the overdue principal and interest defaulted for about 90 days and above. However, no exact time lapse that explain the nonperforming loan due to the fact that, apart from banks management decisions, every financial institution has different loan with different repayment periods.

Our research examines the impact of macroeconomic factors proxied by gross Domestic Product, Money Supply, Exchange Rates, Interest Rates and the Rate of Inflation in the economy - being the independent variables; on the Nonperforming Loan as the dependent variable.

The study is significant due to the fact that, regulators and policymakers responsible for economic stability will use the findings to take appropriate action. Apart from the above significance, the research related to the examination of the effects of macroeconomic variables on nonperforming loans is still at the preliminary level in Tanzania in such a way that, no studies regarding the topic have done on the study area and period regardless of the high economic growth of the country in the Sub Sahara Africa and Africa in general (World Bank 2017), whose economy depends most on commercial banks rather than capital market (Dar es Salaam Stock Exchange) which until now the market has only 27 listed firms (Nyabakora, W. et. el. 2020). With this regard, the commercial banks have to be protected from the unknown harmful factors and this will be attained only if we know how the factors affect the nonperforming loan. This is the theme of this study.

## **II. Literature Review**

The section analyzes the different researchers' empirical works regarding the impact of macroeconomic variables on nonperforming loan in Tanzania economy from the year 2013 to 2019.

The variables employed in this research reflect the prior empirical literature by Kastrati (2011) Using a dynamic panel data model, examines the determinants of non-performing loans in Albania, Armenia, Azerbaijan, Belarus, Bosnia and Herzegovina, Georgia, Bulgaria, Croatia, Macedonia, Moldova, Montenegro, Kosovo, Romania, Serbia and Ukraine, from 1994 to 2009. The study found that the real economic growth rates and inflation rates have a significant impact on non-performing loans.

Also, Espinoza and Prasad (2010) examine the main determinants of non-performing loans, for a sample of 80 banks of the Gulf Cooperation Council region. They found that Gross Domestic Product (GDP) growth rates and interest rates have a significant impact on the dynamics of non-performing loans.

Erdiç and Abazi (2014) studying the macroeconomic factors and bank-specific factors that affect the dynamics of non-performing loans in the period 2000 to 2011 for 20 European emerging market countries, and found that, the real GDP growth rate, inflation, and lending interest rates have a significant impact on the changing of non-performing loans.

Assessing the variables under study, Siraj and Sudarsanan (2011) in their study on performance of Indian commercial banks for the period 1999 to 2011, reports that nonperforming assets is the main threat in Indian banking sector. In their literature review it is identified that, the most powerful macroeconomic indicators are the main influence of nonperforming loans.

Apart from the above findings, Sofolis and Eftychia (2011) employing univariate regression to assess the impact of macroeconomic variables on nonperforming loans, and found that inflation, and Money supply influence the credit risk of Romanian banking system.

Also, Asari et al. (2011) in their research on the relationship between inflation, interested rate and non performing loans employing vector error correction model for commercial banks in Malaysia from 2006 to 2010 and found a strong long run relationship between interest rate and nonperforming loans, While in short run both interest rate and inflation does not affect non performing loans.

Supporting the above empirical finding, Dash and Kabra (2010) on their study relating to the effect of macroeconomic variables on nonperforming loans, conducted in Indian banks from 1998 to 2009 revealed that, high interest rates, and real effective exchange rate leads to high Non-performing Loan (NPLs) level. The results supported by Bofondi and Ropele (2011), Louzis et al. (2010), Solarin, Sulaiman and Jauhari (2011) for interest rates in different economies; Irena Szarowska (2018) supporting them on the context of exchange rates while studying different economies. However Irena Szarowska (2018), assessing the effect of macroeconomic determinants on non-performing loans in Central and Eastern European countries found the negative relationship between interest rate and nonperforming loan, while European Central Bank Financial Stability Review 2011 found the negative correlation between exchange rates and nonperforming loan.

Not only that but also, Bofondi and Ropele (2011) in their study on how macroeconomic factors affect the quality of the aggregate credit portfolio of the Italian banking system for the period 1990–2012, employing aggregate data while applying a simple linear regression model found that the rate of growth of the real gross domestic product has an inverse impact on nonperforming loans. The results supported by Louzis et al. (2010), Babouček and Jančar (2005), J. Kjosevski et al. (2019), while studying the same topic in different economies. However, their findings were against, Irena Szarowska (2018) findings, in the assessment of the same topic in different economies that revealed the positive relationship between GDP growth rates and dynamic

nonperforming loans. The above mentioned macroeconomic variables affect the non-performing loans with different time lag. Louzis et al. (2010) assessed the influence of macroeconomic factors and bank-specific determinants on non-performing loans in the Greece banking sector, using nine biggest banks from 2003 to 2009 found that, GDP growth rate has a negative impact on the increase of non-performing loans, while the interest rate has a positive effect on nonperforming loans.

Thus, our study has contribution on widening existing literature regarding the effect of macroeconomic variables on nonperforming loans for providing the empirical evidence on the main macroeconomic factors having impact on nonperforming bank loans in the developing economies.

### **III. Data and Methodology**

#### **Data**

On the basis of the above empirical literature we have decided to examine the impact of five macroeconomic indicators such that Gross Domestic Product, money supply, Inflation rate, interest rate, and exchange rate as independent variables on Non-performing Loans using an aggregate economic data from the central bank of Tanzania. The study uses the time series data from 2013 to 2019 published by the Bank of Tanzania, Dar es salaam Stock Exchange, and Tanzania Bureau of Statistics.

#### **Nonperforming Loans (NPLs)**

International Monetary Fund defines nonperforming loan as the overdue principal and interest defaulted for about 90 days and above which has negative effect on the economic growth. However, no exact time lapse that explain the nonperforming loan due to the fact that, apart from banks management decisions, every financial institution has different loan with different payment periods.

Regardless of the negative effects of the macroeconomic variables prevailing in the market, banks are the main source of the capital to many Tanzanians' small and medium enterprises. Banks as the providers of loan to investors are not supposed to shut doors for borrowers while escaping the factors, but the issue is to look for the hypothesized factors that may affect the banks' profitability and liquidity.

This study examines the impact of macroeconomic factors proxied by gross Domestic Product, Money Supply, Exchange Rates, Interest Rates and the Rate of Inflation in the economy - being the independent variables; on the Nonperforming Loan as the dependent variable.

#### **Interest Rate**

Interest rate is the charge incurred by the borrower for the received loans from lenders as the return paid against the borrowed money. The risk free rate of return usually remains in control by monetary regulators for economic strengthening objectives. On the other hand, the discount rate is set by the central bank as a tool for open market operation requirement to curb the inflationary pressures. In using the tools sometimes, it leaves borrowers with expensive loans and end up on non serviceable loan which also affects commercial banks.

H<sub>1</sub>: Interest rate is positively related with Non-Performing Loans.

#### **Inflation Rate (INFR)**

This is the rise in general price level of goods and services in an economy, over a period of time. It is calculated as:

$$\text{Inflation} = \frac{\text{Current Consumer Price Index} - \text{Historical Consumer Price Index}}{\text{Current Consumer Price Index}} \times 100$$

The situation is caused by the increase of money supply in the economy which affects the purchasing power of the currency. Many prior empirical studies proxied it by consumer price index due to the fact that, it is the most comprehensive measure of inflation.

Increase in CPI attracts monetary regulators to employ contractionary measures by raising the interest rates to control the inflation which later increase the cost of borrowing that cause nonperforming loans to borrowers. In the same weight, prior studies have proved the positive correlation between the inflation rate and nonperforming loans. For instance, the study conducted by Fofack (2005) on the same topic at Sub - Sahara African context maintains that inflationary pressure persuade people to make bad loans. Therefore, Fofack considers inflation as one of the important causes of the rapid growth of nonperforming loans that disables the banking sector.

H<sub>2</sub>: Inflation has positive effect on nonperforming loans

#### **Gross Domestic Product Rate (GDP Rate)**

Gross Domestic Product is the market value of all final goods and services in a country in the specified time period usually a year. Using expenditure approach, GDP is calculated by summing the private and public

consumption, and investment, the growth of which is considered as a symbol of country's good economic performance. In recession, the countries suffer the low growth of their economy that ending on stagnant economy where prices, output and employment level is poor. However, Based on theoretical literature by Modigliani and Miller, 1967 and the business cycle theory by Salas and Saurina 2002, and Carey 2002, GDP growth has a significant negative impact on Non-Performing Loans due to the fact that, macroeconomic developments enable economic actors to pay their dues.

H<sub>3</sub>: GDP growth rate is negatively correlated with Non-Performing Loans

#### **Exchange Rate (EXCR)**

Exchange rate is the rate used to exchange one currency with another that is determined by the continuous foreign exchange markets operating in 24 hours a day with a wide range of different currency traders. The exercise is largely influenced by the exchange of capital goods and services internationally. Decreases in the amount of home currency results in costly imported goods that pressurize the finance letter of credits issued by commercial banks to traders and so raise the risk of default. Our study uses Tshs /Usd as a proxy of exchange rate.

H<sub>4</sub>: Exchange rate has a positive impact on nonperforming loans

#### **Money Supply (M2)**

Money supply has implication on the country's economy that affects the banking sector and can end either on enabling the borrowers to manage to repay the installments or to disable them on the repayment of the loans. The same can determine the period to be in the recession or booming and that to affect the value of the currency. With this regard now, apart from reserve money the money supply in Tanzania is divided into narrow money (M1) and broad money (M2) as the stock of money available in the economy during a specified time. Reserve money describes the overall tangible money available while narrow money (M1) includes reserve money and all demand and time deposits. Broad money (M2) includes narrow money and all resident foreign currency deposits.

In our study, M2 is the proxy of money supply due to the fact that most of prior descriptive empirical studies use the category.

H<sub>5</sub>: Money supply is positively related with nonperforming loans

### **IV. Methodology**

The study focuses on assessing the relationship between macroeconomic variables and nonperforming loans, the econometric model for nonperforming loans is provided in the following equation;

$$NPL = \beta_0 + \beta_1 GDP + \beta_2 M2 + \beta_3 EXCRT + \beta_4 INTR + \beta_5 INFR + \mu_t$$

where

*NPL* = Non Performing Loans

*GDP* = Gross Domestic Product

*M2* = Money Supply

*ER* = Exchange Rate

*INTR* = interest rate

*INFR* = Inflation rate

$\mu_t$  = Random Error

$\beta_0$  = The intercept of the equation

$\beta_n$  = The change coefficient for independent variables

t = Time Period

#### **Data Analysis Instrument**

In this study descriptive statistics consist of five variables that are independent variables (M2, GDPRates, INFR, INTR and EXCRTSH/USD) and dependent variable (NPL) as it is shown in the table (1) below. The findings reveal that the average 20.928, 6.92%, 5.15 and 2036.35 for M2, ) GDP Rates, INFR, INTR and EXCRTshs/Usd respectively. For the year 2013 to 2019 Tanzania banks had the average on nonperforming loan (NPL) with 24.54; with minimum of 0.0681 and maximum of 2290.481.

This study employed Descriptive Statistics, Correlation and Regression Analysis. In data analysis, the multiple regressions model is employed while using panel data in estimating the coefficients of independent variables as the empirical studies by Ponsian, N., Chrispina, K., Tago, G., & Mkiibi, H. (2014), Ponsian and Chrispin (2014), assert. We run the White test for heteroskedasticity for the reason that, our study is the panel data study which comprise of cross sectional behavior.

White Test for Ho: homoskedasticity  
 Against Ha: Unrestricted heteroskedasticity

**V. Results**

**Data Analysis and Interpretation**

This study employs STATA 12 package to carry out Descriptive Statistics, Correlation and Regression Analysis as follows;

**Descriptive statistics**

In this study descriptive statistics consist of five variables that are independent variables (M2, GDP Rates, INFR, INTR and EXCRTshs/Usd) and dependent variable (NPL) as it is shown in the table (1) below. The findings reveal that the average 20.928, 6.92%, 5.15 and 2036.35 for M2, GDP Rates, INFR, INTR and EXCRTshs/Usd respectively. For the year 2013 to 2019 Tanzania banks had the average on nonperforming loan (NPL) with 24.54; with minimum of 0.0681 and maximum of 2290.481.

**Table 1: Descriptive Statistics Analysis**

Variable	Observation	Mean	Std Deviation	Min	Max
NPL Rates	28	24.54286	10.31085	14.2	40.1
M2	28	20.92857	1.944195	17.5	23.4
GDP Rates	28	0.0692571	0.0005731	0.0681	0.07
INFR	28	5.158571	1.632362	3.45	7.9
EXCRT	28	2036.357	275.9096	1599.222	2290.418
INTR	28	8.977143	3.190169	5.15	14.52

Source: Researcher Computations using STATA 12 Package

**White Test for Heteroskedasticity**

In data analysis, Ordinary Least Square regressions model is used while using panel data in estimating the coefficient of independent variables (GDP Rates, M2, INFR, EXCRTshs/Usd and INTR). We perform the White test for heteroskedasticity due to the fact that, our study is on panel data study which includes cross sectional behavior as shown in table (2) below. It can be concluded that there is no heteroskedasticity.

White's test for Ho: homoskedasticity  
 Against Ha: unrestricted heteroskedasticity

**Table 2: Cameron & Trivedi's Decomposition of IM-test on Non performing Loan (NPL)**

Source	P-value	df	Chi-Square
Skewness	0.0002	5	24.68
Kurtosis	0.3127	1	1.02
Heteroskedasticity	0.0001	6	28.00
Total	0.0000	12	53.70

Source: Researcher Computations using STATA 12 Package

**Correlation Analysis**

The relationship between macroeconomic variables and non performing loan (NPL) was established by using a Pearson correlation analysis. The relationship between the dependent variables and independent variables shown in the table (3) below, The findings reveal that, the independent variables (GDP Rates, M2 and INFR) have the negative impact on NPL but its statistically significant at 95% while (EXCRTshs/Usd and INTR) having positive impact on NPL but EXCRTshs/Usd its statistically significant and INTR is statistically insignificant on nonperforming loan at 95%.

**Table 3: Correlation Analysis**

	NPL Rates	M2	GDP Rates	INFR	EXCR Tshs/Usd	INTR
NPL Rates	1					
	0					
M2	-0.9517*	1				
	0.0000	0				

GDP Rates	-0.6663*	0.8069*	1			
	0.0001	0.0000	0			
INFR	-0.8451*	0.7954*	0.4950*	1		
	0.0000	0.0000	0.0074	0		
EXCR Tshs/Usd	0.7256*	-0.6869*	-0.6534*	-0.8020*	1	
	0.000	0.0001	0.0002	0.0000	0	
INTR	0.1199	0.0166	0.4103*	-0.4815*	0.3330	1
	0.5433	0.9333	0.0301	0.0095	0.0834	0

Source: Researcher Computations using STATA 12 Package

**Regression Analysis**

Regression analysis about the impact of macroeconomic variables on non performing loan can be seen in the table (4) below;

**Table 4: Regression Analysis**

Source	SS	df	MS	Number of Observation = 28		
Model	2864.34255	5	572.868509	F (5, 22)	=	2057.31
Residual	6.12602426	22	0.278455648	Prob > F	=	0.0000
				R-squared	=	0.9979
				Adj R-squared	=	0.9974
Total	2870.46857	27	106.313651	Root MSE	=	0.52769
NPL Rates	Coef.	Std Err.	t	P>  t	[95% Conf.	Interval]
M2	-6.678046	0.1582294	-42.20	0.000	-7.006193	-6.349898
GDP Rates	20166.73	751.8942	26.82	0.000	18607.4	21726.07
INFR	-0.9792368	0.1920931	-5.10	0.000	-1.377614	-0.58086
EXCRTsh/Usd	0.0252111	0.0010926	23.08	0.000	0.0229453	0.027477
INTR	-1.998594	0.0976843	-20.46	0.000	-2.201179	-1.796009
-cons	-1260.731	51.38539	-24.53	0.000	-1367.298	-1154.164

Source: Researcher Computations using STATA 12 package

The relationship between macroeconomic variables and non performing loan (NPL) was established by using ordinary least square regression model, which involves the coefficient of determination. The findings of the regression analysis show that, the coefficient of determination is 99.79% which explain the variation between nonperforming loan and other factors that explain the remained percentage. In regression analysis NPL used independent variables which explained that, all variables are statistically significant at 95%. Under H<sub>3</sub> it is confirmed demonstrating a positive relationship between the GDP Rates and NPL; this contradict to our hypothesis. This means that an increase in the GDP rate will lead to an increase in the NPL. The result is in line with Szarowska (2018).

Under H<sub>2</sub> from the results is confirmed demonstrating a negative relationship between inflation rate and NPLs; which is contrary to the hypothesis. This means that an increase by 1% of inflation rate will determine a reduction of 0.9792368% of the NPLs. In fact the finding support the previous study conducted by European Central Bank in the European Financial stability review (2011).

Under H<sub>1</sub> the results also is not confirmed demonstrating a negative relationship between the interest rate and NPL. The coefficient is -1.998594 also is statistically significant because the probability is lower than 5% (<0.05). The negative relationship of the coefficient demonstrates that the interest rate will determine the decrease in NPL. Under H<sub>4</sub> it is confirmed demonstrating a positive relationship between foreign exchange rate (EXCRTshs/Usd) and the NPLs. The results of the regression show a coefficient of 0.0252111 and highly significant at 95% level. Under H<sub>5</sub> is confirmed demonstrating a positive relationship between the GDP Rates and NPL; this contradicts with our hypothesis.

**VI. Discussion**

The results of our study are presented in Tables 1, 2, 3 and 4, that the coefficients of the explanatory variables and their corresponding t-statistics are revealed. The coefficients have signs as hypothesized and per empirical arguments in the literature.

The results in Table 3 indicate that the annual real GDP growth rate has a major influence on non performing loans rate. Its coefficient of the variable is statistically significant having negative relationship with

NPL, which is in line with our hypothesis. This means, the deterioration of the economy, reduces the income of borrowers and their collateral value that may cause the increase of the non-performing loans. Moreover the results imply that the improvement in GDP growth rate, reduce the non performing loan. Our finding matches with the empirical results reported by Fofack (2005), Louzis et al. (2012), Messai and Jouini (2013), Škarica (2014), and Dimitrios et al. (2016). Espinoza and Prasad (2010), Castro (2013), Erdiç and Abazi (2014), Makri et al. (2014). Therefore, we accept the null hypothesis.

With respect to inflation rate (INFR), the anticipated coefficient have negative relationship with NPL, and statistically significant. In this case, the hypothesis on inflation is obviously rejected. This is due to the fact that, increase in the inflation rate leads to the decrease in the actual value of loans and simplify for the borrowers to pay the loan and so reduces default risks. The finding is consistent with the empirical result by Boujelbene (2011), Ekanayake and Azeez (2015), and Anjom and Karim (2016), Castro (2013), Klein (2013), Erdiç and Abazi (2014), Chaibi and Ftiti (2015). The results imply that, high inflation rates lead to reduction of the actual value of outstanding loans, in such a way that it simplify for borrowers to service their loans.

#### **Exchange rate**

The real exchange rate as one of macroeconomic variables shows statistical significance having positive relationship with non performing loans. This means, the increase in the exchange rate makes it harder to sell overseas due to the rise in relative prices. If exports slowdown, then exporters may choose to cut their investments to reduce output and cut-back employment levels that make hardship in paying loans and so, increase in NPL. Not only that but also, a fall in a value of the currency acts as a tool in an expansionary monetary policy that can be used as a counter-cyclical measure to stimulate demand, profits, output and jobs when an economy is in recession that simplify the payment of loans for borrowers that reduce NPL. Also, a cheaper currency competitively boosts the economy that leads to positive multiplier effect, equally to accelerator effects to the income and spending. However, it positively affects the non performing loans. Our finding is consistent with the results found by European Financial Stability Review (2011). Therefore, we accept the null hypothesis

#### **Interest rates**

The study finds a positive relationship between interest rate and nonperforming loans (NPL) but statistically insignificant. The results match with the finding by (Saurina, 2006; Fofack, 2005; Jimenez, Khemraj and Pacha, 2009; and Dash and Kabra, 2010). The result demonstrate that when banks rise real interest rates, decrease the ability of borrowers to service their loans, that leads to an increase in non-performing loans. Therefore, we accept the null hypothesis.

#### **Money supply**

The study finds a significant negative relationship between the rate of money supply and nonperforming loans. This means, the increase of money supply in the economy lowers interest rates, which stimulates investments, and when injecting more money in hands of consumers, builds the feeling of wealthier, which leads to spur spending. Here business firms increase production and sales, that orders more raw materials and labor for the increased production. Therefore, the ability of loans payment is improved in such a way that reduces the non performing loan. With the same magnitude, falling of money supply or declining of money supply rate, induce economic activities to decline to deflation results that is disabled borrowers' loan payment and the higher the NPL. Therefore, we reject the null hypothesis

### **VII. Conclusion**

The research examines the impact of macroeconomic variables proxied by gross domestic product growth rate, money supply rate, inflation rates, exchange rate, and interest rate; on non-performing loans of Tanzania banking sector for the period 2013 to 2019. The results indicate prevalence of negative impact of economic growth, money supply, and inflation rate, on Non-Performing Loans. They have negative relation with NPL and statistically significant at standard levels.

In data analysis, Ordinary Least Square regressions model is used while using panel data in estimating the coefficient of independent variables (GDP Rates, M2, INFR, EXCRTshs/Usd and INTR). We perform the White test for heteroskedasticity due to the fact that, our study is on panel data study which includes cross sectional behavior as shown in table below. It can be concluded that there is no heteroscedasticity.

The relationship between macroeconomic variables and non performing loan (NPL) was established by using a Pearson correlation analysis. The relationship between the dependent variables and independent variables shown in the table 3, The findings reveal that, the independent variables (GDP Rates, M2 and INFR) have the negative impact on NPL but its statistically significant at 95% while (EXCRTshs/Usd and INTR)

having positive impact on NPL but EXCRTshs/Usd its statistically significant and INTR is statistically insignificant on nonperforming loan at 95%.

The relationship between macroeconomic variables and non performing loan (NPL) was established by using ordinary least square regression model, which involves the coefficient of determination. The findings of the regression analysis show that, the coefficient of determination is 99.79% which explain the variation between nonperforming loan and other factors that explain the remained percentage. In regression analysis NPL used independent variables which explained that, all variables are statistically significant at 95%. Under  $H_3$  it is confirmed demonstrating a positive relationship between the GDP Rates and NPL; this contradict to our hypothesis. This means that an increase in the GDP rate will lead to an increase in the NPL. The result is in line with Szarowska (2018).

Under  $H_2$  from the results is confirmed demonstrating a negative relationship between inflation rate and NPLs; which is contrary to the hypothesis. This means that an increase by 1% of inflation rate will determine a reduction of 0.9792368% of the NPLs. In fact the finding support the previous study conducted by European Central Bank in the European Financial stability review (2011).

Under  $H_1$  the results also is not confirmed demonstrating a negative relationship between the interest rate and NPL. The coefficient is -1.998594 also is statistically significant because the probability is lower than 5% ( $<0.05$ ). The negative relationship of the coefficient demonstrates that the interest rate will determine the decrease in NPL. Under  $H_4$  it is confirmed demonstrating a positive relationship between foreign exchange rate (EXCRTshs/Usd) and the NPLs. The results of the regression show a coefficient of 0.0252111 and highly significant at 95% level. Under  $H_5$  is confirmed demonstrating a positive relationship between the GDP Rates and NPL; this contradicts with our hypothesis.

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### References

- [1]. Adela, S. and Iulia (2010), "Study of Correlation Between Average Interest Rate and Nonperforming Loans in the Romanian Banking System During 2006- February 2010" The Journal of the Faculty of Economics –Economic, Issue 2, 777-782.
- [2]. Asari, Muhamad, Ahmad, Latif, Abdullah and Jusoff, K., (2011) "An Analysis of Non-Performing Loan, Interest Rate and Inflation Rate Using Stata Software". World Applied Sciences Journal, 12, 41-48.
- [3]. Babouček, I.; Jančar, M. (2005). A VAR Analysis of the Effects to Macroeconomic Shocks to the Quality of the Aggregate Loan Portfolio of the Czech Banking Sector. Working Paper Series, no.1, Czech National Bank.
- [4]. Bofondi, M. and Ropele, T; (2011). Macroeconomic Determinants of Bad Loans: Evidence from Italian Banks, Occasional Papers, 89
- [5]. Caprio and D. Klingebiel, (1996), "Bank Insolvencies: Cross-Country Experience," Policy Research Working Paper 1620, World Bank.
- [6]. Carey, M., (2002). A Guide to Choosing Absolute Bank Capital Requirements. Journal of Banking and Finance 26, 929–951.
- [7]. CEICDATA.COM/InternationalMonetary Fund/tradingeconomics.com/bankoftanzania Dash and Kabra (2010), "The Determinants of Non-performing Assets in Indian Commercial Bank an Econometric Study" Middle Eastern Finance and Economics7, 94-106.
- [8]. Dimitrios P.Louzis, Angelos T.Vouldis and Vasilios L. Metaxas (2010), "Macroeconomic and Bank Specific Determinates of Nonperforming Loans in Greece's, comparative Study of Mortgage Business and Consumer Loan Portfolios Bank of Greece Working Paper No 118.
- [9]. Erdiç D.; Abazi E. (2014) The Determinants of NPLs in Emerging Europe, 2000-2011, Journal of Economics and Political Economy, 1(2), p. 112-125.
- [10]. Espinoza R.; Prasad, A. (2010) Nonperforming Loans in the GCC Banking System and their Macroeconomic Effects, IMF Working Paper 224.
- [11]. European Central Bank, (2011). European Financial Stability Review
- [12]. Fofack H; (2005). Nonperforming Loan in Sub-Saharan Africa, Causal Analysis and Macroeconomic Implications. World Bank Policy Research Working Paper N 3769.
- [13]. Irena Szarowska (2018). Effect of Macroeconomic Determinants on Non-performing Loans in Central andEastern European countries. International Journal of Monetary Economics and Finance
- [14]. Jordan Kjosevski, Mihail Petkovski & Elena Naumovska (2019) Bank Specific and Macroeconomic Determinants of Non-performing Loans in the Republic of Macedonia: Comparative analysis of Enterprise and Household NPLs, Economic Research-Ekonomiska Istraživanja,32:1,1185-1203, DOI: 10.1080/1331677X.2019.1627894
- [15]. Kastrati, A. (2011) The Determinants of Non-Performing Loans in Transition Countries, Financial Stability Report, Central Bank of the Republic of Kosovo.
- [16]. Louzis, Vouldis and Metaxas V. L. (2010) "Macroeconomic and Bank Specific Determinants of Nonperforming Loans in Greece" a Comparative Study of Mortgage, Business and Consumer Loan Portfolios Bank of Greece, Working Paper, 118.

- [17]. Nyabakora, W. et al. (2020) The Effect of Financing Decision on Firm Performance (A Case of Tanzania) *International Journal of African and Asian Studies* www.iiste.org ISSN 2409-6938 An International Peer-reviewed Journal. Vol.60, 2020
- [18]. Ponsian and Chrispin (2014) the effects Working Capital Management on Profitability-case of Pakistani Manufacturing Firms. *International Journal of Economics, Finance and Management Sciences* Vol. 2 No. 6, 2014 pp. 347-355.
- [19]. Ponsian, N., Chrispina, K., Tago, G., & Mkiibi, H. (2014). The Effect of Working Capital Management on Profitability. *International Journal of Economics, Finance and Management Sciences*, 2(6), 347-355. doi: 10.11648/j.ijefm.20140206.17.
- [20]. Saad Siddiqui and Kamran Shahzad Malik "Impact of Interest Rate Volatility on Nonperforming Loans in Pakistan " *International Research Journal of Finance and Economics* ISSN 1450-2887 issue 84 (2012).
- [21]. Salas, V. and Saurina, J., (2002). Credit Risk in Two Institutional Regimes "Spanish Commercial and Savings Banks" *Journal of Financial Services Research*, 22(3), 203-224.
- [22]. Schwartz, Anna J. (1987). *Money in Historical Perspective*. Chicago: University of Chicago Press.
- [23]. Siraj, K.K and P. Sudarsanan Pillai (2011). "A Study on the Performance of Non-Performing Assets (NPAs) of Indian Banking during Post Millennium Period" *International Journal for Business and Management* Vol. 2 No 3.
- [24]. Sofoklis, D. Vogiazas and Eftychia Nikolaidou (2011) "Investigating the Determinants of Nonperforming Loans in the Romanian Banking Systems: An Empirical Study with Reference to the Greek crisis" Hindawi Publishing Corporation *Economics Research International* Volume 2011.
- [26]. Solarin Sakiru Adebola, Won Sulaiman, Wan Yusoff and auhari Dahalan (2011) "An ARDL Approach to the Determinants of Nonperforming Loans in Islamic Banking System in Malaysia" *Kuwait Chapter of Arabian Journal of Business and Management Review* vol. 1 no 2.
- [27]. The World Bank, <https://www.theglobaleconomy.com/Tanzania/inflation/>Date: 08/06/2020, 17:20
- [28]. World Economic Forum, (2017): <https://www.weforum.org/agenda/2017/06/these-are-the-world-sfastestgrowing-economies-in-2017-2/>: Reference made in May, 2020

Wakara Ibrahimu Nyabakora, et. al. "The Impact of Macroeconomic Variables on Nonperforming Loans in Tanzania." *IOSR Journal of Business and Management (IOSR-JBM)*, 22(6), 2020, pp. 58-66.