MACRO-ECONOMIC INDICATORS AND NON-PERFORMING LOANS OF PUBLIC LISTED COMMERCIAL BANKS ACROSS SECURITIES EXCHANGES IN EAST AFRICA

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ABSTRACT

Banks play an important role in the financial system. Through their intermediation activities, banks facilitate the development process of an economy. Therefore, for this critical role to be sustainable, banks need to financially perform satisfactorily to enable them efficiently undertake their intermediation role. However, their performance in the country has been at risk due to rise in non-performing loans (NPLs) in the market. The rise in non-performing loans has led to risk aversion among banks denying ordinary people credit facilities. Numerous studies associate the rise in non-perming loans in banks with various macro-economic factors and monetary policies. These macroeconomic factors that affect a banking system, non-performing loans pose a worrisome threat to the performance of banks and the financial stability of an economy as a whole. This study established the influence of macroeconomic indicators on non-performing loans of public listed commercial banks in East Africa Securities Exchanges. The study analyzed panel dataset of 29 East Africa listed commercial banks with yearly data that spans the period from 2006 to 2020, a total of 435 bank years. The study used a correlational research design and a document review guide to extract and compile the required secondary data for analysis from the financial statements. The findings indicated that interest rate has a positive and significant effect on nonperforming loans. Inflation has a positive but non-significant effect on nonperforming loans. Growth of money supply has a positive and significant relationship on nonperforming loans of public listed commercial banks. Lastly, bank size has a positive and a significant effect on nonperforming loans of public listed commercial banks. The study concluded that interest rate, growth of money supply and bank size had a significant relationship with non-performing loans. However, inflation did not have a significant effect on non-performing loans. The study recommended that the management of the commercial banks should actively monitor and set appropriate lending rate for the loans they issue. This is because the lending rate has a significant effect on non-performing loans. Increase in lending rate means that the non-performing loans increase. Commercial banks should also enhance periodic/regular credit risk monitoring of their loan portfolios to reduce the level of non-performing loans. The study recommended that the commercial banks should come up with policies to control base lending rates to a manageable level even with high inflation rates. Central Bank of Kenya should incorporate the ever-changing operating environment of commercial banks when making changes in the money supply

Keyword: interest rates, inflation rates, growth of money supply, bank size, nonperforming loans

INTRODUCTION

Banks are very important constituents in the financial system of countries and play a fundamental role in the global economy. Banks mobilize savings and demand deposits, on the one hand, and extend credit, on the other. In this way, they turn illiquid assets into liquid assets (White, 2018). Banks also facilitate improvement in the society's living standards by supporting various products and services to the market such as trading activities, channeling of financial resources between savers and borrowers and issuing required financial resources to reduce risk and uncertainty in the economy as a whole (Nathan, Ibrahim & Tom, 2020).

The core business of any bank is to receive deposits from customers and on lend these funds to borrowing customers (Warue, 2018). The act of borrowing and lending is the core of money creation (Xiong, Fu & Wang, 2017). When a borrower defaults on a loan, commercial banks cannot circulate the defaulted amounts back into the economy unless otherwise recovered by way of loan collateral liquidation or any other alternative recourse (Omwenga & Omar, 2017). In addition, bad loans reduce banks' profitability and limit their ability to issue new credit (Tumwine, Sejjaaka, Bbaale & Kamukama, 2018). They also risk hampering long-term economic growth, leading to greater uncertainty in the banking system and, in turn, elevated financial stability risks (Nathan, S. 2018; Chimkono, Muturi & Njeru, 2016). The choice of using macroeconomic variables in this assessment can provide valuable insights into the economic conditions that affect the ability of borrowers to repay their loans. Macroeconomic variables such as GDP growth, inflation, interest rates, money supply and exchange rates can affect the overall economic environment and impact the ability of borrowers to repay their loans (Haniifah, 2020).

Several studies conducted have attributed the causes of loan default to movements in macroeconomic factors such as Interest rates, gross domestic product (GDP), exchange rates, inflation, government expenditure, exports, imports among other factors (Ghosh, 2017; Kwack, 2020; Siraj & Pillai, 2019; Wangai, Bosire & Gathogo, 2018). Other studies attribute loan default to bank specific factors such as credit risk assessment techniques, loan portfolio management among other factors (Lartey, Musah, Okyere & Yusif, 2018; Nkusu, 2019; Omwenga & Omar, (2017). According to Kingu, Macha and Gwahula (2018), through the several financial crises, it has become abundantly clear that macro-economic conditions manifested through economic cycles, could have a significant impact on the banking industry's incidence of non-performing loans. This is because business cycles affect cash flows of various economic units and consequently credit portfolio performance which gives rise to Non-performing loans (NPLs). Bank NPLs are financial pollution, and when present, may be harmful to economic growth and social welfare (Zeng, 2019).

The relationship between NPLs and the macro-economy can be explained on the basis that the quality of a loan portfolio is influenced by the systemic risks resulting from exposures to macroeconomic risk factors across banks (Sheefeni, 2015). The prevailing macroeconomic situation inevitably impacts borrower's financial position and their capacity to service debt. Thus, hostile economic shocks together with high capital cost and low interest margins have been established to cause NPLs (Amuakwa-Mensah & Boakye- Adjei, 2014). Michael (2018) posits that the inclusion of non-performing assets in loan portfolios affects the operational efficiency of the banks, a situation that in turn affects the profits, liquidity and solvency of that bank. Further, non-performing assets also affect the stability of the bankers in respect to the disposition of the funds towards credit delivery. Lihawa and Ngaruko (2021) found that unemployment rate and inflation had negative and significant impact on NPLs. Similarly, Carlos (2012) found as NPLs have negative association with GDP growth rate whereas a positive association with unemployment rate. Mbowe, Mremaa and Shayom (2020) on the effectiveness of credit management system on loan performance and found as credit quality, interest rates charged, credit risk control and collection policies had an effect on loan performance

Statement of the Problem

Profitability remains under pressure from rising loan impairment charges (LICs) and tepid credit growth in Kenya's commercial banks (KBA, 2020). Kenyan banks entered 2020 with already weak asset quality,

reflecting persistently challenging economic conditions and sustained low loan growth (KPMG, 2020). The sector's NPL ratio was 12% at end-2019 and continued to climb given the disruption to businesses and households. According to the Mid-Year Fiscal Policy Statement (2020), the upward trend in non-performing loans and recent bank failures in Tanzania is a cause for concern. Despite lessons obtained from the 2008 World financial crisis, banks are still suffering from non-performing loans. The loan-to-deposit ratio of CRDB bank, calculated based on total bank deposits increased between 2018 and 2019; the Group's total assets grew from TZS 5.4 trillion to TZS 5.9 trillion, an increase of 9% while total deposits recorded an increase of 5% to TZS 4.3 trillion from TZS 4.1 trillion. This is consistent with Uganda where the Bank of Uganda in 2020 reported that commercial banks' asset quality declined, with the share of non-performing loans increasing to 5.4 per cent from 5.3 per cent. As of December 2020, non-performing loans stood at 5.1 per cent.

The rise in non-performing loans has led to risk aversion among banks denying ordinary people credit facilities in the East Africa region (Wangai, Bosire & Gathogo, 2018). Lack of access to credit by the private sector, which is necessary to fuel real economic growth is a drag on the East Africa Community efforts towards trade integration. The macroeconomic factors that affect a banking system, non-performing loans pose a worrisome threat to the performance of banks and the financial stability of an economy as a whole (Wangai, Bosire & Gathogo, 2018). By affecting the financial stability of the economy of a country, they undermine the financial intermediation role of commercial banks, and ultimately, the economy of the region.

Further, previous studies present research gaps; Nasserinia *et al.,* (2014) conducted a study on main factors determining the performance of commercial banks in Japan. The study was centered on commercial banks in Japan; therefore, the findings may not be applied to East Africa. The current study sought to address the contextual gap by establishing the influence of money supply on commercial banks in the East Africa context. Otalu *et al.,* (2014) conducted a study on monetary policy and commercial banks performance in Nigeria with an assessment of credit creation role. However, the study was centered on Nigeria and the study made use of total bank credit as a measure of performance. The current study focused on East Africa, as it adopted asset quality as a measure of non-performing loans of commercial banks. Non-performing loans could rise further with the ongoing deceleration in economic activity. This gives a reasonable concern for assess macroeconomic indicators and their impact on non-performing loans of commercial banks in East Africa Securities Exchanges.

Objectives of the Study
The general objective of the study was to establish the macroeconomic indicators on non-performance loans of public listed commercial banks in East Africa Securities Exchanges.

The study was guided by the following specific objectives;
- To establish the influence of interest rates on nonperforming loans of public listed commercial banks in East Africa Securities Exchanges
- To establish the influence of inflation rates on nonperforming loans of public listed commercial banks in East Africa Securities Exchanges
- To establish the influence of growth of money supply on nonperforming loans of public listed commercial banks in East Africa Securities Exchanges
- To establish the influence of bank size on nonperforming loans of public listed commercial banks in East Africa Securities Exchanges

The study was guided by the following research null hypotheses;
- H_{o1}: Interest rates have no significant influence on nonperforming loans of public listed commercial banks in East Africa Securities Exchanges
- H_{o2}: Inflation has no significant influence on nonperforming loans of public listed commercial banks in East Africa Securities Exchanges

- **H_{03}:** Growth of money supply has no significant influence on nonperforming loans of public listed commercial banks in East Africa Securities Exchanges
- **H_{04}:** Bank Size has no significant influence on nonperforming loans of public listed commercial banks in East Africa Securities Exchanges

LITERATURE REVIEW

Theoretical Framework

Loanable Funds Theory

The neo-classical theory of interest or loanable funds theory of interest owes its origin to the Swedish economist Knut Wicksell in 1930. According to this theory, rate of interest is determined by the demand for and supply of loanable funds. The interest rate is decided by the extent at which the demand for securities is equal to the supply for those securities and the elements that determines interests are actual savings and actual interest demand, what the new classical economist named the normal forces of 'thrift as well as productivity'. The ascertainment of the rate of interest when it comes to the above funds theory depends on how available the loan amounts to be given are. The accessibility of these amounts of loan is established on particular factors like the net increase in deposits in terms of currency, how much savings are made that intensify the balances in cash and new chance that will bring in new capital.

According to Thomas (2018), he stated that this theory is an optimizing theory which is dynamic and consolidates the theories of portfolio and production and also financial intermediation. That particular model which is unified offers insights on the importance between output of bank services vis a vis the portfolios of the assets which are risky. The risks of these portfolios are the ones that determine the return on the loans for the banks and the discount used for future profits.

The amount of the output of service is ostentatious by the risk only to the degree that portfolios of disparate risk demand for a variety of amounts in processing information (Jakab & Kumhof, 2018). In that respect, the models reveal that the loanable funds are solely a transitional process that goes through banks, whereas what can be said as value addition is when services provision by these institutions is when it facilitates the funds provision. This model further initiates that there should be a separate function between the funds use and how available these funds are in order to avoid the optimality problem.

The relevance of this theory to the study is that in this theory, the interest rate is exhibited by the relationship between how the demand is on the loanable funds are and its supply. When you have the level of supply that is the same and the demand for these funds increase through an informed decision on your part, then this will lead to a dramatic positive increase of the lending rate and the same goes with a negative change relationship. In addition, an increase in supply of these loanable funds would in effect create a decrease in the rate in but consequently, if both change, that is supply of these funds which are loanable and demand for them, then the difference in rate would lean towards the enormity and level of the gesticulation of the supply and demand of these funds which are given as loans.

Keynesian Theory

Keynesian economic theory by Keynes (1936), emphasize that increase in aggregate demand as the source of demand-pull inflation. "According to Appelbaum (2017) there are three major types of inflation, or what he commonly refers to as the triangle model. Demand-pull theory states that the rate of inflation accelerates whenever aggregate demand is increased beyond the ability of the economy to produce (its potential output). Hence, any factor that increases aggregate demand can cause inflation. Sebastiani (2016) argue that in the long run, aggregate demand can be held above productive capacity only by increasing the quantity of money in circulation faster than the real growth rate of the economy. Gordon (1988) offers that demand inflation is

beneficial to a rapid economic growth in view of the fact that the excess demand and favourable market conditions will stimulate investment and expansion."

Cost-push inflation, also called supply shock inflation, is a consequence of a drop in aggregate supply. This may be because of natural disasters, or increased prices of inputs. For example, a sudden decrease in the supply of oil, leading to increased oil prices, can cause cost-push inflation. Producers for whom oil is a part of their costs could then pass this on to consumers in the form of increased prices. Built-in inflation is induced by adaptive expectations, and is often linked to the price/wage spiral. "Hatton (2018) suggests that it involves workers trying to keep their wages up with prices (above the rate of inflation), and firms passing these higher labour costs on to their customers as higher prices, leading to a 'vicious circle'. The author argues that built-in inflation reflects events in the past, and so might be seen as hangover inflation."

The Keynesian theory is relevant as it informs on inflation and fluctuations in components of spending consumption, investment, or government expenditures cause output to change which affects the loan performance in banks in the long run.

Monetarist Theory

Monetarists by Friedman (1987) contend that since cash is an immediate substitute for every other asset, an increase in the supply of cash, given a steady velocity of circulation, will directly affect the need for different resources. In the event that the aggregate yield of the economy is settled, an increase in the cash supply will lead specifically to more expensive rates (Friedman, 1987).

Monetarists believe monetary policy is more effective than fiscal policy (government spending and tax policy). Stimulus spending adds to the money supply, but it creates a deficit adding to a country's sovereign debt. That will increase interest rates. Monetarists say that central banks are more powerful than the government because they control the money supply (Uysal, 2016). They also tend to watch real interest rates rather than nominal rates. Most published rates are nominal rates, while real rates remove the effects of inflation. Real rates give a truer picture of the cost of money (Ireland, 2019).

Monetarist Theory is relevant as it informs the variable on money supply. When the money supply expands, it lowers interest rates. This is due to banks having more to lend, so they are willing to charge lower rates. That means consumers borrow more to buy items like houses, automobiles, and furniture. Decreasing the money supply raises interest rates, making loans more expensive—this slows economic growth.

Conceptual Framework

A conceptual framework is a hypothesized model identifying the model under study and the relationship between the dependent and independent variables.
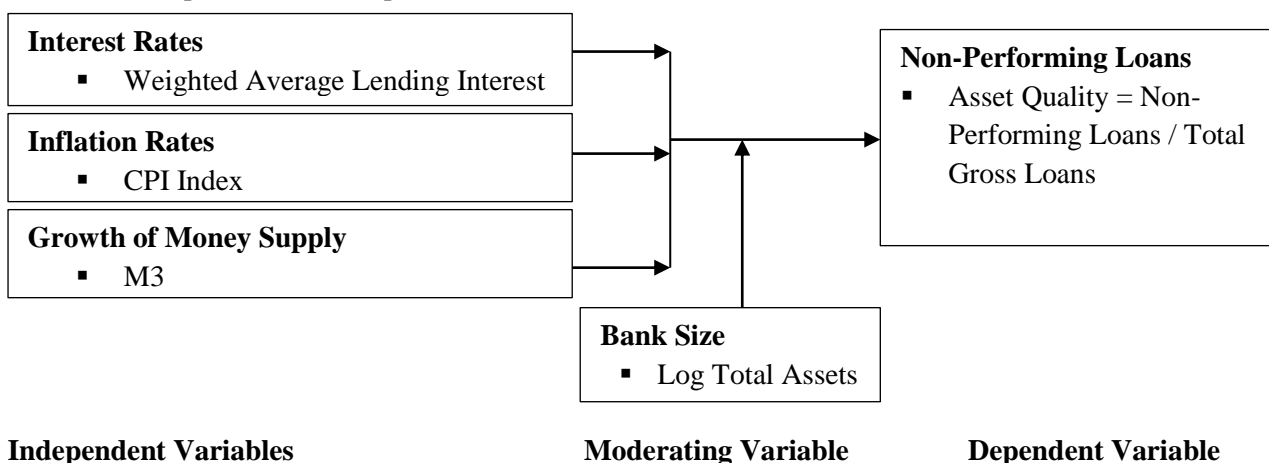
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┌─────────────────────────────────┐
│ Interest Rates                  │
│   ▪ Weighted Average Lending    │──────┐        ┌──────────────────────────┐
│     Interest                    │      │        │ Non-Performing Loans     │
└─────────────────────────────────┘      ├───────▶│   ▪ Asset Quality = Non- │
┌─────────────────────────────────┐      │        │     Performing Loans /   │
│ Inflation Rates                 │      │        │     Total Gross Loans    │
│   ▪ CPI Index                   │──────┤        └──────────────────────────┘
└─────────────────────────────────┘      │
┌─────────────────────────────────┐      │
│ Growth of Money Supply          │      │
│   ▪ M3                          │──────┘
└─────────────────────────────────┘
                              ┌──────────────────┐
                              │ Bank Size        │
                              │   ▪ Log Total    │
                              │     Assets       │
                              └──────────────────┘
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Independent Variables   **Moderating Variable**   **Dependent Variable**

Figure 1: Conceptual Framework

METHODOLOGY

Research Design: Correlational research design is a non-experimental research design technique which helps researchers to establish a relationship between two or more closely connected variables and thus was adopted in this study. Correlational research design was best suited since panel data was used.

Target Population: This study targeted all the 29 East Africa listed commercial banks. The study covered 15 years from 2006-2020.

Sample and Sampling Technique: A census was conducted for all the East Africa listed commercial banks. Census approach increase confidence interval. No other method is accurate like census method when the universe is small and is suitable for Heterogeneous Units.

Data Collection: The researcher used a document review guide to extract and compile the required secondary data for analysis from the financial statements. The secondary data encompasses panel data. The data for all the variables in the study was extracted from the annual published financial reports of the 29 commercial banks covering the years 2006-2020. The specific financial statements from which the data was extracted from include the income statement, statement of financial position and the notes to the accounts.

Data Analysis: Data analysis was conducted using Eviews software and data collected was presented using tables, figures and graph to analyze the trend. Descriptive statistics entailed mean, and standard deviation. This research used correlational analysis to examine the association between macroeconomic indicators and non-performing loans among commercial banks in East Africa Securities Exchanges. This research study used panel data because it combines both time series and cross-sectional data and hence it is expected to give unbiased estimators.

Panel data regression analysis was used to test the hypothesis on the effect of macroeconomic indicators on non-performing among commercial banks in East Africa Securities Exchanges at 0.05 significance level. A panel regression analysis was conducted to evaluate the relationship and variation between the independent and dependent variables.

FINDINGS

Descriptive Statistics

This section provides a summary of the data obtained for the variables non-performing loans, interest rate, inflation, growth of money supply and bank size. The descriptive statistics employed were; mean, standard deviation, minimum and maximum values. These statistics were discussed in Table 1.

Table 1: Descriptive Statistics

Variable		Mean	Std. Dev.	Min	Max
Nonperforming Loans	overall	7.560	1.487	5.000	9.990
	between		0.440	6.696	8.669
	within		1.426	4.663	10.564
Interest Rate	overall	8.913	2.352	2.464	15.750
	between		1.442	5.970	10.437
	within		1.974	3.821	16.569
Inflation	overall	8.500	4.933	-0.311	26.240
	between		1.890	6.573	16.817
	within		4.754	0.082	25.683
Growth of money supply	overall	10500000	14000000	93248	45600000
	between		11200000	132633	24000000
	within		7922895	-6176874	32100000
Bank Size	overall	354622	1009580	58697	6597248
	between		1021001	105549	5651468
	within		140034	-591158	1300402

The results indicated that nonperforming loans to total loans had a mean of 7.56% and a standard deviation of 1.487. The minimum ratio was 5.00% and the maximum of 9.99%. The implication was that on average, the banks had an asset quality that is below the maximum set rate of 12% by Central Banks. Interest rate had a mean of 8.913 and a standard deviation of 2.352. The minimum ratio was 2.464% and the maximum of 15.75. Interest rates, which depict the cost of borrowing, implied a wide gap on the rates over the 15 years. Inflation had a mean of 8.50 and a standard deviation of 4.933. The minimum ratio was -0.311 and the maximum of 26.240. Growth of money supply had a mean of 10,500,000 and a standard deviation of 14,000,000. The minimum ratio was -93,248 and the maximum of 45,600,000. Bank Size had a mean of 354,622 and a standard deviation of 1,009,580. The minimum ratio was 58,697 and the maximum of 6,597,248. The mean implied a wide gap between the commercial banks is asset size.

The trend lines on the movement of the variables over time are as shown in Figure 2.
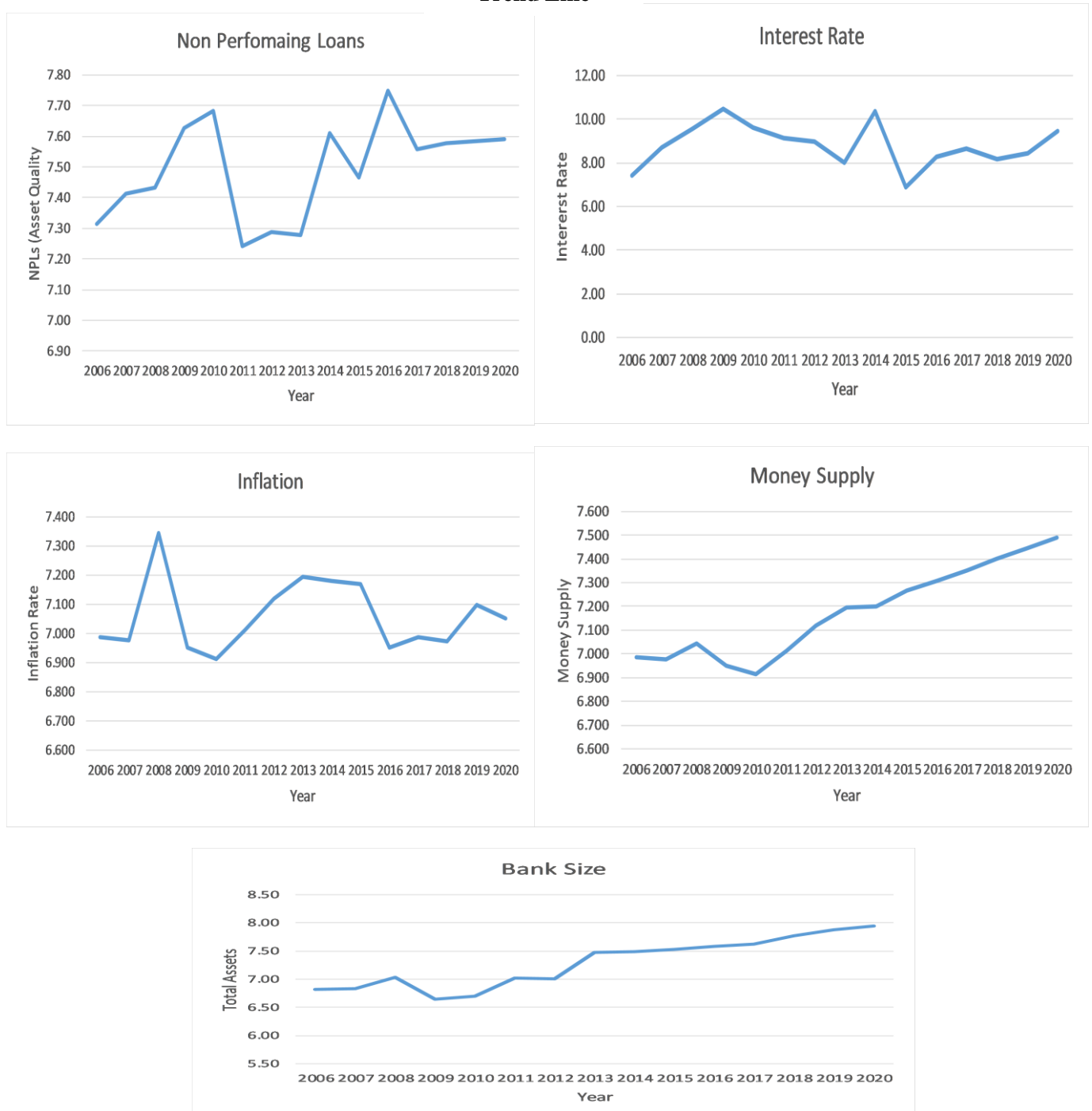
Trend Line

Figure 2: Trend Line

To test for normality, the study applied the Jarque-Bera method. The Jarque-Bera is a goodness-of-fit test of whether sample data have the skewness and kurtosis matching a normal distribution. Normality was checked on the residuals of a model, because those assumptions apply to the unexplained variance of a model. The hypothesis was that the data was normally distributed. The results are as shown in Table 2."

Table 2: Normality Test

	NONPERFORMING LOANS	INFLATION	INTEREST RATE	BANK SIZE	GROWTH OF MONEY SUPPLY
Jarque-Bera	69.10816	281.8803	30.60880	23.47653	30.57374
Probability	0.08861	0.05914	0.05283	0.08627	0.06892
Sum	2652.380	3782.879	3128.525	3111.500	3088.660
Sum Sq. Dev.	4652.748	13414.91	7321.398	567.8439	76.85165

The results indicate that using the Jarque-Bera test of normality, the data is normal since the p-values are above 0.05 for all the variables and thus we do not reject the alternative hypothesis (H_1). The study concluded that interest rate, inflation, growth of money supply, bank size and Nonperforming Loans values are normal in distribution and hence subsequent analysis can be carried out.

Multicollinearity

Multicollinearity was assessed in this study using the variance inflation factors (VIF). According to Field (2009) VIF values in excess of 10 is an indication of the presence of Multicollinearity. The results are illustrated in Table 3.

Table 3: Multicollinearity Results

Variable	Coefficient Variance	Centered VIF
INFLATION	0.000177	1.075122
INTEREST RATE	0.000360	1.131832
BANK SIZE	0.008528	2.128115
GROWTH OF MONEY SUPPLY	0.063748	2.165112
C	2.257706	NA

As shown in Table 3, the results of interest rate, inflation, growth of money supply and bank size revealed that there was no multicollinearity since all the values for VIF were less than 10.

Autocorrelation test

Autocorrelation Test was conducted to determine if the data contravenes the attributes of the Ordinary Least Square (OLS), which culminates to wrong outcomes in hypothesis testing. The study used Durbin-Watson for Serial Correlation to ascertain whether the data collected has a serial autocorrelation. The Durbin-Watson statistic have a value ranging between 0 and 4. A value of 2.0 indicates there is no autocorrelation detected in the sample. Values from 0 to less than 2 point to positive autocorrelation and values from 2 to 4 means negative autocorrelation.

Table 4: Durbin-Watson Correlation Tests

Variable	Coefficient	Std. Error	t-Statistic	Prob.
INTEREST RATE	0.599843	0.020906	28.69240	0.0000
INFLATION	0.059343	0.015134	3.921137	0.0001
GROWTH OF MONEY SUPPLY	1.227554	0.115711	10.60878	0.0000
BANK SIZE	-1.050411	0.101756	-10.32284	0.0000

R-squared	0.711513	Mean dependent var		6.164917
Adjusted R-squared	0.709438	S.D. dependent var		3.239078
S.E. of regression	1.745988	Akaike info criterion		3.961974
Sum squared resid	1271.213	Schwarz criterion		4.000383
Log likelihood	-829.9954	Hannan-Quinn criter.		3.977153
Durbin-Watson stat	2.304197			

The results for the Durbin-Watson for autocorrelation indicated that the Durbin-Watson stat value was 2.304197. The value was between 2.0 and 2.5 and thus there was no first order autocorrelation."

Heteroscedasticity Test

In regression models, the error term difference or variance is assumed to be constant across observations. If this assumption is violated, the random variable is called heteroscedastic. If the control model is heteroscedasticity, then the analysis is not correct. This study used Breusch-Pagan test to check for existence of heteroscedasticity in the data collected with the hypothesis that the data was homoscedastic."

Table 5: Heteroscedasticity Test Results

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	0.997348	Prob. F(4,416)	0.4087
Obs*R-squared	3.998991	Prob. Chi-Square(4)	0.4061
Scaled explained SS	4.613915	Prob. Chi-Square(4)	0.3293

The hypothesis was therefore not rejected at a critical p value of 0.05 since the reported value for the chi2 (1) was 0.997348 with a p-value of 0.4087 which was larger than the critical 0.05. Thus, the data did not suffer from statistically significant heteroscedasticity.

Cointegration test

Cointegration test is established if variables under study are non-stationary at level, and are of the same order of integration. Cointegration test is used to check the long-run relationship between variables. Johansen Cointegration test was used. The hypotheses were;

H_0: *There are no cointegration equations*

H_1: *There are cointegration equations*

Table 6: Johansen Cointegration test

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None	0.181269	286.7034	69.81889	0.07585
At most 1	0.160299	208.3034	47.85613	0.05490
At most 2	0.142970	139.8175	29.79707	0.09657
At most 3	0.123515	79.33898	15.49471	0.06218
At most 4	0.068128	27.65943	3.841466	0.01820

When the probability (p-value) is higher than 0.05 we do not reject the null hypothesis, and conclude that there is no cointegration equations. The Johansen Cointegration Test results showed that the probability value was 0.5153 hence, we fail to reject the Ho and conclude that there are no cointegration equations. Further the trace statistic was greater than the Critical Value (75.76217<95.75366) hence we fail to reject null hypothesis and conclude that there are no cointegrating equations.

Hausman Fixed-Random Test

Hausman Fixed-Random test was used determine the right model between the fixed and random effects model.

Hypothesis: Null hypothesis (H_0): Random effects model is appropriate

Alternative hypothesis (H_1): Fixed effects model is appropriate

Decision Criterion: Reject H_0 if probability value is less than 5%, Accept H_0 if probability value is greater than 5%. The results are as shown in Table 7.

Table 7: Random Effects - Hausman Test

Correlated Random Effects - Hausman Test

Equation: Untitled

Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	5.352085	4	0.02530

The probability value was 0.0000 which is less than 5% thereby we accept null hypothesis and conclude that the fixed effects model is appropriate.

Correlation Analysis

The study conducted correlation analysis for the various variables that are interest rate, inflation, growth of money supply and bank size on nonperforming loans of public listed commercial banks in order to examine the nature of the statistical relationships between each pair of variables. Table 8 shows the correlation matrix of all the variables included in the study."

Table 8: Correlation Matrix

Correlation Probability	Nonperforming Loans	Interest Rate	Inflation	Growth Of Money Supply	Bank Size
Nonperforming Loans	1.0000				

Interest Rate	0.792625	1.0000			
	0.0000	-----			
Inflation	0.071529	0.048859	1.0000		
	0.0004	0.3173	-----		
Growth Of Money Supply	-0.760743	-0.326820	-0.239020	1.0000	
	0.0000	0.0000	0.0000	-----	
Bank Size	-0.7590923	-0.297838	-0.245175	0.720982	1.0000
	0.0000	0.0000	0.0000	0.0000	-----

The results in Table 8 show that interest rate (r= 0.792625, p=0.000) had a positive and significant association on nonperforming loans of public listed commercial banks. Inflation (r=0.071529, p=0.0004) had a positive and a significance association on nonperforming loans of public listed commercial banks. Growth of Money supply (r= -0.760743, p= 0.000) had a negative and significance association on nonperforming loans of public listed commercial banks. Lastly, bank size (r= -0.7590923, p=0.000) had a negative and a significance association on nonperforming loans of public listed commercial banks. This positive association of interest rate and inflation implied that an increase in interest rate and inflation leads to an increase on nonperforming loans of public listed commercial banks. However, the negative coefficient of growth of money supply and bank size implied that an increase in growth of money supply and bank size leads to a decrease on nonperforming loans of public listed commercial banks. The results also indicated a high association between the independent and the dependent variables.

Regression Analysis
Regression analysis was conducted to establish the statistical significance relationship on the effect of macroeconomic indicators on nonperforming loans of public listed commercial banks. The variables were interest rate, inflation, growth of money supply and bank size on nonperforming loans. The regression includes techniques for modeling and analyzing several variables, when the focus is on the relationship between a dependent and one or more independent variables. The results are presented in Table 9."

Table 9: Regression Analysis

Variable	Coefficient	Std. Error	t-Statistic	Prob.
INTEREST RATE	0.517451	0.018971	27.27535	0.0000
INFLATION	0.017401	0.013315	1.306882	0.1920
GROWTH OF MONEY SUPPLY	-1.700639	0.252483	-6.735651	0.0000
BANK SIZE	-0.649114	0.092347	-7.029065	0.0000
C	18.92805	1.502566	12.59714	0.0000

R-squared	0.791173	Mean dependent var		6.164917
Adjusted R-squared	0.789165	S.D. dependent var		3.239078
S.E. of regression	1.487281	Akaike info criterion		3.643582
Sum squared resid	920.1943	Schwarz criterion		3.691594
Log likelihood	-761.9740	Hannan-Quinn criter.		3.662557
F-statistic	394.0191	Durbin-Watson stat		1.285649
Prob(F-statistic)	0.000000			

The fitted model was;

$Y_{it} = 18.92805 + 0.517451X_{1it} + 0.017401X_{2it} - 1.700639X_{3it} - 0.649114X_{4it}$

Where;

Y_{it} = Non Preforming Loans

X_{1it} = Interest Rates

X_{2it} = Inflation Rates

X_{3it} = Growth of Money Supply

X_{4it} = Bank Size

The overall R squared of 0.791173 implied that the four variables namely interest rate, inflation, growth of money supply and bank size explained 79.12% on the variations on nonperforming loans of public listed commercial banks. The overall model was significant as indicated by the Prob>chi2 of 0.000 with an F-statistic of 394.0191. In addition, the constant of 18.92805 showed that when interest rate, inflation, growth of money supply and bank size are held constant, on nonperforming loans will remain at 18.92805 units. The regression results indicate a positive and significant relationship between interest rates and nonperforming loans (β= 0.517451, p=0.000). There was a positive and insignificant relationship between inflation and nonperforming loans (β= 0.017401, p= 0.1920). Growth of money supply had a negative and significant relationship with nonperforming loans (β= -1.700639, p= 0.000). Lastly, bank size revealed a negative and significant relationship on nonperforming loans (β= -0.649114, p= 0.000)."

4.6 Hypotheses Testing

Hypotheses were tested using multiple linear regression analysis as represented in Table 9.

Objective One

The first hypothesis to be tested was:

H_{o1}: Interest rates have no significant influence on nonperforming loans of public listed commercial banks in East Africa Securities Exchanges

The hypothesis was tested by using multiple linear regression and determined using p-value. The acceptance/rejection criteria was that, if the p value is less than 0.05, we reject the H_{01} but if it is more than 0.05, the Ho_1 is not rejected. The results in Table 9 indicated a positive and significant relationship between

interest rates and nonperforming loans (β= 0.517451, p=0.000). The null hypothesis was therefore rejected. The study therefore adopted the alternative hypothesis that interest rates have a significant influence on nonperforming loans of public listed commercial banks in East Africa Securities Exchanges.

Objective Two

The second hypothesis to be tested was:

H_{o2}: Inflation has no significant influence on nonperforming loans of public listed commercial banks in East Africa Securities Exchanges

The hypothesis was tested by using multiple linear regression and determined using p-value. The acceptance/rejection criteria was that, if the p value is less than 0.05, we reject the H_{02} but if it is more than 0.05, the Ho_1 is not rejected. The results in Table 7 indicated a positive and insignificant relationship between inflation and nonperforming loans (β= 0.017401, p= 0.1920). The null hypothesis was therefore not rejected. The study therefore adopted the null hypothesis that inflation has no significant influence on nonperforming loans of public listed commercial banks in East Africa Securities Exchanges.

Objective Three

The third hypothesis to be tested was:

H_{03}: Growth of money supply has no significant influence on nonperforming loans of public listed commercial banks in East Africa Securities Exchanges

The hypothesis was tested by using multiple linear regression and determined using p-value. The acceptance/rejection criteria was that, if the p value is less than 0.05, we reject the H_{03} but if it is more than 0.05, the Ho_1 is not rejected. The results in Table 7 indicated a negative and significant relationship between growth of money supply and nonperforming loans (β= -1.700639, p= 0.000). The null hypothesis was therefore rejected. The study therefore adopted the alternative hypothesis that growth of money supply has a significant influence on nonperforming loans of public listed commercial banks in East Africa Securities Exchanges.

Objective Four

The fourth hypothesis to be tested was:

H_{04}: Bank Size has no significant influence on nonperforming loans of public listed commercial banks in East Africa Securities Exchanges

The hypothesis was tested by using multiple linear regression and determined using p-value. The acceptance/rejection criteria was that, if the p value is less than 0.05, we reject the H_{04} but if it is more than 0.05, the Ho_1 is not rejected. The results in Table 7 indicated a negative and significant relationship between growth of money supply and nonperforming loans (β= -0.649114, p= 0.000). The null hypothesis was therefore rejected. The study therefore adopted the alternative hypothesis that growth of money supply has a significant influence on nonperforming loans of public listed commercial banks in East Africa Securities Exchanges.

Discussion of findings

The objective of this study was to establish the influence of macroeconomic indicators on non-performance loans of public listed commercial banks in East Africa Securities Exchanges. The independent variables were interest rate, inflation, growth of money supply and bank size on non-performing loans of commercial banks. The pre-estimation tests conducted confirmed the data met the linear regression assumptions.

Interest Rates and Non-Performing Loans

The first objective of the study was to establish the influence of interest rates on nonperforming loans of public listed commercial banks. The null hypothesis that interest rates have no significant influence on nonperforming loans of public listed commercial banks in East Africa Securities Exchanges was rejected. The results are consistent with Okoye and Onyekachi (2013) who examined the impact of bank lending rate on the performance of Nigerian deposit money banks and established that those lending rates had a significant effect

on bank loan performance. Chepchirchir (2011) found that the coefficients for liquidity, capital, expense management (cost efficiency), bank size, market share, inflation and loan loss provisions (asset quality) were the most significant in determining profitability. Demirguc-Kunt and Huizinga (2019) using bank-level data for 80 countries found that, among other variables, there was a positive relationship between interest rates and profitability.

Staikouras and Wood (2014) study in the EU banking industry results showed that the profitability of European banks was influenced interest rates. Kwack (2016) study indicated that interest rate, the nonperforming loan rates and corporate leverage ratio were very significant in explaining the Asian financial crisis. Ngure (2014) study on the effect of interest rates on financial performance of commercial banks in Kenya found that and interest rate volatility had effect on profitability of commercial banks. Ngumi (2014) study on the effect of lending interest rates on financial performance of deposit taking micro finance institutions found out that a strong relationship exists between lending interest rates and financial performance of deposit taking micro-finance banks.

Obamuyi (2013) results indicated that improved banks capital and interest rates as well as efficient expenses management and favorable economic condition contribute to higher banks performance and growth in Nigeria. Khan and Sattar (2014) found that there is strong and positive correlation between interest rate and commercial banks profitability. Irungu (2013) found that there is strong positive relationship between financial performances of commercial banks with interest rate spread. The study found that interest rate spread affect performance assets in banks as it increases the cost of loans charged on the borrowers, regulation on interest rates have far reaching effects on assets non-performance. However, Ndichu (2014) findings showed that interest rate spread is statistically significant with a negative correlation thus as interest rates spread increases the financial performance of deposit taking micro-finance banks decreases.

Inflation and Non-Performing Loans
The second objective of the study was to establish the influence of inflation rates on nonperforming loans of public listed commercial banks. The null hypothesis was not rejected inflation has no significant influence on nonperforming loans of public listed commercial banks in East Africa Securities Exchanges. The results are in line with Vena (2014) findings indicated that inflation has an adverse effect on profitability and it was concluded that stock returns are low when there is high inflation since investments are moved from stock exchange into business ventures that are not influenced by inflation. Beck *et al.* (2013) study found a large negative relationship between inflation and bank loaning size. Chioma, Adanma and Clementina (2014) study revealed that there is positive but not significant relationship between inflation, banks' performance and the investment decision of commercial banks operating in Nigeria. This implied that the impact of inflation on bank's performance vis-à-vis investment decision of banks was positive but not statistically significant. Wamucii (2010) study findings indicated that there was an inverse relationship between inflation and financial performance and therefore, he concluded that as inflation decreased, the profits for the same period increased.

Khan, Shahid, Bari, Anam, Shehzad and Siddique (2014) found a strong positive relation was found among the variables and the study concluded that inflation has a strong correlation on bank performance. Omondi (2014) found a positive relationship between inflation rate and the base lending rate charged by the bank, as inflation levels rises, so did the bank's base lending rate both from the key informant figures and the regression analysis of the secondary data, showing that inflation has a significant effect on KCB base lending rate. Kamisky and Reinhart (2016) noticed that there is a positive relations between inflation and loan fee. A change in inflation results into an increase loan cost charged, this is clarified by the fact that banks need to make profit for the cash they loan and if there is inflation this implies that genuine estimation of the speculator's value is being minimized at the yearly inflation rate. Wanjohi (2013) findings indicated that despite the banks being different in characteristics and experience it was evident that the internal factors

contributed to the profitability and this was mainly from interest on loans and this was because loans formed the major part of the banks' capital structure.

The findings are consistent with Huybens et al. (2018) who found that inflation adversely affects credit market activities with negative repercussions on the commercial banks performance. Hooshyari and Moghanloo (2015) found a strong correlation between inflation and profitability of banks in Iran. In inflation there is more economic activities assumed by many different players meaning they earn more, and the funds are stored in banks which increases the profitability of commercial banks. However, Ziramba (2018) study indicated that an increase or decrease in loans would cause investment and consumer spending to either rise or fall.

Growth of Money Supply and Non-Performing Loans
The third objective of the study was to establish the influence of growth of money supply on nonperforming loans of public listed commercial bank. The null hypothesis was rejected that growth of money supply has no significant influence on nonperforming loans of public listed commercial banks in East Africa Securities Exchanges. The findings agree with Kwakwa (2014) study on the determinants of performance of commercial banks whose findings of the study show that growth of money supply had a significant negative effect performance of commercial banks. Al-Qudah and Jaradat (2013) on macroeconomic variables, bank characteristics on the Profitability Jordanian Islamic Banks found that growth in money supply had a positive effect on the profitability of Jordanian Islamic Banks. The study opined that banks have higher capacity to lend out money when there is higher supply, which subsequently brings about higher banks' profitability. Otalu et al., (2014) study on monetary policy and commercial banks performance found a significant positive effect of growth of money supply on performance of commercial banks.

Bank Size and Non-Performing Loans
The fourth objective of the study was to establish the influence of bank size on nonperforming loans of public listed commercial banks. The null hypothesis was rejected that bank size has no significant influence on nonperforming loans of public listed commercial banks in East Africa Securities Exchanges. The findings agree with Leong and Dollar (2012) study showed that the size of the total assets had a significant inverse effect on banks profitability. Hassan and Bashir (2013) also showed in their results that, bank size has a negative relationship on profitability. Lepetit, Rous and Tarazi (2018) in consideration of banks size effect, they found a positive link with the financial performance for smaller banks. Muhindi and Ngaba (2018) study found a positive relationship between bank size and financial performance and revealed that larger banks exhibit higher ROA relative to medium and small. Menicucci and Paolucci (2016) showed a statistically significant direct relation between shareholders' equity and profitability when studying European banks. Gul et al (2011) found that banks with more equity capital, total assets, loans, deposits and macro factors. Tarawneh (2016) found that bank with higher total capital, deposits, credits, or total assets does not always mean that has better profitability.

However, AlAli et al (2021) when examining the effect of marketing on the financial performance of Kuwaiti banks showed that although there was a relation between number of staff and number of bank branches with bank's financial performance that relation was statistically insignificant. Mulwa and Kosgei (2016) also found a negative relationship between bank size and financial performance, which conflict. Naceur (2013) found that while capital ratio, loans and stock market improvements had a positive relationship with profitability, assets size demonstrated a negative relationship.

SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

Summary of Findings
This section provides a summary of the findings from the analysis. This was done according to the objectives of the study where analysis was done from the data collected. The primary objective of the study that was to

establish the influence of macroeconomic indicators on non-performance loans of public listed commercial banks in East Africa Securities Exchanges.

Interest Rates and Non-Performing Loans

The first objective of the study was to establish the influence of interest rates on nonperforming loans of public listed commercial banks. Correlation results indicated that interest rate had a positive and significant relationship on nonperforming loans of public listed commercial banks. The regression results indicate a positive and significant relationship between interest rates and nonperforming loans. The null hypothesis was therefore rejected. The study therefore adopted the alternative hypothesis that interest rates have a significant influence on nonperforming loans of public listed commercial banks in East Africa Securities Exchanges.

Inflation and Non-Performing Loans

The second objective of the study was to establish the influence of inflation rates on nonperforming loans of public listed commercial banks. Correlation results indicated that inflation had a positive and a significance relationship on nonperforming loans of public listed commercial banks. Regression results indicated that there was a positive and insignificant relationship between Inflation and nonperforming loans. The null hypothesis was not rejected inflation has no significant influence on nonperforming loans of public listed commercial banks in East Africa Securities Exchanges.

Growth of Money Supply and Non-Performing Loans

The third objective of the study was to establish the influence of growth of money supply on nonperforming loans of public listed commercial bank. Correlation results indicated that growth of money supply has a negative and significance association on nonperforming loans of public listed commercial banks. Regression results indicated that growth of money supply had a negative and significant relationship with nonperforming loans. The null hypothesis was rejected that growth of money supply has no significant influence on nonperforming loans of public listed commercial banks in East Africa Securities Exchanges.

Bank Size and Non-Performing Loans

The fourth objective of the study was to establish the influence of bank size on nonperforming loans of public listed commercial banks. Correlation results indicated that bank size had a negative and significance association on nonperforming loans of public listed commercial banks. Regression results indicated that bank size revealed a negative and significant relationship on nonperforming loans. The null hypothesis was rejected that bank size has no significant influence on nonperforming loans of public listed commercial banks in East Africa Securities Exchanges.

Conclusions

Based on the findings the study concluded interest rates have a positive and significant relationship with nonperforming loans. The positive coefficient for interest rates imply that increase in the interest rates raises the level of nonperforming loans of the commercial banks significantly. The study concluded that inflation has a positive and an insignificance relationship on nonperforming loans of public listed commercial banks. The positive coefficient for inflation imply that increase in the inflation rates raises the level of nonperforming loans of the commercial banks. However, the impact is not significant.

The study concluded growth of money supply has a negative and significant relationship with nonperforming loans. The negative coefficient for growth of money supply imply that increase in the growth of money supply reduces the level of nonperforming loans of the commercial banks significantly. Lastly, the study concluded bank size has a negative and significant relationship with nonperforming loans. The negative coefficient for bank size imply that increase in the bank size by assets reduces the level of nonperforming loans of the commercial banks significantly.

Recommendations

The study draws its recommendations from the conclusions made by the study. The study recommends that the management of the commercial banks should actively monitor and set appropriate lending rate for the loans they issue. This is because the lending rate has a significant effect on non-performing loans. Increase in lending rate means that the non-performing loans would increase albeit in small quantities. The banks should also enhance periodic/regular credit risk monitoring of their loan portfolios to reduce the level of nonperforming loans.

For policy, the study recommends that the commercial banks should come up with policies to control base lending rates to a manageable level even with high inflation rates. Inflationary forces cannot be controlled by a single bank since it is brought about by both monetary and macro policies. There is need for the commercial banks to invent products that can attract new borrowers even with increasing inflation and base lending rates. The study found that growth of money supply reduces the level of non performing loans of commercial banks in Kenya. Therefore, the Central Bank of Kenya should incorporate the ever changing operating environment of commercial banks when making changes or adjustments in the growth of money supply.

The study also recommends that commercial banks should make substantial expenditure in undertaking their due diligence before issuing loans. This can be drawn from the fact that large banks have a lower ratio of non-performing loans than smaller banks. It shows that there is something that the big banks do in which case the small banks are not able or do not do it, in order to reduce their non-performing loans to total loans ratio. The most practical explanation for such a result would be the big banks are able to employ advanced technology and more resources in scrutinizing their clients before issuing loans.

Areas for Further Studies

This study recommends that another study be done to augment finding in this study; it therefore recommends a study be done on more number of banks rather than including only listed banks for the sake of generalizing the results of the study. In addition, this study included only four factors, there could be some other relevant factors that may be perceived important but were excluded from this study. Future researches, therefore, may consider more factors, like micro economic factors, and other variables such as exchange rates and economic growth that can influence loan performance

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