

# Macroeconomic Determinants of Non-Performing Loans in Kenya: 1998-2015

Mwangi Mercy Wairimu <sup>1\*</sup> Esther Wanjugu Gitundu <sup>2</sup>

1. Chandaria School of Business, United States International University – Africa, P.O Box 14634-0800, Nairobi, Kenya
2. Department Accounting, Finance and Management Science, Egerton University P.O Box, 536-20115, Egerton, Kenya

## Abstract

The study examined the Macroeconomic determinants of non-performing loans in Kenya. Time series data for periods 1998 to 2015 was analyzed using a linear regression model. The dependent variable was the ratio of non-performing loans to total loans. The independent variables were GDP growth rate, inflation rate, interest rate, exchange rate, remittances, unemployment rate and public debt. The empirical results indicated that inflation rate, interest rate, GDP growth rate, public debt, and exchange rate were not statistically significant while unemployment rate and remittances were statistically significant at 0.05 level of confidence. The study concludes that the significant macroeconomic determinants of non-performing loans in Kenya for periods 1998 to 2015 were remittances and the unemployment rate.

**Keywords:** Non-Performing Loans, Macroeconomic determinants, Inflation rate, Interest rate, GDP growth rate, Public Debt, Exchange rate, Unemployment Rate, Remittances

## 1. Introduction

Non-performing loans (NPLs) denote those financial assets from which banks no longer receive interest and/or instalment payments as planned. This is because the loan ceases to “perform” or generate income for the bank. Joseph, Edson, Manuere, Clifford, and Michael (2012) defines NPLs as loans that are ninety days or more past their due date or not accruing interest anymore. Badar and Javid (2013) state that a loan is considered as non-performing if it is in default or close to being in default. High NPLs stock is a noteworthy predictor of bank failure, and distorts banks cost structure and efficiency (Lu & Whidbee, 2013; Maggi & Guida, 2009; Cucinelli, 2015).

High NPLs tie up bank capital, require greater loan provisions which shrink capital resources available for lending, dent bank profitability, and increase funding costs, thereby diminishing credit supply (Shekhar, 2015). A bank dogged with a high stock of NPLs is likely to focus on internal consolidation and improving asset quality rather than providing new credit (Leon & Tracey, 2011). Reducing NPLs expeditiously is thus vital in assisting credit growth. Further, ‘unclogging’ the bank lending channel would improve the transmission of monetary policy to the real economy (Shekhar, 2015).

The rise of NPLs is a salient feature of financial crises. European banks are struggling with high levels of NPLs. The Global Crisis and consequent recession have left companies and households in many countries with debts that they cannot pay. For the EU as a whole, NPLs stood at over 9% of GDP at the end of 2014, more than double the level in 2009. NPLs are predominantly elevated in some Southern European countries, such as Cyprus, Greece, Italy, and Portugal (Shekhar, 2015). Emerging markets are now struggling with similar problems. In 26 countries, the ratio of NPLs to total loans (the NPL ratio) overall surpassed 10% in 2015 according to the World Bank data (Balgova, Nies, & Plekhanov, 2016). The Financial Stability Report issued by Central Bank of Nigeria indicated that NPLs in the Nigerian banking system rose by 78.8 percent year-on-year in 2015, from N363.31 billion documented at the end of December 2014 to N649.63 billion as of December 31, 2015. According to the Central Bank of Kenya Supervision Report (2016) the gross NPLs increased by 15.8 percent from Ksh 147.3 billion in December 2015 to Ksh 170.6 billion in March 2016.

Many studies have looked at the determinants of NPLs worldwide. GDP, interest rate, inflation rate, unemployment rate, exchange rate, degree of openness to the outside world, government policy, credit growth and remittances have been identified as macroeconomic variables that have strong relationships with NPLs (Klein, 2013; Nkusu, 2011; Inekwe, 2013; Saba, Kouser & Azeem, 2012; Farhan, Sattar, Chaudhry, & Khalil, 2012; Glogowski, 2008; Zeng, 2012; Ouhibi & Hammami, 2015; Fiqiri, Dika and Xhabija, 2015; Ekanayake & Azeem, 2015; Makri, Tsagkanos, & Bellas, 2014).

Studies undertaken in Kenya included real GDP, GDP per capita, lending interest rates, inflation, government expenditure, export and imports, exchange rate as the macroeconomic determinants of NPLs in banks (Warue, 2013; Ombaba, 2013). However, other macro-economic variables such as unemployment rate and remittances can influence the level of NPLs and could be very important in managing the credit risk in Kenya. An increase in the unemployment rate would adversely affect the cash flow streams of households and increase the debt burden. With regard to firms, increases in unemployment may signal a decline in production as

a consequence of a drop in actual demand. Remittances sent by emigrants to their home nation increase households' incomes and expand financial intermediation which can improve growth prospects for the nation overall. A decline of remittances may lead to a decline of households' incomes, and as a consequence lead to a lower capability of repayment of previously contracted loans, which contributes to a higher share of NPLs to total loans.

This study brings in new variables which have not been included in previous studies. Unemployment rate and remittances were included as macroeconomic variables that affect NPLs in Kenya. The objective of the study is to identify the macroeconomic determinants of NPLs in Kenya for period 1998 to 2015. The rest of the paper is structured as follows. The next Section provides the theories underpinning the study and a short description of the literature related to determinants of NPLs. Section 3 gives the details of the model and data set used. The Section also focuses on the methodology that is applied for measuring the relationship between NPLs and macroeconomic factors. In Section 4 the results of the analysis are given and discussed while Section 5 concludes the study.

## 2.0 Literature review

### 2.1 Theoretical Foundation

*The Life-Cycle Consumption theory* was advanced by Franco Modigliani and his pupil, Richard Brumberg in 1954. The theory suggests that people design their consumption and savings activities over their life-cycle. It assumes that all individuals elect to sustain stable lifestyles. This infers that they usually do not save up a lot in one period to spend furiously in the next period, but keep their consumption levels nearly the same in every period. The choice of GDP growth rate, unemployment rate and interest rate as the primary determinants of NPLs may be justified from the theoretical literature of life-cycle consumption models. According to Lawrence (1995) borrowers with low incomes have higher rates of default because of their increased risk of facing unemployment and being unable to repay their loans. They are also charged higher interest rates since banks consider them to be riskier clients (Rinaldi & Sanchis-Arellano, 2006).

*The Deflation theory* developed by Fisher in 1934 suggests that when the debt bubble bursts, the following sequence of events occurs; debt liquidation leading to distress selling and contraction of deposit currency, as bank loans are paid off. This contraction of deposits causes a fall in the level of prices, which leads to greater fall in the net worth of business, hence precipitating bankruptcies which leads the concerns running at a loss to make a reduction in output, in trade and in employment of labor. These cycles cause complicated disturbances in the rates of interest and a fall in the money value. The complicated turbulences described above can be summed up as both external and internal forces (macro and micro factors) influencing state of over-indebtedness existing between, debtors or creditors or both which can compound to loan defaults.

*The Financial Accelerator theory* was developed by Bernanke and Gertler (1989) and Bernanke, Gertler, & Gilchrist (1998). The theory argues that credit markets are procyclical and that information asymmetries between lenders and borrowers as well as the balance sheet effect work to amplify and propagate credit market shocks to the economy. This theory seeks to explain how lending and borrowing activities of organizations are largely affected by small economic tremors. The theory also designates that due to economic tremors, borrowers may not have the aptitude to borrow and there is a probability of them avoiding to repay their loans or external finance.

### 2.2. Empirical literature

Various studies have been undertaken to examine the determinants of NPL's. Saba et al. (2012) explore the determinants of NPLs for the period 1985 to 2010 in the United States using correlation and regression model. The conclusions were that inflation, real GDP per capita and total loans affects NPLs significantly. Zeng (2012) used a utility function and a model designed using optimal control theory to examine the bank NPLs for the period 1999 to 2010 in China. The findings were that the bank NPLs were determined by degree of openness to the outside world and government policy. Studies conducted on some European Union (EU) countries includes Klein (2013) who explored the determinants and impact of NPLs on macroeconomic performance in CESEE for the period 1998–2011 using regression analysis. He accredited the level of NPLs to macroeconomic conditions, such as GDP growth, unemployment, and inflation. Moinescu (2012) using conditional risk model and dynamic panel regressions established that GDP growth explained NPLs' growth among CEE economies for the period 2003-2011.

The study by Mileris (2014) pointed out that unemployment rate, GDP, exports, compensation of employees, final consumption expenditures of households, the number of bankrupted companies and government expenditures were positively correlated to NPLs in Lithuanian banks. Using dynamic panel data methods, Louzis et al. (2012) indicated that NPLs in the Greek banking system can be explained mainly by macro fundamentals (which include GDP, unemployment, interest rates) and management quality. Applying a dynamic panel regression method on 17 countries for the years 2000 to 2008 in the Euro zone, Makri et al. (2014) identified

strong correlations between NPL and various macroeconomic factors (public debt, unemployment, and annual percentage growth rate of gross domestic product). Škarica (2013) concluded that Real GDP growth rate was positively related to NPL in CEE countries.

Studies in developing countries include studies by Badar and Javid (2013) and Farhan et al. (2012) who found out that inflation, interest rate, energy crisis, unemployment, and exchange rate had a significant positive relationship with the NPLs, while GDP growth had a significant negative relationship with NPLs in the Pakistan. Vogiazas and Nikolaidou (2011) established that construction and investment expenditure, inflation, the unemployment rate, the country's external debt to GDP and M2 determined the NPLs in Romanian. The real GDP growth rate, the lending rates, the unemployment rate and public debt were found to have a strong effect on the level of NPLs in Greece (Dimitrios, Angelos, & Vasilios, 2011). Fofack (2005) explored the leading causes of NPLs in Sub-Saharan Africa in the 1990s. The author noted a strong relationship between NPLs and the real interest rate, economic growth, real exchange rate appreciation, net interest margins and interbank loans.

Similarly, Ouhibi and Hammami (2015) examined the determinants of NPLs in the Southern Mediterranean states (Tunisia, Morocco, Egypt, Lebanon, Jordan and Turkey). The research findings named nominal exchange rate, the consumer price index and the gross capital formation as the major determinants of NPLs. Moreover, Turan and Koskija (2014) scrutinized NPLs in Albania for the period 2003-2013 by applying Johansen multivariate co-integration test. Findings revealed that a connection exists between NPLs and real GDP, unemployment, inflation, loan interest rate, and remittance.

Figiri et al. (2015) revealed that the interest rate and credit to economy is positively related to NPLs while GDP is adversely related to NPLs in Albania. Clementina, and Isu (2014) showed that the increase in NPLs impacted negatively on the GDP in Nigeria, while inflation rate had a positive relationship with NPLs. In the same country Akinlo and Emmanuel (2014) found that economic growth is negatively related to NPLs while unemployment, credit to the private sector and exchange rate exerted a positive relation on NPLs. Ombaba (2013) evaluated factors causing NPLs in Kenyan banks for the period 2008- 2012. Results indicated that interest rates, inflation rate and GDP growth lead to increased NPLs in Kenyan Banks. Warue (2013) explored the effects of bank specific and macroeconomic factors on NPLs in Kenya over 1995 to 2009. The findings were that real GDP and per capita were negative and significantly related to NPLs; there was positive and significant correlation between lending interest rate, interest rates spread and NPLs. The study however found no evidence to show that inflation was related to NPLs.

It is apparent from the literature review that real GDP growth, inflation, real interest rate, real GDP, unemployment, loan interest rate, credit to the private sector, exchange rate, energy crisis, exports, compensation of employees, final consumption expenditures of households, the number of bankrupted companies, public debt, government expenditures and remittance are determinants of NPLS. The studies by themselves provided contradictory conclusions because of different models and methodologies they used. In Kenya the studies already carried out have omitted unemployment rate and remittances as factors that could affect NPLs. The existence of this knowledge gap in the area motivated this study. Hence, the purpose of this study is to investigate the macroeconomic determinants of NPLs in Kenya over 1998 to 2015

### 3.0 Data and Methodology

The data used are annual data for Kenya over the period 1998-2015. The data was obtained from Central Bank of Kenya, Kenya National Bureau of Statistics and the World Bank data bases. To examine the macroeconomic determinants of NPLs in Kenya, the specified and estimated equation 1 below is used (Espinoza and Prasad, 2010; Saba et al., 2012)

$$NPL_t = \alpha + \beta_1 GDP_t + \beta_2 INT_t + \beta_3 INF_t + \beta_4 EX_t + \beta_5 UNE_t + \beta_6 REM_t + \beta_7 PD_t + \epsilon_t \text{-----Equation (1)}$$

Where  $NPL_t$  refers to ratio of non-performing loans out of total loans;  $GDP_t$  refers to GDP growth rate;  $INT_t$  is real interest rate;  $INF_t$  is the inflation rate;  $EX_t$  is the exchange rate;  $UNE_t$  is the unemployment rate;  $PD_t$  is the public debt as a % of GDP;  $REM_t$  is the change in remittances as a % of GDP;  $\alpha$  is a constant variable;  $\beta$  is a vector of estimated parameters and  $\epsilon_t$  is the error term.

## 4.0 Results and Discussions

### 4.1 Descriptive Statistics

The summary statistics of variables used in model for 1998-2015 are shown in Table 1 below shows.

Table 1: Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
NPL	18	4.43	34.9	16.3	11.4222353
Unemployment	18	9.1	9.8	9.466667	0.235147
GDP	18	0.23	8.4	4.281111	2.3241213
Inflation	18	1.96	26.24	9.339444	5.3333617
Exchange	18	60.37	98.18	78.08833	8.8947415
Public Debt	18	42.66	73.55	56.07333	10.6249412
Interest	18	-8.01	21.1	8.947778	7.346509
Remittance	18	-10.41	3.44	0.595556	2.9013125
Valid N (listwise)	18				

The average NPL ratio over 1998 to 2015 is 16.3% with a standard deviation of 11.42%. The rate of unemployment averaged 9.4% with a standard deviation of 0.23%. Mean GDP growth rate was 4.28% and standard deviation was 2.32%. Inflation rate had a mean of 9.33% and standard deviation of 5.33%. The mean for exchange rate was kshs 78 with a standard deviation of kshs 8.8. Interest rate averaged 8.94 % with a standard deviation of 7.34 % over the same period. The average public debt as a % of GDP was 56% with a standard deviation of 10.62% over the period 1998 to 2015 while the average change in remittance ratio to GDP averaged 0.59% with a standard deviation of 2.9 %.

#### 4.2 Correlation

The study used Pearson correlation coefficient to test for the relationship between independent variables. Table 2 below shows the correlation results.

Table 2 Correlations

	UNE	GDP	INF	EX	PD	INT
Pearson Correlation	1					
Sig. (2-tailed)						
N	18					
Pearson Correlation	-.580 <sup>*</sup>	1				
Sig. (2-tailed)	0.012					
N	18	18				
Pearson Correlation	-0.124	-0.198	1			
Sig. (2-tailed)	0.624	0.432				
N	18	18	18			
Pearson Correlation	-.664 <sup>**</sup>	0.307	-0.229	1		
Sig. (2-tailed)	0.003	0.215	0.361			
N	18	18	18	18		
Pearson Correlation	.514 <sup>*</sup>	-0.279	-0.381	0.142	1	
Sig. (2-tailed)	0.029	0.262	0.119	0.573		
N	18	18	18	18	18	
Pearson Correlation	.483 <sup>*</sup>	-0.324	-.686 <sup>**</sup>	-0.125	0.42	1
Sig. (2-tailed)	0.042	0.19	0.002	0.622	0.082	
N	18	18	18	18	18	18

\*\* . Correlation is significant at the 0.01 level (2-tailed).

\* . Correlation is significant at the 0.05 level (2-tailed).

Correlation measures degree or strength of relationship that may exist between two variables (Mueni, 2015). The results indicate that unemployment is -0.580 correlated to GDP at 0.05 level of significant, -0.664 to exchange rate at 0.01 level of significant, 0.514 to public debt at 0.05 level of significant and 0.483 to interest rate at 0.05 level of significant. Inflation was also 0.686 correlated with interest at 0.01 level of significance. According to Greene (2012) the rule of thumb for evaluating whether variables have severe correlation is when the correlation coefficient is greater than 0.80. The table above shows that there is no problem of correlation since all correlations are below 0 .80.

#### 4.3 Multi-collinearity

Multi-collinearity is a problem that occurs with regression analysis when there is a high correlation of at least one independent variable with a combination of the other independent variables. Variance inflation factor (VIF) values for the predictors as a check for multi-collinearity were used. VIF is a measure of how much the variance of the estimated regression coefficient  $b_k$  is "inflated" by the existence of correlation among the predictor variables in the model. According to Musiega et al. (2013) researchers have used VIF= 10 as critical value rule of thumb to decide whether too much correlation exist. Table 3 shows that there is no problem of multi-collinearity since VIF of all variables is less than 10. If multi-collinearity increases, the regression coefficient can fluctuate from sample to sample hence complicating interpretation of the coefficient as an indicator of relative importance of predicting variables (Cooper & Schindler, 2003).

Table 3: VIF

Collinearity Statistics VIF	
GDP	2.536
Inflation	3.784
Exchange	5.178
Public Debt	3.838
Unemployment	8.252
Interest	3.655
Remittance	1.289

#### 4.4 Model Testing

The  $R^2$ , Durbin Watson and F test are done to examine the reliability of the data and model used. The goodness of fit of the regression equation was determined using the coefficient of determination between the overall independent variables and NPLs. Table 4 below shows the model summary.

Table 4: Model Summary

Model	R	$R^2$	Adjusted $R^2$	Std. Error of the Estimate	Durbin-Watson
1	.942 <sup>a</sup>	0.888	0.809	4.986428	2.636

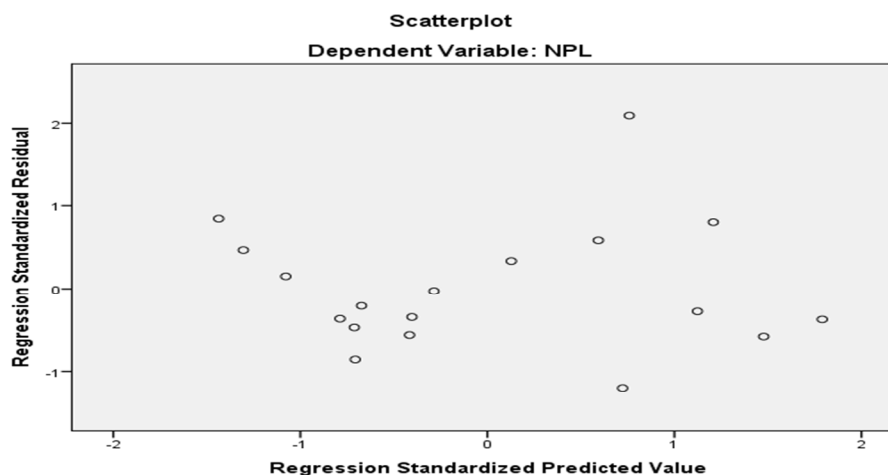
a. Predictors: (Constant), Remittance, Exchange, Interest, GDP, Public debt, Inflation, Unemployment b. Dependent Variable: NPL

From the determination coefficients, it can be noted that there is a relationship between dependent and independent variables given an  $R^2$  values of 0.942 and adjusted to 0.888. This shows that the independent variables (GDP growth rate, inflation rate, interest rate, unemployment rate, public debt, exchange rate and remittances accounts for 88.8 % of the variations in NPLs in Kenya over the period of study 1998 to 2015.

Durbin Watson test was used to detect the presence of autocorrelation. The test checks whether the residuals from a linear regression or multiple regression are independent. If Durbin-Watson factors are between (1) and (3) there is no autocorrelation problem (Alsaeed, 2005). From table 4 above the Durbin Watson value is 2.636 hence there is no autocorrelation problem on the regression model.

The test of heteroscedasticity was also carried out. The test helps show that the variance of the dependent variable being explained in the dependence relationship is not concentrated in only a narrow range of the independent values (Musiega et al., 2013). The standard errors of the estimators will be biased if heteroscedasticity exist therefore the model cannot use the usual t statistics or F statistics for drawing inferences.

Figure 2: Scatter Plot



The residuals plot revealed above in figure 2 indicate that the clusters of points are distributed approximately the same width all over the average residual. Thus this does not violate the assumption of heteroscedasticity.

ANOVA was used to make simultaneous comparisons between two or more means; thus, testing whether a significant relation exists between variables (dependent and independent variables). This helps in bringing out the significance of the regression model. The ANOVA results are presented in Table 5 below



Table 5 ANOVA

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	1969.302	7	281.329	11.314	.000 <sup>b</sup>
Residual	248.645	10	24.864		
Total	2217.947	17			

- a. Dependent Variable: NPL  
 b. Predictors: (Constant), Remittance, Exchange, Interest, GDP, Public debt, Inflation, Unemployment

The results shows that the regression model has a margin of error of  $p = .000$ . This indicates that the model has a probability of 0.000% of giving false prediction. This point to the significance of the model. From the analysis of variance (ANOVA) statistics depicted above, at .05 significance level, the value of calculated F is 11.314 while the F critical at .05 level of significance was,  $F_{0.05,7,17} = 2.61$ . Since F calculated was greater than the F critical ( $11.314 > 2.61$ ), this showed that the overall regression model was significant and that the results can be used to make inferences of the study.

#### 4.5 Results

Regression analysis was used to establish the effect of macroeconomic factors on the NPL level. The seven factors which include: inflation rate (INF), interest rate (INT), GDP growth rate (GDP), public debt (PD), exchange rate (EX), unemployment rate (UNE) and remittances (REM) were used as the predictor variables and the NPL ratio as the dependent variable for the regression model.

Table 6: Analysis of the Coefficients

	Unstandardized Coefficients		Standardized Coefficients	t	Prob
	B	Std. Error	B		
(Constant)	-343.428	154.501		-2.223	0.05
GDP (GDP)	0.995	0.829	0.203	1.201	0.257
Inflation (INF)	0.438	0.441	0.205	0.994	0.344
Exchange (EX)	-0.14	0.309	-0.109	-0.454	0.66
Public Debt (PD)	0.468	0.223	0.435	2.099	0.062
Unemployment (UNE)	35.276*	14.774	0.726	2.388	0.038
Interest (INT)	0.128	0.315	0.082	0.406	0.693
Remittance (REM)	1.679**	0.473	0.426	3.547	0.005

\*\* . Correlation is significant at the 0.01 level (2-tailed).

\* . Correlation is significant at the 0.05 level (2-tailed).

From table 6 above, the model equation was established as follows

$$\text{NPL} = -343.428 + 0.995\text{GDP} + 0.438\text{INF} - 0.14\text{EX} + 0.468\text{PD} + 35.276\text{UNE} + 0.128\text{INT} + 1.679\text{REM}$$

Through the analysis of the coefficients, predictor variables EX was shown to have a negative impact on NPLs with a coefficient of  $-0.14$ . This indicates that one unit change (increase/ decrease) in EX results in a change in the NPL's rate by 0.14 in the opposite direction. For GDP, INF, PD, UNE, INT and REM the impact on NPLs was positive with coefficients of 0.995, 0.438, 0.468, 35.276, 0.128, and 1.679 respectively implying that one unit change in each variable results in a 0.995, 0.438, 0.468, 35.276, 0.128, and 1.679 unit change in the NPL's rate in the same direction.

#### 4.6 Discussion of Results

##### 4.6.1 Effect of GDP on NPLs

The finding indicate that an increase of 0.995 in GDP annual growth rate will lead to an increase of 1 unit of NPL all other things held constant. The findings were not statistically significant. These findings contradict theory since a growing economy increases borrower's income and ability to repay loans. Life cycle hypothesis notes that consumers keep their consumption levels nearly the same in every period so increased incomes from a growing economy would help borrowers pay their loans. The findings that GDP was not statistically significant in determining NPLs in Kenya was consistent with Farhan et al.(2012).The results were however inconsistent with studies by Klein (2013), Škarica (2013) and Saba et al. (2012) who found them significant in explaining NPLs. Conclusive inference cannot however be based on this as the coefficient of GDP is not significant.

##### 4.6.2 Effect of Inflation rate on NPLs

The study findings were that the coefficient of inflation was 0.438 positive meaning that increase in inflation leads to increase in NPLs. Inflation is the constant increase in the general level of prices for goods and services. Inflation may lead to economic tremors. The financial accelerator theory designates that due to economic tremors, the borrowers may avoid the repayment of their loans or external finance thereby leading to high levels of NPLs. Inflation may pass through nominal interest rates as lenders adjust rates to maintain their real returns or

simply to pass on increases in policy rates resulting from monetary policy actions to combat inflation, thus reducing borrowers' loan-servicing capacity (Skarica, 2014). The coefficient is however not significant and is consistent with Warue (2013) findings which concluded that inflation was not statistically significant in the study in Kenya. The findings contradict the findings of Moinescu (2012) and Mileris (2014) who found inflation statistically significant in explaining NPLs.

#### **4.6.3 Effect of Exchange rate on NPLs**

The results showed a coefficient of -0.14 for exchange rate meaning that an increase in exchange rate led to a decrease in NPLs. Exchange rate is the price of a nation's currency in terms of an alternative currency. A decrease in home currency will result in costly imported goods which put a pressure to finance letter of credits issued to traders by commercial banks, and thus increasing the risk of default, and vice versa (Badar & Javid, 2013). The deflation theory suggests that when the debt bubble bursts sequence of events occurs which cause complicated disturbances in the rates of interest and a fall in the money value, influencing state of over-indebtedness existing between, debtors or creditors or both which can compound to loan defaults. An increased exchange rate could have also positively affected private debtors, whose loans are denominated in foreign currency, reducing the NPL ratio. The findings of studies by Farhan et al. (2012); Badar and Javid (2013); and Akinlo and Emmanuel (2014) found exchange rate significant.

#### **4.6.4 Effect of Public debt on NPLs**

The study found that the coefficient of public debt was 0.468 positive. This means that increase in public debt stock/GDP ratio in the long-term increases the ratio of NPLs. Similar to this result, Reinhart and Rogoff (2010) stated in their study that the increase in the public borrowing requirement would lead to a decrease in loanable funds in loan market and thus, banks are obliged to limit their loan placements. It is concluded that this increases the ratio of NPLs because loan customers cannot renew their loan debts. The most rational explanation for this situation is that a high public debt may lead to lower confidence of investors, higher interest rates and, thus, a lower ability to repay debts. The coefficient was not significant and is inconsistent with the findings of Makri et al. (2014) and Dimitrios et al. (2011) who found public debt to be significant in explaining NPLs.

#### **4.6.5 Effect of Unemployment rate on NPLs**

The coefficient for unemployment was 35.276 positive and significant at 0.05 level of confidence. This indeed conforms to a priori expectation and is supported by the life-cycle hypothesis. It could mean that increase in unemployment negatively affect income of individuals thereby increasing their debt burden, unemployed people will be charged higher interest rates since banks considers them to be riskier clients. It could also mean that increased unemployment in the economy negatively affected the demand for products of firms which ultimately affected the production/sales of the firms, which led to a decline in revenues of the firms and a fragile debt conditions. The findings are consistent with results of studies by Louzis et al. (2012) and Makri et al. (2014) who also found unemployment rate statistically significant with NPLs.

#### **4.6.6 Effect of Interest rate on NPLs**

NPL was found to be positively related to interest rates. The coefficient was 0.128 but not significant. An increase in interest rates weakens borrower's debt servicing capacity. This is consistent with the life cycle hypothesis on consumer's consumption, increased interest rates will reduce available incomes and borrowers will experience difficulties paying the loans. The findings are consistent with findings by Turan and Koskija (2014); Ombaba (2013); Fofack (2005) and Farhan et al. (2012).

#### **4.6.7 Effect of Remittance on NPLs**

The coefficient for remittance was positive 1.679 and was statistically significant at 0.050 % level of confidence. The finding is inconsistent with findings of Turan and Koskija (2014) and Clichici and Colesnicova (2014) who found an inverse relationship between remittances and NPLs. A decline of remittances will lead to a decline of households' incomes, and as a consequence they face a lower capability in repayment of previous contracted loans, which contributes to a higher share of NPLs to total loans. Studies on use of remittance in 2004 to 2011 indicated that in Kenya 12.7 percent of diaspora inflow was used for investment, education (23.1 percent), health (6.3 percent), household Consumption (54.2 percent), showing that remittances may not have been used for loan repayments (Omia et al., 2015).

### **5.0 Conclusion, Recommendations and Suggestions for further Studies**

The objective of the study was to examine the macroeconomic determinants of NPLs in Kenya over 1998 to 2015. NPLs was the dependent variable, while the independent variables included public debt, remittances, exchange rate, inflation, unemployment, interest rate, and GDP growth. The general results of our study confirm that macroeconomic conditions have a strong and decisive influence NPLS in Kenya over the period of our analysis (1998-2015). Regression analysis was used to carry out the analysis. Remittances and unemployment were found to be statistically significant while the rest were not. The general conclusion is that in managing the credit risk the macroeconomic factors are very important in Kenya. Understanding the interrelation between macroeconomic indicators and NPLs can help banks to manage credit risk more effectively. Further research can

consider adding more explanatory variables such bank specific factors such as bank size, management, loans level, and net interest margin, loan to asset ratio, capital adequacy ratio and return on equity.

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