



Assessing effects of Interest Rates Spread on Non-Performing Loans: A Case of Commercial Banks in Trans-Nzoia County, Kenya

Lewis Agwata^{1*}, Peter Simotwo¹ and Martin Onsiro Ronald¹

¹Mount Kenya University, Kenya.

Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

Article Information

DOI: 10.9734/AJEBA/2021/v21i930419

Editor(s):

(1) Dr. Ivan Markovic, University of Nis, Serbia.

Reviewers:

(1) Edwins Edson Odera, University of Namibia, Namibia,

(2) Chinelo Jenevive Obiekwe, Michael Okpara University of Agriculture, Nigeria.

Complete Peer review History: <http://www.sdiarticle4.com/review-history/70727>

Original Research Article

**Received 02 May 2021
Accepted 07 July 2021
Published 09 July 2021**

ABSTRACT

In the spike of increasing occurrences of non-performing loans among commercial banks in Trans-Nzoia County, Kenya, interest rate spread should be given serious consideration through more empirical research. This study therefore sought establish the relationship between the interest rate spread and occurrence of non-performing loans among commercial banks in Trans-Nzoia County. It specifically; looked into the credit risk management impacts non-performing loans, bank regulation impacts non-performing loans, and the capital sufficiency impacts non-performing loans. Adopting descriptive research design, the study used the 78 employees of commercial banks in Trans-Nzoia County as its targeted. The entire population participated in the study as respondents. Data, which was gathered using a questionnaire, was using quantitative approach to yield descriptive and inferential statistics. Multiple regression analysis was used to draw inferences from the findings. All factors were found to be statistically significant (p,0.05). Thus, credit risk management, bank regulation impacts, and the capital sufficiency have a positive significant effect on non-performing loans among commercial banks in Trans-Nzoia. The study recommended for; credit staff training programmes, applying strict interest rate rules and strict lending advances policies. In the spike of increasing occurrences of non-performing loans among commercial banks in Trans-Nzoia County, Kenya, interest rate spread should be given serious consideration through more

*Corresponding author: Email: agwata15@gmail.com;

empirical research. This study therefore sought establish the relationship between the interest rate spread and occurrence of non-performing loans among commercial banks in Trans-Nzoia County. It specifically; looked into the credit risk management impacts non-performing loans, bank regulation impacts non-performing loans, and the capital sufficiency impacts non-performing loans. Adopting descriptive research design, the study used the 78 employees of commercial banks in Trans-Nzoia County as its targeted. The entire population participated in the study as respondents. Data, which was gathered using a questionnaire, was using quantitative approach to yield descriptive and inferential statistics. Multiple regression analysis was used to draw inferences from the findings. All factors were found to be statistically significant ($p,0.05$). Thus, credit risk management, bank regulation impacts, and the capital sufficiency have a positive significant effect on non-performing loans among commercial banks in Trans-Nzoia. The study recommended for; credit staff training programmes, applying strict interest rate rules and strict lending advances policies.

Keywords: *Bank regulation impacts; Capital adequacy; Commercial banks; Credit risk management; Interest rate spread; Lending advances policies; Non-performing loans.*

1. INTRODUCTION

In many countries, commercial banking is very vital and essential financial institutions for stimulating socio-economic growth [1]. Commercial banks as intermediaries, offer loans that are part of their assets on interest. However, repayment of these loans and the associated interest, in most Kenyan commercial banks has been elusive, escalating into high occurrences of non-performing loans (NPLs) loans. The regulatory of commercial bank in Kenya, Central Bank of Kenya [2] report that from KSh123.9 billion (\$1.4 billion) in June 2015 to KSh 249.65 billion in the June of 2017. The ratio of gross non-performing loans to gross loans grew by 54.3 percent [2].

Interest rate spread has always been one of the most essential and significant economic issues in various countries throughout the world, and is one of the main indicators of banking industry efficiency [3]. Despite this knowledge, local research on the link between interest rate spread on NPLs has mixed findings. Most local research has focused on the variables that drive interest rate spreads, but it has neglected considering the impact of interest rate spreads on the level of NPLs. In addition, research on the effect of the interest rate spread were limited to a period before the introduction of Kenya's interest rate capping law, prompting to this study. Interest rate as a monetary price indicates market information on predicted currency shifts or future inflation [4]. Fluctuations in the market interest rate have a substantial effect on commercial banks' operations. Banks set the interest rates that customers are given, and the mortgage manufacturing line culminates in the acquisition of a mortgage by an investor. The market clearing prices for mortgage-backed securities

are determined by the free market. The mortgage industry uses these costs to calculate the interest rates provided to consumers. Sheefeni [5] confirms the notion that the higher market interest rates the higher the profitability of the banking industry. [4] illustrates that when interest rates are unpredictable, banks can act as brokers or asset transformers. Banks simply match the arrival of liabilities and assets thus reducing their risk exposure in a fluctuating interest rate environment by acting as brokers.

The interest rate spread in Kenya had been increasing until late 2016, when interest rate caps was implemented. Prior to interest rate limiting, the lending rate could be as high as 18 percent, while the deposit interest rate was typically 4 percent, leading in a 12 percent interest rate differential. The average loan rate is now about 14 percent, while the average deposit interest rate is around 7%, resulting in an average interest rate differential of around 7%.

The major indicators of IRs are; credit risk management, bank regulations, and capital adequacy. Credit risk management is for ensuring the effective collection of customers' payments and minimizing the risk of non-payment thus maximizing profits [6]. Commercial banks should manage their assets efficiently through their credit policies which describe the bank's lending philosophy, particular processes and techniques of overseeing the lending process [7]. The basic tenets of credit risk management regulations include credit risk measurement and supervisions, which contribute to review of the lending process and internal risk rating systems through checks and audits. The capital adequacy ratio is used to quantify the total financial leverage of the bank. Banks with more volatility in income have a larger financial

leverage than banks with a lower income volatility. As a result of the extent to which banks cover inherent risk in their operations. In a study conducted by Bhattarai [6], Capital adequacy (CAR) and nonperforming ratio (NPLR) of Nepalese commercial banks (CBs) were found to have a significant relationship.

Notably, the most obvious signs for anticipating financial crises are those connected directly to NPLs [8]. Therefore, commercial banks can increase the interest rate spread by raising lending rates and lowering deposit rates for avoidance of high occurrences on NPLs [5]. On contrary, sustained large interest rate spreads are indicators of the financial system's poor performance [9].

1.2 Statement of the Problem

Although banking is the most profitable and effective sector, many Kenyan commercial banks are struggle with non-performing loans [4]. These banks are allegedly unable to efficiently manage the loan portfolio in order to increase their profitability and sustainability, putting their survival in jeopardy. Gezu [10] states that NPLs are a crucial component of the bank's overall efficiency and have an influence on profitability since increased NPLs provision decreases revenue. Empirical literature has associated interest rate spread with raising the risk of NPLs [4]. Due to its detrimental effect on NPLs, more empirical research should take the interest rates spread seriously. While several researches were carried out to study the influence of interest rate spread on NPLs, most of these studies pertain to established countries, which suggest that the difficulties in emerging markets such as Kenya are not explained. Moreover, no recorded evidence of interest rate spread in Trans-Nzoia County affecting the commercial banks exists, indicating a knowledge gap. As a result, this study sought to close the gap by establishing the relationship between the interest rate spread and NPLs occurrence among commercial banks in Trans-Nzoia County.

1.3 Research Objectives

The research sought to assess effects of interest rate spread on non-performing loans in commercial banks in Trans-Nzoia County. The following objectives guided the study:

- i. To examine how credit risk management affect non-performing loans in commercial banks in Trans-Nzoia county

- ii. To assess how bank regulations, affect non-performing loans in commercial banks in Trans-Nzoia county
- iii. To investigate how capital adequacy, affect non-performing loans in commercial banks in Trans-Nzoia county

2. LITERATURE REVIEW

2.1 Theoretical Framework

This research was informed by the capital asset pricing theory and liquidity.

The Capital Asset Pricing Theory was introduced by Sharpe in 1964 in the idea of the pricing of capital assets through a model of capital asset pricing (CAPM). The theory suggests that in order to achieve the appropriate level of risk, all investors will hold, leverage or eliminate the market portfolio of risk-free assets. Investors have a return rate that reflects our readiness to accept risks. The CAPM assists us in determining investment risk and expected return on investment [11]. The most important aspect of the model is that risk of returning an asset is categorized into two group. Risk is the first category, systemic or corporate. The return on assets should on the average be equal with the risk-free bond rates held on the same term and a premium that is proportionate to the systemic stock risk [12]. This is useful in informing the present on the need of have a suitable interest rate spread to encourage the borrower to borrow endlessly while ensuring maximum benefit from this through reducing the NPLs.

While discussing liquidity preference theory, Keynes contends that speculative need for money is sensitive to interest rate fluctuations [13]. This is uncompromising particularly at low interest rates. The strong demand for speculation suggests a (high, low) transaction balance, which corresponds to a (high, low) income level when the money supply is consistent. If consumers with a certain cash supply and balanced rate of interest are suddenly overtaken by a fetish of liquidity, speculative balance demand (right and left) would shift and put pressure on the interest rate (upwards and downsides) [13]. The importance for the study is that the bank should always minimise non-performing loans due to the liquidity preference, because this would lower the bank's risk. This can be accomplished by reducing the rate diffusion. Thus, it helped relate the IRS to NPLs in that it shows that interest rate is a strong policy signal of current information for money supply.

2.2 Empirical Literature

Various attempts by different Researchers and scholars have attempted to seek out how non-performing loans can be influenced by various variables in the study including the effects of IRS on NPLs in commercial banks (CBs). Araujo [14] failed to establish a statistically significant relationship between interest rates and GDP growth while Okwany [15] established that capping interest rates reduced loan interest rates and number of credit facilities provided while strengthening selection criteria, which led to rise in NPLs. Thus, a drop in the lending rate, reduced bank profitability, and increased NPLs resulting from the decrease in the number of new loans issued.

While Budiarto [16] reveals a positive link between credit collectivity and NPLs, Mburu, Mwangi and Muathe [17] showed that Kenya's commercial-bank loan performance had a significant influence on both debt collection policy and lending policy. Kolawole Osemene and Ijaiya [18] found that particular measures of bank control had a substantial influence on Nigerian CBs' NPLs. More so, Kariuki [19] verified Mogga, Mwambia and Kithinji [20] that credit risk management greatly improved and contributed to improving performance. In Pakistan's banking system Haney et al. [21] found that the banking industry lacks a proper risk management framework. According to the study, NPLs are also on the rise as a result of a lack of risk management, posing a danger to bank profitability. Biabani et al. [22] exposed collaterals, bounced checks, client credit histories, loan repayment durations, average account balances as linked to NPLs [23].

[4] revealed that interest rate limitations lead to NPLs, which have an influence on the ROA and ROE financial performance of Kenyan commercial banks. Furthermore, Athirah and Mansur [24] reveal that on the long term, NPL level is commensurate with the lending of banks' interest rates. Tefera [25] found that diversion of funds into superfluous business growth and speculation influenced NPLs in the earning of high incomes and legal environments, reflecting the availability or non-accessibility of foreclosure legislation. Sheefeni [5] study findings revealed that interest rate spreads in Namibia had a positive and statistically significant influence on NPLs.

While Nyabaga and Matanda [26] show that capital adequacy and bank size have a strong

positive impact on outcomes Musa and Nasieku [27] revealed that the credit efficiency of CBs in Kenya has had a substantial and beneficial effect as better capital adequacy ratios result in greater loan returns. Mananda [28] research findings reveal that financial performance are associated with capital adequacy oppositely and significantly with commercial banks.

3. RESEARCH METHODOLOGY

The research adopted descriptive survey research technique [29] to learn more about the influence of interest rates on non-performing loans at commercial banks. It allowed the researcher to accurately generalize the findings to a much broader group.

The research targeted 78 officers of 13 commercial banks in Trans-nzoia county who included; credit analyst, relationship manager, credit processing officer, credit approval officer, credit documentation officer and branch managers

Since the target population was readily manageable and accessible census was employed for sampling where the 78 officers appreciated in the research in accordance with Mugenda and Mugenda [30].

Administration of questionnaire was employed to collect primary data owing to its being fast low-cost gathering of benefit [31] The questionnaire was design on a 5-point Likert scale [32]

The tool was pretested for validity using content analysis and reliability using Cronbach's alpha techniques of internal consistency [31]. The reliability analysis show a Cronbach's Alpha was 0.865 captured in Table 1.

The Cronbach's Alpha coefficient was 0.865, was considerably higher than the suggested threshold of 0.7 [31]. The reveals a high level of internal consistency among the items in the tool. Furthermore, each variables; Non-performing loans ($\alpha = 0.716$), Credit risk management ($\alpha = 0.903$), Bank regulations ($\alpha = 0.882$), and Capital adequacy ($\alpha = 0.723$) had a Cronbach's Alpha coefficient greater than 0.7. This suggests that that items in each research variables were also consistent. As a result, the instrument was deemed to have a high level of precision and acceptability for collecting data which would yield accurate and reliable results.

After all of the gathering the data, there was, sampling, categorization, and interpretation in

order to create data that was meaningful, comprehensible, authentic, and correct, resulting in trustworthy findings [31]. The research used a quantitative technique to analyse the data and provide descriptive statistics [32] which included frequencies, percentages, means (M), and standard deviations (SD).

Quantitative analysis was also utilised to produce inferential statistics (correlation and multiple regression) where correlation analysis was done to see whether there was a relationship between the independent variables (IVs) and the dependent variable (DV), and the regression analysis was used to find a model;

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \epsilon \dots \dots \dots (i)$$

- Where, Y= non-performing loans
- X₁= credit risk management
- X₂=bank regulations
- X₃= capital adequacy
- ε= Error term
- β₀=the term that remains constant

whereas the coefficient β_i=1...3 will be used to measure how sensitive the dependent variable (Y) to unit a change in the independent variables X₁, X₂ and X₃.

4. RESEARCH FINDINGS AND DISCUSSION

The study response rate was 75(96%) which was sufficient to draw conclusions regarding the impact of interest rate spreads on NPLs in commercial banks in Trans-Nzoia [30]. Majority of them, 41(55%) were male while 34(45%) were female. These respondents had banking work experiences of; less than 5 years by 20(27%), between 6 and 10 years indicated by 34(45%), between 11 and 20 years by 11(15%) and over 20 years of 10(13%). Most of the banks, 45(60%) were local owned while the foreign owned were 22(29%) and the joint ventures were 8(11). Furthermore, according to Omboto and Mwengei's [33] state ownership structure has an influence on NPLs at Nairobi's commercial banks. The state ownership structure has a favourable and considerable influence on commercial bank NPLs. According to the research, government ownership of commercial banks increased NPLs.

A majority of 40(53%) showed that secure loan was more preferred while 8(24%) preferred unsecure loan and 17(23%) preferred overdraft

loan. This confirms the findings by Zobitz [34] that unsecured loans would rank behind secured debts in Kenya. Unsecured loans are made and maintained purely on the creditworthiness of the buyer and not on any type of collateral in accordance with Muthee [35]. Credit reference control is a challenging procedure since the loan analyst must evaluate the company's ability to repay the loan using all of the financial data gathered, which varies depending on the type of unsecured loan sought. It was revealed that 38(51%) had a loan portfolio of below 6-10%, while 12(33%) had loan portfolio between 5% and 9% as 12(16%) had loan portfolio between 10-15%. These findings support the findings by Safavian and Zia [36] that Kenya banks were more likely to provide loans with shorter maturities and make eligibility rules for interest bearing deposit accounts stricter as loan interest rates fell. However, because of the danger of losing consumers to competitors, the surge of quality clients could mean longer-term loans and deposits. Safavian and Zia [36] established that there was a statistically significant drop in aggregate lending in Kenya after February 2016.

5. DESCRIPTIVE ANALYSIS

5.1 Credit Risk Management and Non-Performing Loans

Analysis on the way credit risk management affected commercial bank non-performing loans are shown in table 2.

According to the results, there suitable credit policies accessible at the bank (M=3.5, SD=1.07) and the bank's credit risk strategy represents the bank's risk tolerance (M=3.69, SD= 0.82). According to Kargi [37], who claimed that credit risk management provides a framework for identifying the influence of credit risk management on bank profitability. Control systems for monitoring are assessed monthly at the banks (M=3.69, SD= 0.79) and the bank had a clearly defined procedure for awarding new and existing refinancing loans (M = 3.68, SD =0.95). It was shown that the banks had created a framework for independent credit risk management review (M = 3.67; SD = 0.89). This is in line with the findings of a research by Haney et al. [21], who found that NPLs are rising as a result of a lack of risk management, jeopardizing bank profitability. These banks possessed information systems and analytical procedures that allowed management to assess the credit risk involved in all on and off-balance sheet

activities (M= 3.65; SD =0.91). This is in line with Mogga et al. [20], who stated that credit risk is by far the most essential risk that banks confront, and that exact evaluation and good management of this risk is more vital to their company's profitability than any other risk. More so, the senior management in their bank sets policies and processes for recognizing, measuring, monitoring, and controlling credit risk (M =3.65; SD =0.91) This is consistent with Kargi's [37] assertion that credit risk management includes the decision-making process as well as the

follow-up of credit obligations, including all monitoring and reporting systems, prior to the credit decision. Furthermore. the senior management closely implements the credit risk strategy set out by the board of directors (M = 3.65, SD =0.88). therefore, the bank operated under excellent, well-defined loan providing criteria (M =3.57= 0.98) and the credit risk strategy and important credit risk regulations were approved by the board of directors (M = 3.50= SD = 1.07).

Table 1. Reliability Test Results for the Study Variables

Variables	Cronbach's Alpha
Non-performing loans	0.716
Credit risk management	0.903
Bank regulations	0.882
Capital adequacy	0.723

Cronbach's Alpha = 0.865, N = 4

Table 2. Descriptive statistics of credit risk management

Details	SA		A		N		D		SD		M		STD
	N	%	N	%	N	%	N	%	N	%	N	%	
Board approves credit risk strategy/ credit risk	7	9%	47	63%	1	1%	17	23%	3	4%	3.5	1.07	
The credit risk strategy reflects risk tolerance.	3	4%	59	79%	1	1%	11	15%	1	1%	3.69	0.82	
There are regular audits of control systems.	2	3%	60	80%	2	3%	10	13%	1	1%	3.69	0.79	
There is credit risk management	4	5%	52	76%	1	1%	11	15%	2	3%	3.67	0.89	
Loan defaulters are tracked and regulated	5	7%	59	79%	1	1%	8	11%	2	3%	3.76	0.84	
Board authorise credit risk plan	4	5%	56	75%	1	1%	13	17%	1	1%	3.65	0.88	
Top management creates credit risk management strategies.	5	7%	55	73%	2	3%	11	15%	2	3%	3.65	0.91	
Credit risk is addressed in all activities	6	8%	58	77%	2	3%	8	11%	1	1%	3.8	0.79	
Information systems and analytical procedures assess credit risk	5	7%	55	73%	2	3%	11	15%	2	3%	3.65	0.91	
There are well-defined procedure loaning procedures	7	9%	53	71%	1	1%	12	16%	2	3%	3.68	0.95	
Customers meet their financial obligations	5	7%	60	80%	0	0%	8	11%	2	3%	3.77	0.83	
The bank follows reasonable, well-defined credit-granting standards	3	4%	60	80%	1	1%	11	15%	0	0%	3.73	0.76	
	5	7%	52	69%	1	1%	15	20%	2	3%	3.57	0.98	

Source: Research data (2019)

Table 3. Descriptive statistics of bank regulations

Details	SA		A		N		D		SD		M	STD
	N	%	N	%	N	%	N	%	N	%		
Policies are influenced CBK lending rules.	8	11%	48	64%	1	1%	16	21%	2	30%	3.59	1.03
The lending policies have an impact NPLs	6	8%	58	77%	1	1%	8	11%	2	30%	3.77	0.85
Repayment is influenced by lack of information	7	9%	52	69%	0	0%	13	17%	3	30%	3.63	1.01
The number of loanees is reduced by the credit reference bureau.	5	7%	51	68%	1	1%	15	20%	3	30%	3.53	1.02
Differences in loan policy arise as a result of competition.	5	7%	54	72%	1	1%	13	17%	2	30%	3.63	0.94
Bank earnings impact on its profitability.	8	11%	54	72%	1	1%	11	15%	1	30%	3.76	0.88
Credit officers' quality determine NPLs	7	9%	53	71%	1	1%	12	16%	2	30%	3.68	0.95
Economic situation impact on loan policy.	5	7%	52	69%	1	1%	15	20%	2	30%	3.57	0.98
Interest rates influence loan repayment	4	5%	56	75%	1	1%	13	17%	1	10%	3.65	0.88
The deposit level impact on ending portfolio.	4	5%	57	76%	1	1%	13	17%	0	0%	3.69	0.82
Interest rates affects loan acceptance rates.	5	7%	53	71%	1	1%	14	19%	2	30%	3.6	0.96
lending policies determine borrowing behaviour	6	8%	53	71%	1	1%	13	17%	2	30%	3.64	0.95
Loanee income impact on loan repayment	4	5%	55	73%	0	0%	14	19%	2	30%	3.6	0.94

Source: Field data (2021)

5.2 Effect of Bank Regulations on Non-Performing Loans in Commercial Banks

Analysis was done on the way bank rules affected commercial bank NPLs to produce. Table 3.

The results show that the lending practices of individual banks had an impact on the levels of non-performing loans. (M = 3.77, SD =0.85). Insider lending, according to Haney et al. [21], was the single largest factor to many of the failing local banks' poor loans. While income from loans influence bank profitability (M = 3.76, SD =0.88), bank's deposit level had an impact on its lending portfolio, (M = 3.69, SD =0.82). The quality of credit officers also had an impact on the way NPLs (M =3.68, SD =0.95). Outstandingly, high interest rates had an impact on the quality of loan repayment (7M =3.65, SD =0.88). This is in accordance with Biabani et al.

[22], who concluded that banks give lower interest rate premiums to riskier credit contracts. Thus, lending restrictions had an influence on consumer borrowing behavior and insider lending was the single most important factor for many of the failing local banks' poor loans (M = 3.64, SD =0.95) average. Insider loans accounted for a significant part of the bad debts in at least half of the bank collapses [21]. Lack of adequate information about a customer's capacity to repay a loan influenced repayment capacity M= 3.63, SD = 1.01) while commercial bank competition led to variations in lending practices M = 3.63, 0.94). furthermore, relationship exists between interest rate and loan take-up rate (M = 3.60, SD =0.96). Changes in discretionary income for the loaned had an impact on repayment capabilities M =3.60, SD = 0.94) as the central bank's lending rules impact individual banks' practices (M = 3.59, 1.03) which coincides with Demirguc-Kunt and Huizinga [38], who discovered that

greater contract enforcement, legal system efficiency, and a lack of corruption are linked to lower realised interest margins and asset non-performance. The current economic conditions had an impact on lending policy (M = 3.57, Sd = 0.98). This accords with Mukalazi [39], who states that banking system suffer massive losses as a result of years of economic mismanagement and political meddling. Also, credit reference bureaus limit the amount of loans issued (M = 3.53, SD =1.02).

5.3 Effects of Capital Adequacy on Non-Performing Loans in Commercial Bank

The study assessed effect of capital sufficiency on commercial bank NPLs to yield Table 4.

These results show that capital adequacy requirements favorably influence a bank's loan portfolio (M = 3.73, 0.86). This is in line with Nyabaga and Matanda [26] study, which found that banks with low capital requirements are far more vulnerable to risk. Meanwhile, banks had a larger margin of safety than other businesses, allowing them to continue profitable even during economic downturn M = 3.73, 0.81) and capital owned by banks is solely utilised to satisfy the bank's obligations (M = 3.70, SD = 0.88). There existed a mechanism to maintain the minimum required capital in the bank M = 3.69, SD = 0.90) to agree with Dang's [40] that a bank should have a system in place to absorb the bare minimum of potential losses and risks, such as operational, credit and market risks, in order to offset expected losses and protect the debt holders of the financial institution. These banks operate without relying on outside funding M = 3.69, SD =0.82) and adequate capital to maximise shareholder value at the expense of financing providers (M = 3.67, SD = 0.89) to supports Tesfai [41] that capital adequacy rules offer a buffer against losses not covered by current bank revenues and safeguard depositors and other creditors from loss in the case of liquidation. This was because capital adequacy rules had a direct impact on the number of non-performing loans (M = 3.67, 0.86). Bhattarai [6] discovered that banks with adequate capital ratios have reduced NPLs rates. However, the banks were less attentive in directing funds to the real sector (M = 3.67, SD =0.84) but capital requirements in banks were heavily regulated by the government (M =3.61, SD =0.94). This is in line with the findings of Oladejo and Oladipupo [42] who found, this has enhanced banks' ability to compete on a national, regional, and global scale. Based on these results, liquidity levels had

a direct influence on loan supply (M = 3.53, SD = 1.05) and capital adequacy rules had a negative influence on loan portfolio (M = 3.53, SD = 0.93). This is consistent with the results of Mananda [28] which showed a positive relationship between asset quality as measured by risk and capital requirements and that banks with more capital above regulatory requirements are exposed to lower risk and hence increase asset quality growth. So, banks should invest more in productive assets (M = 3.52, SD =0.99) and the banks' capital should be utilised to cover risks (M = 3.52, SD =0.99).

5.4 Non-Performing Loans

The research sought to establish the status commercial banks' NPLs. The results were tabulated in Table 5.

According to these statistics, high interest rates affect the quality of repayment of loans (M = 3.88, SD =0.99) while NPLs negatively impacted on shareholder money (M = 3.84= SD = 0.94), most respondents agreed with this statement. So, significant amount of NPLs may lead insolvency and bank failure (M = 3.83, SD = 0.98) where high levels of NPLs hinder banks' access to capital markets efficiently (M= 3.80, SD = 1.03). Weak credit essay standards resulted in NPLs (M = 3.76. SD = 0.81) and NPLs resulted in a decrease in bank loan payback durations (M = 3.77, SD= 1.11) since high frequency of non-performing loans has an adverse signaling effect on stock prices and market capitalization (M = 3.69, SD = 1.02). thus, NPLs, have a negative influence on a country's GDP (M = 3.68, SD =1.04). Non-performing loans cause loan payback periods to be shortened (M = 3.68, SD = 1.12) and it may lead to insolvency and hence bank collapse (M = 3.63, SD =1.12) also, NPLs had a negative impact on a bank's profitability because of higher provisions (M = 3.63, SD = 1.08). These NPLs had grown as a result of a weak regulatory environment (M = 3.60, SD =0.94) and consumer credit history resulted in non-performing loans (M = 3.55, SD = 0.93). Occurrences of high level of NPLs caused banks to face market and liquidity problems (M = 3.53, SD =1.02).

5.5 Inferential Analysis

The research used inferential analysis to see if the IVs, credit risk management, bank rules, and capital sufficiency were good predictors of DV; NPLs in CBs in Trans-Nzoia county. The researchers used correlation analysis and

specifically Pearson correlation at a 5% (0.05) significance level to see if there was a significant relationship between each of the IVs; credit risk management, bank regulations, capital adequacy, and the DV; NPLs in CBs in Trans-Nzoia county. After that, a multiple regression analysis was used to determine the research model.

5.6 Correlation analysis

Table 6 shows the results of a correlation study using Pearson's Product Method (PPM) to check if there is a significant link between the IVs and the DV.

Ultimately, table 6 shows that the probability value (p-value) for each link between each IV

and the DV was less than 0.05 for credit risk management (p=0.001), bank regulations (p=.033), and capital adequacy (p=0.002), implying that each IV and DV has a significant link. Credit risk management showed the strongest association (r = 0.372), followed by capital adequacy (r = 0.356), and bank rules (r = 0.246). According to the findings, credit risk management (r = 0.372; p=0.001) had the strongest relationship, followed by capital adequacy (r = 0.356; p=0.002), which had a moderate positive significant relationship because the correlation coefficient (r) was between 0.3 and 0.6, and bank regulations (r = 0.246; p=0.033), which had a weak significant positive relationship with NPLs in CBs.

Table 4. Descriptive statistics of capital adequacy

Details	SA		A		N		D		SD		M	STD
	N	%	N	%	N	%	N	%	N	%		
We ensure that the minimum capital is maintained.	5	7%	57	76%	0	0%	11	15%	2	3%	3.69	0.9
The capital adequacy requirement detrimentally impacts loan portfolio	3	4%	53	71%	1	1%	17	23%	1	1%	3.53	0.93
Loan portfolio benefits from capital adequacy requirement.	6	8%	56	75%	1	1%	11	15%	1	1%	3.73	0.86
Liquidity levels impact on loan supply.	7	9%	48	64%	1	1%	16	21%	3	4%	3.53	1.05
Capital sufficiency demands influence NPLs.	3	4%	58	77%	2	3%	10	13%	2	3%	3.67	0.86
The government strictly regulates capital requirements	5	7%	53	71%	2	3%	13	17%	2	3%	3.61	0.94
We have sufficient capital to maximise value from borrowers	4	5%	57	76%	1	1%	11	15%	2	3%	3.67	0.89
we have sufficient capital to increase value from creditors.	3	4%	61	83%	1	1%	8	11%	2	3%	3.73	0.81
or bank makes profits all the time	3	4%	59	79%	1	1%	11	15%	1	1%	3.69	0.82
Banks support their operations without relying on outside capital.	4	5%	52	69%	0	0%	17	23%	2	3%	3.52	0.99
The capital of banks is used to mitigate risk.	3	4%	58	77%	1	1%	12	16%	1	1%	3.52	0.99
Banks are putting more money into productive assets.	4	5%	55	73%	1	1%	13	17%	2	3%	3.67	0.84
Capital is utilised only to satisfy the bank's requirements	5	7%	57	76%	1	1%	10	13%	2	3%	3.7	0.88

Source: Field data (2021)

Table 5. Descriptive of non-performing loans

Details	SA		A		N		D		SD		M	STD
	N	%	N	%	N	%	N	%	N	%		
NPLs affect shareholder money negatively	12	16%	51	69%	2	3%	7	9%	3	4%	3.84	0.93
High NPLs hinder banks for financial markets access	16	21%	44	59%	1	1%	12	16%	2	3%	3.8	1.04
NPLs lead to insolvency and bank failure.	11	15%	51	63%	0	0%	12	16%	5	7%	3.63	1.12
High Levels lead to undercapitalization and job losses	14	19%	48	64%	1	1%	10	13%	2	3%	3.83	0.98
NPLs affect GDP negatively	10	13%	49	65%	2	3%	10	13%	4	5%	3.68	1.04
High NPLs signal negatively to stock market.	11	15%	48	64%	2	3%	10	13%	4	5%	3.69	1.05
Loan payback terms are shortened by NPLs	14	19%	45	60%	0	0%	12	16%	4	5%	3.71	1.11
Loan repayment is influenced by high interest rates.	17	23%	45	60%	2	3%	9	1%	2	2%	3.88	0.99
High NPLs lead to market and liquidity problems.	57	51%	68	11%	1	5%	20	3%	4	5%	3.53	1.02
Credit essays with insufficient criteria have resulted in NPLs	57	59%	7	9%	1	18%	1	12%	3	4%	3.76	0.84
Shoddy regulatory environment increases NPLs	45	55%	7	3%	1	17%	23	11%			3.55	0.94
Customers' credit histories have had a role in NPLs	34	53%	72	1%	0	0%	14	19%	2	3%	3.6	0.9

Source: Field data (2021)

Table 6. Correlation Analysis Results

Correlations		Non-performing loans	Credit Risk management	Bank lending regulations	Capital adequacy
Non-performing loans	Pearson Correlation	1			
	Sig. (2-tailed)				
	N	75			
Credit Risk management	Pearson Correlation	-.372**	1		
	Sig. (2-tailed)	.001			
	N	75	75		
Bank lending regulations	Pearson Correlation	-.246*	-.021	1	
	Sig. (2-tailed)	.033	.859		

	N	75	75	75	
Capital adequacy	Pearson Correlation	-.356**	.465**	-.059	1
	Sig. (2-tailed)	.002	.000	.614	
	N	75	75	75	75

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

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

Source: Field data (2021)

Table 7. Analysis by Model Goodness of fit

ANOVA ^a					
	Sum of Squares	df	Mean Square	F	Sig.
Regression	8.275	3	2.758	7.973	.000 ^b
Residual	24.563	71	0.346		
Total	32.837	74			

a. Dependent Variable: Non-performing loans

b. Predictors: (Constant), Capital adequacy, Bank lending regulations, Credit Risk management

Source: Field data (2021)

5.7 Regression Analysis

Prior to estimating the model, the research utilised Analysis of Variance (ANOVA) to determine its appropriateness for predicting the DV. ANOVA displays the model's goodness of fit. Table 7 shows the findings of the investigation.

The research was led by the premise that the beta values coefficient of X1, X2, and X3 are all zero, that is, $\beta_1 = \beta_2 = \beta_3 = 0$, as the null hypothesis, and then offered an alternative that at least one of the beta values is not zero, $\beta_i \neq 0$. The value of p-value = 0.000 in the results (F= 7.973, p0.001) is much lower than 0.05, so at the 0.05 significance level ($\alpha = 0.05$), there is sufficient evidence to claim that at least one of the following is useful in estimating NPLs in CBs in Trans-Nzoia county: credit risk management, bank regulations, and capital adequacy. Furthermore, the findings (F= 7.973, p=0.001) support the argument that the model is significant and sufficiently explains the data. Because ($F_{3,71} = 7.973$) is bigger than ($F\text{-critical}_{3,71} = 2.734$), this was the case that F-test is significant. Because the F-test is significant, it implies that R-squared is not and that the model IVs and DV have a statistically significant association.

The regression results as shown in Table 8.

The p-value is less than 0.05, implying a significant link between credit risk management and NPL in CBs in Trans-Nzoia county, according to the findings (T= -2.254; p = 0.027). Credit risk management is a good estimator of NPLs in CBs in Trans-Nzoia county at a 5% significance level (= 0.05). Because T-critical (74) = 1.666, t (74) = -2.254, and p = .027, $Abs(t(74)) > T\text{-critical} (74)$ indicates that credit risk management is an estimator of NPL performance in CBs in Trans-Nzoia county.

The results (T= -2.590; p= 0.012) show that the p-value is less than 0.05, implying that bank regulations have a significant impact on NPLs in commercial banks in Trans-Nzoia county and that there is sufficient evidence that bank regulations are useful estimators of NPLs in CBs in Trans-Nzoia county. Given the 75 replies, the degree of freedom is 75-1 = 74. T-critical (74) = 1.665, whereas t(74) = -2.590, p = .012 in these data. Because $Abs[t(74)] = 2.590$ is larger than T-critical (74) there is evidence that bank rules in Trans-Nzoia county predict the performance of NPLs in CBs.

Table 8. Analysis by Regression Results

	Coefficients ^a				
	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	5.372	0.552		9.735	0.000
Credit Risk management	-0.245	0.109	-0.261	-2.254	0.027
Bank lending regulations	-0.227	0.088	-0.266	-2.590	0.012
Capital adequacy	-0.232	0.107	-0.250	-2.158	0.034

a. Dependent Variable: Non-performing loans; Source: Field data (2021)

According to the findings, the p-value is less than 0.05, implying a significant association between capital adequacy and NPLs in CBs in Trans-Nzoia county (T= -2.158; p = 0.034). As a result, at 0.05, capital adequacy appears to be a useful estimator of NPLs in CBs in Trans-Nzoia county. Furthermore, T-critical (74) = 1.666, but t(74) = 2.158, p = 0.013 implying that $Abs[t(74)] > T\text{-critical}$ (127), implying that bank rules can forecast the performance of NPLs in CBs in Trans-Nzoia county.

The analysis revealed that credit risk management (r = 0.372; p=0.001) has a significant association with management of NPLs in CBs in Trans-Nzoia county at the 5% significance level. Credit risk management (T= -2.254; p = 0.027) displayed substantial negative influence on NPLs among CBs in Trans-Nzoia county, according to the regression results. Credit risk management ($\beta=-0.260$) had a smaller impact on NPLs in CBs than bank regulations ($\beta=-0.266$), but was greater than capital adequacy ($\beta= -0.250$). The study established a moderate significant correlation between capital adequacy (r = 0.356; p=0.002) and NPLs in CBs in Trans-Nzoia county at 5% significance level. According to results, capital adequacy (T= -2.154; p = 0.034), capital adequacy has a significant relationship effect on NPLs in CBs in Trans-Nzoia county. The results show that

capital adequacy ($\beta= -0.250$) has the lowest effect on NPLs in CBs in Trans-Nzoia county

The following is the linear regression equation generated from the data:

Non-performing loans in commercial banks in Trans-Nzoia county (\hat{Y}) = 5.372cons - 0.245 credit risk management (X_1) - 0.227 bank regulations (X_2) - 0.232 capital adequacy (X_3).....
 ... (ii).

So;
 $Y = 5.372 - 0.245X_1 - 0.227 X_2 - 0.232X_3 \dots\dots\dots$ (iii)

In these results it is show that each of; credit risk management, bank regulations, and capital adequacy had negative coefficients, which means that they were all indirectly proportional to non-performing loans in commercial banks in Trans-Nzoia county. This means that an increase in any of IVs; credit risk management, bank regulations, capital adequacy, and reactor strategy leads to decrease in performance of non-performing loans in commercial banks in Trans-Nzoia county and any decrease in any of them will have an opposite effect on non-performing loans in commercial banks in Trans-Nzoia county.

The study model was captured in Table 1.

Table 9. Model Summary

Model Summary ^b			
R	R Square	Adjusted R Square	Std. Error of the Estimate
.502a	0.2520	0.2204	0.58818

a. Predictors: (Constant), Capital adequacy, Bank lending regulations, Credit Risk management

b. Dependent Variable: Non-performing loans

Source: Filed Data (2021)

Eventually, Table 8 indicate that the coefficient of determination was .2520 to imply that 25.20% of variation in NPLs in CBs operating in Trans-Nzoia county is explained by change in; credit risk management, and bank regulations, and capital adequacy. Therefore, all the IVs; credit risk management, and bank regulations, and capital adequacy are determinants of NPLs in CBs operating in Trans-Nzoia county.

6. CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusions

At the 5% significance level, the study finds that credit risk management had a small negative

significant influence on NPLs in CBs in Trans-Nzoia county. According to the findings, senior management in banks developed credit risk policies and procedures that were used for identifying, controlling, monitoring and measuring credit risk in all of the bank's activities, as well as at both the individual credit and NPLs portfolio levels in CBs in Tranz-nzoia county.

The research also concludes that banking systems and analytical techniques have been established, enabling management to evaluate the credit risk associated with all on- and off-balance sheet business. The Banking Institutions also had an independent credit risk evaluation system in place that recognized and regulated the credit risk inherent in each product and

operation, and a risk tolerance plan for the bank. The findings have shown that the banks have a clearly defined authorization system for new and refinanced existing loans based on strong and well-defined criteria for providing loans. The data indicate that banks maintained monthly inspections of their control systems to minimise loan defaults.

The analysis also confirms the statistically substantial little negative effect on NPLs in Trans-Nzoia county CBs at 5% of the significance level of bank rules at the end of the study. The researchers have shown that the percentage of non-performing lending among individual banks has been affected by individual lending policies and that there have been disparities in the competitiveness between commercial banks. The quality of loan repayments was affected by high interest rates while individual bank practises were affected by the lending guidelines of the Central Bank. A relationship existed between interest rates and borrowing rates. Changes in the available income of the borrower affected the bank's ability to repay and profitability, whilst a lack of good customer information affected its ability to repay the bond. The competence of the lending officers impacts the kind and depth of the assessment and the present economic situation influences banking lending policy.

Research suggests that the current adequacy of the CB in the Trans-Nzoia County has a very mild negative impact on NPLs at a 5 per cent level.

This study shows that at the significant level of 5%, credit risk management, bank rules and capital sufficiency are predicting non-existent commercial banks' loans in the county of Trans-Nzoia which account for 25.20% of the non-performing loans in the county of Trans-Nzoia.

6.2 Recommendations

Based on the findings, the researcher recommends the following to commercial banks, central bank and to other researchers;

The study recommends that credit personnel should be trained on a regular basis and the banks must also utilise efficient, effective management of credit risk to ensure that loans fit their repayment capacity, that credit defaults are properly projected and that suitable action is taken to reduce credit defaults. Banks should strengthen the periodic credit risk surveillance for

their credit portfolio to minimise the number of NPLs. This can be achieved through the use of professional debt collectors and expert staff.

It is advisable to implement stringent interest rate rules on Kenya's central banks, regulating trade banks, to limit interest rate spread and rigorous loan advance policies to eliminate moral hazards, as well as insider lending and asymmetrical information.

The study recommends that the retail banks should examine market expectations adequately prior to release new products in order to protect the widening IRS margins. They need to comprehend the market demands sufficiently to aid them in determining good interest rates according to current interest rates. The banks should therefore be wary to design and release risky products in spite of products which appear to be beneficial to potential clients. Sufficient research on the product should be carried out to determine its impact on the IRS and mainly the NPLs.

6.3 Suggestion for Further Studies

In the future it is necessary to undertake a comparison research of the NPLS factors between the surrounding economies to identify whether drivers differ in the region.

This study was not completely thorough and a similar investigation is suggested in other counties which will most probably use the same elements to determine whether the results of this study will be valid in an alternative environment.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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Peer-review history:
 The peer review history for this paper can be accessed here:
<http://www.sdiarticle4.com/review-history/70727>