http://dx.doi.org/10.18623/rvd.v23.6235

INSTITUTIONAL AND MACROECONOMIC INFLUENCERS OF LOAN PERFORMANCE IN SUB-SAHARAN AFRICAN CONTEXT

FATORES INSTITUCIONAIS E MACROECONÔMICOS QUE INFLUENCIAM O DESEMPENHO DOS EMPRÉSTIMOS NO CONTEXTO DA ÁFRICA SUBSAHARIANA

Article received on: 12/23/2025
Article accepted on: 3/25/2026

Innocent Odekina Idachaba*
*Department of Banking and Finance, University of Nigeria, Enugu Campus, Nsukka, Nigeria
innocent.idachaba.pg18608@unn.edu.ng

Ebere Ume Kalu*
*Department of Banking and Finance, University of Nigeria, Enugu Campus, Nsukka, Nigeria
ebere.kalu@unn.edu.ng

Wilfred Isioma Ukpere**
**Department of Industrial Psychology and People Management, School of Management, College of Business and Economics, University of Johannesburg, Auckland Park, Johannesburg, South Africa
wiukpere@uj.ac.za

Francis E. Monyei**
**Department of Industrial Psychology and People Management, School of Management, College of Business and Economics, University of Johannesburg, Auckland Park, Johannesburg, South Africa
monyei_francis@yahoo.com

The authors declare that there is no conflict of interest

Abstract
Non-performing loans (NPLs) continue to pose a significant risk to bank stability in Sub-Saharan Africa (SSA), yet the institutional and macroeconomic factors that influence their dynamics are not well understood. The present research focuses on the degree to which the quality of institutions and the macroeconomic indicators cause the loan performance in the context of a panel ARDL model in the SSA economies between 1996 and 2023. The institutional quality is modelled by a composite index that is built with Principal Component Analysis (PCA) and this guarantees a statistically sound aggregation of six fundamental aspects of governance. The empirical results indicate that the quality of institutions is decisive in enhancing loan performance. The economic size (GDP level) also displays a negative and statistically significant impact on NPLs and it is possible to suggest that larger and more diversified economies have a higher risk-absorption capacity and a more resilient credit system. Inflation on the other hand has a positive and sizable effect on NPLs proving that price instability undermines borrowers' repayment power and increases credit risk. The effects of unemployment and monetary policy rate are theoretically consistent yet statistically

Resumo
Os empréstimos inadimplentes (NPLs) continuam a representar um risco significativo para a estabilidade bancária na África Subsaariana (SSA), mas os fatores institucionais e macroeconômicos que influenciam sua dinâmica ainda não são bem compreendidos. A presente pesquisa se concentra na medida em que a qualidade das instituições e os indicadores macroeconômicos determinam o desempenho dos empréstimos no contexto de um modelo ARDL de painel nas economias da SSA entre 1996 e 2023. A qualidade institucional é modelada por um índice composto construído com a Análise de Componentes Principais (PCA), o que garante uma agregação estatisticamente sólida de seis aspectos fundamentais da governança. Os resultados empíricos indicam que a qualidade das instituições é decisiva para melhorar o desempenho dos empréstimos. O tamanho da economia (nível do PIB) também exibe um impacto negativo e estatisticamente significativo sobre os empréstimos inadimplentes (NPLs), sendo possível sugerir que economias maiores e mais diversificadas possuem maior capacidade de absorção de risco e um sistema de crédito mais resiliente. A inflação, por outro lado, tem um efeito positivo e considerável sobre os NPLs,

insignificant, and this means that their impacts on NPLs may not be the same in different countries and may be transmitted through indirect mechanisms. The coefficient of Error Correction Mechanism (ECM) (-0.892) that is significant at the 5% level proves the presence of fast adjustment towards long-run equilibrium, meaning that there are powerful corrective forces in the institutional and macroeconomic systems. In sum, the paper highlights institutional quality and macroeconomic stability specifically inflation control as the key to mitigating credit fragility and increasing banking sector resilience in SSA.

Keywords: Institutional Quality. Macroeconomic Stability. Non-Performing Loans. Panel ARDL.
JEL classification: C87, E02, G21, G28, N27.

comprovando que a instabilidade de preços prejudica a capacidade de pagamento dos tomadores de empréstimo e aumenta o risco de crédito. Os efeitos do desemprego e da taxa de política monetária são teoricamente consistentes, mas estatisticamente insignificantes, o que significa que seus impactos sobre os NPLs podem não ser os mesmos em diferentes países e podem ser transmitidos por meio de mecanismos indiretos. O coeficiente do Mecanismo de Correção de Erros (MCE) (-0,892), que é significativo ao nível de 5%, comprova a presença de um ajuste rápido em direção ao equilíbrio de longo prazo, o que significa que existem forças corretivas poderosas nos sistemas institucionais e macroeconômicos. Em suma, o artigo destaca a qualidade institucional e a estabilidade macroeconômica — especificamente o controle da inflação — como a chave para mitigar a fragilidade do crédito e aumentar a resiliência do setor bancário na África Subsaariana.

Palavras-chave: *Qualidade Institucional. Estabilidade Macroeconômica. Empréstimos Inadimplentes. ARDL de Painel.*
Classificação JEL: C87, E02, G21, G28, N27.

1 INTRODUCTION

The necessity of comprehensive financial stability is becoming difficult to overestimate as scholars and policymakers around the globe acknowledge the vital role the financial system plays as the medium through which economic activity is carried out (Chyrak, 2020; Smets, 2018; Istrefi, Odendahi & Sestieri, 2023). Moreover, it has been identified by scholars that the need to have sound loan performance in the financial system can never be overemphasized. It is the sensitive fulcrum that links the stability of financial institutions, trust in depositors and investors, and the efficiency by which monetary policy is transmitted, and the stability upon which the economy can continue to operate sustainably. Nonetheless, the worsening levels of loans indicate fundamental weakness with a long-term impact on several regions of the globe, inclusive of sub-Saharan African countries. Increased anxiety about the concentration of non-performing loans (NPLs) is a primary issue that regulators and financial institutions worldwide face

and empirical literature identifies as a leading macroprudential risk and major driver of systemic fragility in the international financial architecture (Kalu *et al*., 2021).

Even research of African contexts, such as Okyere and Mensah (2022), Obadire (2022), and Osunkoya, Ikefan, and Olokoyo (2023), have all canvassed that NPLs are indeed a significant and alarming concern across much of SSA. Also, it serves as a threat to financial stability, causes a credit crunch, reduces capital erosion, increases the cost of credit, and acts as a fiscal risk to the government. Similar views are related to the works by Nwonye, Okanye, Olelewe, Nwekwo, and Onuselogu (2023). Indeed, there are numerous works in the literature devoted to the issue of the factors influencing loan performance. It would also help to cite more works that support this stance (Hamal, Sharma, Budhathoki, Jha & Chimire, 2025). Recent scholarly discussion has highlighted the significance of loans to financial institutions as well as their related effect on economic growth and development. Nouran and Zertaj (2022) point to the necessity of financial institutions expanding their financial intermediation activities since it enables investment, consumption, and economic growth through the provision of much-needed capital to the business and individuals. There is, however, a reduction in the financial intermediation gap with proliferation of poor loan performance in SSA regions despite an effort by financial institutions to decrease them. A contradiction of this kind suggests more institutional and policy-related issues. Besides, Goyal, Singhal, Mishra, and Verma (2023) emphasize institutional and macroeconomic environmental influencers in overturning the rising non-performing loans spill-over. Moreover, in the SSA climes, according to Ozili (2025), quality of regulation was one of the most influential parameters that made an impact on the NPLs after the period of the year 2020. This approach has affirmed the findings by Makri and Papadatos (2014), who established that in crises, NPL was lower in Eurozone countries with reputable and regulated rules. This integrated approach can play an effective role in luring up the unnecessary NPLs and save the strategic objective of the banks of intervening between the units having surplus and deficit in the economy and establishing a durable institution.

Despite the raging debate on the issues that determine loan performance, which has led to many researchers giving great emphasis on the bank-specific factors without taking account of the institution quality variables. Therefore, these loopholes have validated the pursuit of an effective criterion on which non-performing loans can be

drastically reduced to the minimum point. Nevertheless, the above-mentioned hindsight indicates that the six components of institutional quality aspect can be connected with loan performance. The academic literature has highlighted the eminence of institutional quality in the regulation of loan performance mostly as a reputation concern that has been brought forth by the systemic financial crisis and regulatory response which is to bring financial stability. These include, among others, the post-2008 Finance crisis, which led to the establishment of Basel II/III accords and the IFRS 9 accounts aimed at covering the flaws that had been pointed out during the financial crises in 2008 (Engelmann & Pham, 2020), Zombie firms and low interest (Altman, Dai & Wang, 2024), Information Asymmetry and syndicated loan risks (Delis, Losifidi, Kokas, Xefteris & Ongena, 2023)

Also grounded in the scholarly consensus that institutional weaknesses are a key antecedent to distress in the financial sector, this question makes a set of six institutional metrics the analytical object of interest. The political stability, control of corruption, voice and accountability, governance effectiveness, rule of law, and quality of regulations are these measures that form an institutional substrate in which the credit risk is actualised. It is the conceptual priority that is justified by empirical studies, including Hasan and Ashfaq (2021) and Akuoko-Konadu and Mahmud (2024), where the etiology of NPL proliferation is traced back to failures in these particular institutional areas. Focusing on all institutional quality features, the present research fills this gap in the literature regarding the need to examine more closely how it impacts NPLs in SSA countries. Existing literature has been highlighting the role of these attributes as critical aspects of managing NPLs, although empirical data on the actual role of these features in combating NPLs are limited. The paper will also give useful information on the institutional quality influencers' using the limited SSA context-specific cross-sectional data available to enhance better comprehension of the dynamics of evolving relationships amongst these elements and their subsequent impacts on loan performance.

Following the above arguments, a second vital variable that is of interest in this present research is the macroeconomic influencers of loan performance. Researchers have demonstrated how macroeconomic conditions are major determinants of the loan performance, especially in the SSA regions, where economic volatility and failure of institutions enhance such factors. Nevertheless, such an association between the macroeconomic conditions and loan performance has been overtly criticised worldwide

(e.g., Zheng, Bhowmik & Sarker, 2019). However, analyses across the areas in SSA only suggest that there are several practical and statistical loopholes that limit deeper understanding of this critical financial dynamics.

More so, it is firmly documented in the literature that the study of loan performance in sub-Saharan Africa necessitates a treading of institutional weakness and macroeconomic fluctuations against a backdrop of dramatic cross-sectional disparities. As an example, Ndungu (2019) conducted research that showed that the statistical evidence has constantly indicated a high level of variation in impaired loan across SSA, and this is largely associated with poor governance quality. To provide a point of comparison, studies based on the countries of the East African Community, such as Rwanda, Kenya and Uganda, which have better World Bank Worldwide Governance Indicators (WGIs) and more control of corruption, rule of law and regulatory quality, have much lower NPL ratios. Comparing the findings with those of countries such as Nigeria, Mozambique, Zimbabwe, and Tanzania, where IQ was lower but experiencing greater NPLs during comparative times, leads to the conclusion that there was a higher rate of NPLs in those countries than in the US.

Also, larger and more diverse economies (South Africa and Kenya) have proven to be less sensitive to sectorial shocks than smaller, resource-dependent economies (Zambia and Equatorial Guinea). Similarly, Country Reports by the IMF (2023) show that oil price collapses always lead to a more pronounced outbreak of NPLs in countries like Angola and Nigeria compared to those countries with a more diverse economy, like Cote d'Ivoire and Senegal. These imbalances mean that economies that have diversified their output have greater opportunities in loan repayment compared to the economies driven by resources; these are susceptible to increased NPL shocks associated with a fall in commodities prices since there is an implication on the government receipts and respective loan absorption by the private sector actors.

In spite of such disparities, SSA countries possess essential features in common which enable them to form a coherent and legitimate grouping and study them across the spectrum of institutional quality, macroeconomic attributes and loan performance jointly. Such structural institutional commonalities are the weaknesses accompanying most SSA nations; they are low on IQ against the world averages, although varying, and suffer the same challenges of institutional weaknesses. The institutional setting, which is shared,

drastically alters the behaviour of both lenders and borrowers compared to advanced economies and even more emerging markets that are not in Africa. Their collective study enables the analysis of how differences in this shared context of fragility are significant to loan performance.

In addition, the SSA economies experience macroeconomic volatility and vulnerability. This mutual weakness brings with it the common ground of economic uncertainty that increases credit risk by its very existence in comparison to the more stable regions. Considering this defined volatility, the urgent need to study the influencers of loan performance in such an environment becomes one of the key areas of research where the current models of bank risk can be improved. Moreover, SSA banking industries had similar characteristics within the underdeveloped financial systems, which were bank-centred. This monopoly of conventional bank lending on capital markets, relatively high intermediary costs, access to credit and the population residing in rural areas and, in many cases, concentrated ownership play a role in the process of propagation of the macro and institutional influencers of loan performance.

The present research also has a set of contributions to the field of knowledge. To start with, it is among the leading academic research that examines the significant role of the institutional quality (encompassing all the six composite variables) over the loan performance. Secondly, the study employed the principal component analysis (PCA) instrument as a measuring instrument of the institutional qualities (IQ) indices given that it aggregates a set of several indicators of characteristics by eliminating the errors of individual indicators and concentrating on the variance effects across the set of indicators. This approach was also adopted by the study by Mbulawa and Chingoiro (2024). This is to ensure that a single measure that adequately captures the variability of all of these correlated components of institutional quality is adequately measured with the PCA. Thirdly, to advance the discussion on the nexus of institutional quality, macroeconomic influencers of loan performance, the current research combines a robust database into the SSA geographic clime encompassing massive research on various countries. Fourth, we are taking on a rigorous econometric methodology to perform a robustness examination of the study data. Lastly, the study, though it is confined to the context of SSA scope, is executed in a region where NPLs are extremely evident and have aggravated the position of financial institutions progress. Such knowledge thus becomes critical in making policy

on the SSA economies on how the institutional quality and macroeconomic influencers are related to loan performance.

To address this gap in scholarship, the present study poses the following critical questions.

1. To what extent does institutional quality influences loan performance in SSA countries?
2. To what degree does size of the economy affects loan performance in SSA countries?
3. By what magnitude does inflation affect loan performance in SSA countries?
4. To what extent does unemployment rate influences loan performance in SSA countries?
5. How significantly does monetary policy rate drives loan performance in SSA countries?

The article proceeds in the following way: Section 2 is a synthesis of the theoretical and empirical literature. Section 3 gives the model specification, data and empirical estimation procedure. Section 4 presents the core findings and provides a critical discussion. The final part states specific policy interventions based on the empirical findings and points out the overall implications of the research to policy formulation.

2 LITERATURE REVIEW AND HYPOTHESES FORMULATION

To do the literature review, we split it into two strands; the first strand is the theoretical basis supporting the study while the second strand is the extant empirical literature on the association between institutional quality, macroeconomic factors and loan performance.

2.1 Theoretical underpinnings

Several studies have explored the institutional quality and macroeconomic influencers of loan performance through different theories. Our theoretical perspective is that of North (1989) who posited that the performance of an economy, including its

financial sector stability, is a product of its institutional architecture, which in turn will adjust to environmental pressure. The institutional theory, especially its basic ideas and assumptions, offers valuable directions in the analysis of relationships between an organisation and the environment. According to this theory, business organisations are affected by larger social institutions like private and public regulation, non-governmental and other non-state organisations to keep a check on the actions of the corporate (Campbell, 2012).

The second theory that supports the study is the systemic risk theory, which was initiated by the contributions of Ludwig Von Bertalanffy in 1970. The systemic risk theory assumes that society operates like a human body wherein a malfunction of one organ/institution can potentially harm the whole human system. Therefore, the premise is that a rise in a dislocation in the political, economic, social, or ecological (environmental) institution can negatively impact the whole of the functioning mechanisms of the society, including the financial system and the banking industry. The emergence of the systems theory compelled the social scientist to begin viewing organisations as open systems that were in interaction with the environment. The environment may affect an open system dramatically. Thus, a variation in business environmental forces is likely to induce a variation in the open systems, hence the banking system.

2.2 Empirical review

This section is the empirical discussion of previous studies that sought to employ factors affecting loans performance in industrialized and other emerging economies. Li (2025) has conducted empirical research using a panel dataset of 10 Sub-Saharan African economies during the 2012-2023 years by estimating the effect of corruption on bank credit risk. The identification method was based on comparative use of Pooled OLS, Fixed Effects, and Random Effects models. It is empirically proved that corruption control has a great effect of reducing credit risks in banks. The research thus ended that their results will be advantageous to the policymakers, ranging to the level of minimizing banking risks.

A recent experimental evaluation was carried out by Rehman, Mehmood and Al-Gharaibeh (2025) who assessed the relationship between country governance and non-

performing loans in South Asian countries during 2000-2019. The study conducted was done in Pakistan, India and Bangladesh. The study utilised the descriptive and multiple regression methods and took into account such concepts as political stability, rule of law, government effectiveness, regulatory quality, and voice and accountability. Based on the findings, the relationship is negative and significant, implying that the NPLs would be lower with the improved governance of the country. Nevertheless, to provide reliability of the results, it is re-estimated using a regression model per country. In the single-country analysis, the findings indicate that the NPLs would be minimised through better management of the country. The results of this study are beneficial on the part of the policymakers in making strategic decisions about NPLs and can be said to be correlated with country governance indicators.

Akuoko-Konadu and Mahmud (2024) add to this nuance providing their empirical research studying the connection between corruption, economic growth, and non-performing loans in 31 economies in Sub-Saharan Africa. Using an Arellano-Bond GMM dynamic panel estimator, they analyzed 493 banks in 2011 to 2019 and found that the corruption and NPLs were significantly and positively correlated whereas economic growth had a significant negative correlation. The results have shown that corruption did not have much effect on the NPLs of the Central and Southern Africa banks, and the opposite scenario is applicable to West and Eastern Africa. The study confirms that the presence of the NPLs is a source of deadweight loss to the society.

Contemporary studies by Chibawe and Haabazoka (2025) established that in the Zambian commercial banks, there is a possibility of a positive relationship between GDP growth and high NPL dynamics. Their research was on influencers of bank loans in the commercial banks of Zambia. Analysis of data was a descriptive method and a regression analysis from 2004-2023. This finding is aligned with Ristevska (2020). Nonetheless, a positive correlation with non-performing loans was reported on the Zambian commercial banks. The discrepancies and inequalities of the available literature in the solving of the problem of the GDP growth and non-performing loans in scholarly work and the cause-effect relationship have motivated the current study to seek answers to them in terms of the SSA context. This research will attempt to do this through the implementation of a number of econometric models and the ability to use more detailed financial information about loan performance.

In examining the factors that determine non-performing loans in the Chinese setting, it is evident that Lin (2024) developed five macroeconomic indicators that included the GDP growth indicator, the broad money supply indicator, the loan prime rate indicator, the real estate paid-in investment indicator, and the total export value from 2010 to 2022. By examining the classical econometric model and the multiple regression models, it was realised that there was a negative and significant relationship between the GDP and the non-performing loans. The study finds that with a good economy, a low proportion of non-performing loans, and stable activity of enterprises and banks, the economy will be improved further and create a virtuous cycle.

Also, Goyal, Singhal, Mishra, and Verma (2023) investigated how macroeconomics and the institutional environment affect NPL within developing and high-income countries during 2010-2020 in 89 of these and 60 high-income countries. The panel system GMM regression result means that coefficients of GDP in all panels, actual economic activity, and NPLs have a negative relationship. The study opines that default on loans often occurs at a reduced rate in case of a fast growth of the economy, and this leads to a reduced amount of non-performing loans. When a systemic risk is duly regulated, the bigger the banking sector in proportion to the smaller one, the more stable it will be. The impact of the institutional environment on enhancing the credit quality of banks is also revealed in the study. NPLs are greatly reduced in the developing and developed economies when the institutional environment is enhanced.

Another quantitative study worth highlighting is the study by Nwonye, Okanya, Olelewe, Nwekwo, and Onuselogu (2023) on the influence of the impact of governance and macroeconomic indicators on Africa's non-performing loans. The data used in the research was between the years 2010 and 2021 in 30 countries in the SSA countries. GMM estimation method indicates that the rate of increase of the GDP per capita is always linked to a decline in the ratio of this NPL. Conversely, the expansion of domestic credit is highly associated with a rise in NPLs. Further, the study indicates that the economic index, institutional quality index, political index, and aggregate governance indicator exert an inverse and statistically significant effect on the NPL ratio, which implies that these governance institutional areas reduce the level of NPL. The study also looks at the joint effect of GDP per capita growth rate and the four dimensions of governance institutions and indicates that there is significant interaction between the

terms (between them). It means that the influence of the macroeconomic indicators on the NPL ratio depends on the quality of governmental institutions.

Recent insights were further provided by Pokhrel, Dhungana, Poudel, and Sharma (2025) who explored the determinants of non-performing loans among the ten Nepalese commercial banks. The study was between 2014 and 2023. They conducted descriptive and causal comparison analysis research. Return on assets, capital adequacy ratio, credit-deposit ratio, bank size, gross domestic product, and inflation are the variables of interest in the study. Among other things, these outcomes indicate that the return on assets, capital adequacy, and bank size has a substantial impact on the NPLs, and the credit-deposit ratio indicates a weak but positive significant correlation. The GDP shows a negative, though insignificant, correlation with the NPLs, but the same is on the negative side and significant with inflation. This part of the investigation shows the relationships between the bank-specific statistics and the situation in the economy.

Also, reviewing African perspective study, Kalu *et al*. (2021) applied Panel ARDL and Panel NARDL to analyze the macroeconomic (inflation rate and GDP growth) and bank-specific (return on assets and return on equity) variables of the Non-Performing Loan (NPL) in the six (6) West African Monetary Zone (WAMZ) between the years 2003 and 2018. Based on the research findings, it turns out that the NPLs are concurrently predetermined by two types of factors, namely bank-specific factors and macroeconomic factors, though the strength of these factors varies. There is even empirical evidence that NPL will react more non-linearly/asymmetrically to the dynamics of the bank-specific and macroeconomic determinants than in a linear manner. The study concluded that the policy direction should be rebalanced on how loan and credit administration is undertaken, not only in a linear direction but also in a combination of linear and nonlinear directions, more so in the WAMZ. Although the study of Kalu *et al*. (2021) offers an effective yet narrow scope of African context in their research studies, which only consider this region, they have not overgeneralised the findings to the SSA.

Indeed, the newly emerging work had been captured by Pamungkas, Septiano, Trinugroho, Ab-Rahim, and Sergi (2025) who reviewed the connection between monetary policies through bank lending based on the lending decomposition model between 2010 and 2023. In addition, the research only uses data from one country, which comprises 33 provinces in the Indonesian context. The study used the GMM model in its

estimation. The monetary policy interest rate, deposit/GDP, number of bank branches, and GDP growth are the explanatory variables that are adopted. This finding creates an indirect and substantial connection between the interest rate of monetary policy and bank loaning. The study points out a very substantial presence of regional differences in Indonesia in the context of policy effectiveness of monetary policy.

The factors affecting non-performing loans on Nepalese commercial banks was tested using the fixed and random effect model by Hamal, Sharma, Budhathoki, Jha, and Chimire (2025) after the study involving a total of 280 quarterly observations of twenty Nepalese commercial bank regions and conducted in the regions of Nepal between the periods of Q1 2021 and Q2 2024. The study utilised income ratio as an independent variable, credit-deposit or CDR, liquidity, interest rate charged on loans, prescribed lending ratio in the sectors, inflation rate, and growth rate of the GDP. The outcomes show that the impact on the NPL is indirect and significant as a consequence of capital adequacy and the credit-to-deposit ratio and direct and substantial due to liquidity and the sector lending provided. NPL is not much affected by the lending rate of interest. Likewise, the GDP growth rate and inflation rate also have a greater positive impact on the NPL of the Nepalese commercial banks in the observation study provided. The researcher inferred that both internal factors, such as capital adequacy ratio and credit-to-deposit ratio, and external factors, such as GDP growth, have significant roles in non-performing loan ratios in the Nepalese commercial banks. It has also been indicated in the study that there is a need to have a good capital management process and increased credit monitoring, together with macroeconomic stabilisation policies, in a bid to curb default risks and also increase the asset quality within the sector.

There is therefore inconclusive evidence from prior studies in this loan performance and its influencers' nexus. The research hypotheses based on the above have been postulated as given below.

H_{o1}: Institutional Quality does not significantly affect loan performance in Sub-Saharan African countries.

H_{o2}: Size of the economy does not significantly affect loan performance in Sub-Saharan African countries.

H_{o3}: Inflation does not significantly affect loan performance in Sub-Saharan African countries.

H_{o4}: Unemployment rate does not significantly affect loan performance in Sub-Saharan African countries.

H_{o5}: Monetary policy rate does not significantly affect loan performance in Sub-Saharan African countries.

3 ECONOMETRIC METHODOLOGY AND MODEL ESTIMATION

The study aims to investigate institutional quality and macroeconomic influencers of loan performance in the 48 SSA economies for the period 1996-2023. The study's scope is chosen because during this time span, major changes have been witnessed in the financial sector that may significantly influence loan performance in SSA countries. Additionally, the selection of the variables is made based on the empirical studies and data availability. The loan performance is taken as response variable while institutional quality, size of the economy, inflation, unemployment rate and monetary policy rate represents the explanatory variables. Also, this study has suggested incorporation of control variables (Banking sector stability and Global financialization) to increase robustness, accuracy and reliability of the results by adjusting confounding effects. Moreover, in the absence of control variables, the study will unduly assume that high NPLs were caused by poor institutional quality environment or macro-economic factors to draw skewed conclusions. The data were obtained from World Bank Development Indicators (WDI) sourced from https://data.worldbank.org/indicator/. Panel Autoregressive Distributed Lag (PARDL) model forms the main estimation technique for this study. The choice of this technique is justified in view of the fact that it can handle mixed stationarity, short- and long-run association, accommodate heterogeneity, and maintain robustness against endogeneity (Menegaki, 2019; Kripfganz & Schneider, 2023).

The six dimensions of institutional quality, which are government effectiveness, control of corruption, political stability, regulatory quality, rule of law, and voice and accountability were summed up into one Institutional Quality Index (IQI) with the help of Principal Component Analysis (PCA). This will help in capturing the mutual variance between these indicators giving it a strong measure of the latent institutional construct. This methodology was also used in previous studies, such as Ozili (2024) and Mbulawa

and Chingoiro (2024). The PCA is employed as an appropriate description of the variability in all of these correlated elements of institutional quality. This is represented in equation (i) below

$$IQI_{it} = \vartheta_0 + \vartheta_1 IQI^{COC}{}_{it} + \vartheta_2 IQI^{VAA}{}_{it} + \ +\vartheta_3 IQI^{GOE}{}_{it} + \vartheta_4 IQI^{PSA}{}_{it} + \vartheta_5 IQI^{REQ}{}_{it} + \vartheta_6 IQI^{ROL}{}_{it} + \varepsilon_{it} \quad (1)$$

Where

IQI is the composite IQI index, while IQI with superscript COC, VAA, GOE, PSA, REQ and ROL represent control of corruption, voice and accountability, government effectiveness, political stability and absence of violence, regulatory quality and rule of law. respectively. ϑ_1 and ϑ_6 are the relative weight of each dimension and ε_{it} is the error term.

Therefore, the aggregated model for this study is as presented below in equation (ii):

$$NPLR_{it} = \delta_o + \sum_{t=1}^{k} \delta_1 NPLR_{it-1} + \sum_{t=1}^{k} \delta_2 IQI_{it-1} + \sum_{t=1}^{k} \delta_3 SOTE_{it-1} + \sum_{t=1}^{k} \delta_4 \mathrm{INF} + \sum_{t=1}^{k} \delta_5 UNEMP_{it-1} + \sum_{t=1}^{k} \delta_6 MPOR_{it-1} + \sum_{t=1}^{k} \delta_7 BSS_{it-1} + \sum_{t=1}^{k} \delta_8 GLF_{it-1} + \varphi_1 NPLR_{it-1} + \varphi_2 IQI_{it-1} + \varphi_3 SOTE_{it-1} + \varphi_4 INF_{it-1} + \varphi_5 UNEMP_{it-1} + \varphi_6 MPOR_{it-1} + \varphi_7 BSS_{it-1} + \varphi_8 GLS_{it-1} + \mu_{it} \quad (2)$$

δ_o	=	the intercept
$\delta_1 - \delta_8$	=	coefficients of short-run parameters
$\varphi_1 - \varphi_8$	=	coefficients of the long-run parameters
μ_{it}	=	the residual or error term.

Table 1

Operational description of the variables

Variable name	Symbol	Measure	Data sources
Loan performance	NPLR	NPL/Total Loans	WDI database
Institutional Quality	IQI	Institutional Quality	WDI database
Size of the economy	SOTE	Annual growth of GDP	WDI database
Inflation	INF	Consumer Price Index	WDI database
Unemployment rate	UNEMP	Annual Unemployment rate	WDI database
Monetary policy rate	MPOR	Central Bank annual monetary policy rate in the observed countries	WDI database
Banking sector stability	BSS	Z-score for measuring the stability of the entire banking sector	WDI database
Global financialization	GLS	Foreign Exchange Market Activity	WDI database

Source: Authors' compilation from Available literature, 2025

4 EMPIRICAL ANALYSIS

4.1 Principal component analysis (PCA)

The Institutional Quality Index (IQI) was obtained using the Principal Component Analysis (PCA) by standardizing all the indicators of governance by country and across different time periods to make the indices cross-sectional and cross-temporally comparable. The PCA process separates the prevalent common variance pattern within the institutional data, and as such, comes up with a meaningful parsimonious compound index that reflects the latent institutional construct more effectively than any of the individual indicators.

The PCA, as applied in Table 1, makes a significant dimensionality reduction without significant loss in the informational content of the six governance indicators beneath the data. The first principal component (PC1) has the eigenvalue of 4.38, and it captures about 73 per cent of the total variance which is far much higher than the traditional Kaiser factor of unity which suggests that PC1 is the major systematic

constituent common across all institutional measures. The large scale of explained variance indicates co-movement of institutional attributes in the Sub-Saharan African countries to a high extent indicating the high level of underlying coherence of governance structures during the 1996-2023 period.

Moreover, there is a positive and significant loading of all indicators on PC1, with the loading being between 0.81 and 0.92. These consistently high and positive loadings are further indication that PC1 is more indicative of a general latent dimension of overall institutional quality, than it is of any of the specific differences particular to any of the governance domains. In empirical terms, the higher the PC1 score, the more favourable institutional environment which is better government performance, rule of law, quality of regulation, stronger control over corruption, enhanced political stability, and better voice and accountability. Therefore, the IQI that was built on PC1 offers a conceptually consistent and empirically sound measure of institutional quality that can be dependably incorporated into the further econometric estimation to investigate its effect on the loan performance and other macro-financial performance in SSA.

Table 1

PCA analysis

Component	Eigenvalue	% Variance	Cumulative %
PC1	4.38	73.0%	73.0%
PC2	0.72	12.0%	85.0%
PC3	0.36	6.0%	91.0%
PC4	0.30	5.0%	96.0%
PC5	0.18	3.0%	99.0%
PC6	0.06	1.0%	100.0%

Source: Authors.

Additionally, to achieve robust analysis, two key diagnostics are required. To dismiss the possibility of heterogeneity, first, slope homogeneity needs to be established to determine whether institutional quality and macroeconomic variables influence the performance of loans in SSA countries in a similar manner; failure to do so will lead to biased estimation and policy misinterpretation. Second, the cross-sectional dependence should be tested under Breusch-Pagan LM test and P-CD test of Pesaran since there is a

possibility of shared shocks and regional spillovers in SSA. By handling these issues, it is ensured that the right second-generation panel estimators are selected and the empirical results are strengthened.

Table 2

CD status of the panel of SSA countries

Variables	**P-CD test**		**BP LM test**	
	Statistic	**p-value**	**Statistic**	**p-value**
Institutional Quality	31.60	0.000	160.32	0.000
Size of the economy	41.11	0.000	116.97	0.000
Inflation	24.37	0.000	152.40	0.000
Unemployment rate	51.42	0.000	123.72	0.000
Monetary policy rate	47.82	0.000	156.07	0.000

Source: Authors.

Table 3

Slope homogeneity test

Homogeneity test (delta)	15.48(0.000)
Homogeneity test (adjusted delta)	15.21(0.000)

Source: Authors.

In order to offer a clear empirical basis, the most important diagnostic findings are presented in the Tables 2 and 3. These tests provide a definite guide to the further modelling plan. In the evidence, there is a strong existence of cross-sectional dependence, which supports the fact that shocks and institutional dynamics are interdependent in the SSA countries. This discovery supports the necessity to use estimation methods that explicitly support such interdependence.

Further, the results of the CD tests suggest that traditional first-generation panel unit root tests cannot be applied in our dataset as such. We therefore use the Cross-Sectionally Augmented Dickey-Fuller (CADF) and Cross-Sectionally Augmented IPS (CIPS) methods that are specially developed to deal with the presence of cross-sectional dependence. Such a change of methodology guarantees a higher level of reliability and accuracy in evaluating stationarity and, consequently, the high validity of all the empirical findings.

Table 4

Stationarity tests using the CADF and CIPS

Variables	CADF (level)	CADF (first difference)	CIPS (level)	CADF (first difference)
Institutional Quality	-2.32 (0.07)	-4.68 (0.00)***	-0.78 (1.00)	-2.50 (0.00)***
Size of the economy	-6.75 (0.42)	-18.92 (0.00)***	-4.19 (0.31)	-6.17 (0.00)***
Inflation	-3.14 (0.14)	-4.32 (0.00)***	-2.47 (0.11)	-4.76 (0.00)***
Unemployment rate	-1.17 (0.08)	-8.41 (0.00)***	-5.40 (0.09)	-9.40 (0.00)***
Monetary policy rate	-0.96 (0.21)	-5.13 (0.000)***	-2.41 (0.07)	-4.19 (0.05)**

Note: ***p ≤0.01, **p ≤0.05.
Source: Authors.

The results of the CADF and CIPS indicated in Table 4 are clear evidence to the claim that all the variables are mixed, as they are stationary at either I(0) or I(1). It is based on this that the next major step is to identify whether there exists a stable long-run relationship between the variables. In this respect, the cointegration tests panel co-integration test of Kao (1999) and Pedroni (2004) is adopted as it is quite strong when there is cross-sectional dependence. The null hypothesis is rejected in these tests and this proves the presence of cointegrated relationship. The results, which are summarised in Table 5, give a good statistical support of co-integrating the variables over the long-term, therefore, supporting the use of the long-run estimation methods in the subsequent empirical analysis.

Table 5

Cointegration Results

Variables	Statistics
Pedroni Test	
Modified Phillips-Perron t	-0.139
Phillips-Perron t	-9.752*
Augmented Dickey-Fuller t	-9.193*
Kao Test	
Modified Dickey-Fuller t	-3.019*
Dickey-Fuller t	-3.016*
Augmented Dickey-Fuller t	-1.102
Unadjusted modified Dickey-Fuller t	-3.873*
Unadjusted Dickey-Fuller t	-3.382*

*Note: * represent P-value at 5% level.*

Source: Authors.

The results of the cointegration tests based on the Kao and Pedroni tests consistently show evidence of a stable long run relationship between institutional quality, macroeconomic factors, and loan performance in the SSA countries tested. The test statistics in both cases are followed by statistically significant p-values which prompt the null hypothesis of no cointegration to be rejected. This establishes the fact of long-term equilibrium effects among the variables, as well as justify the application of long-run estimation methods in the further analysis.

Table 6

Panel Estimation Results

	MEAN GROUP (MG)			HAUSSMANN TEST OF PMG AND MG	POOLED MEAN GROUP (PMG)			HAUSSMANN TEST OF PMG AND DFE	DYNAMIC FIXED EFFECT (DFE)		
	Coefficient	t-stat	Prob.		Coefficient	t-stat	Prob.		Coefficient	t-stat	Prob.
IQI	-0.52	0.14	0.150		-0.45	1.67	0.01**		-0.40	0.07	0.140
SOTE	-0.28	0.11	0.04**		-0.30	2.15	0.03**		-0.35	1.08	0.09**
INF	0.18	0.06	0.07	2.459	0.12	1.86	0.04**	2.028	0.10	0.11	0.10
UNEMP	0.08	0.04	0.210	(0.0618)	0.05	0.19	0.281	(0.0812)	0.04	1.02	0.07
MPOR	0.09	0.05	0.07		0.07	0.09	0.102		0.06	1.18	0.000
$ECM_{(t-1)}$	-0.713	22.189	0.001		-0.892	24.856	0.005		3.672	26.556	0.02

Note: ** represent P-value at 5% level.

Source: Authors.

Hausman Test is a statistical test that is applied to compare models such as Pooled Mean Group (PMG), Mean Group (MG) and Dynamic Fixed Effects (DFE). It assists to determine the most effective and consistent estimator. The test is used to compare the coefficient of the two models and to verify systemic differences. When the p-value exceeds 5 percent, it does not reject the null hypothesis and use PMG estimator. When the p-value is below 5 percent, the alternative hypothesis is adopted and MG or DFE estimator would be used (Hausman, 1978). Hausman result presented in Table 6 above showed that both p-values (0.0618 MG/PMG and 0.0812 PMG/DFE) are above 5% and therefore the null hypothesis cannot be rejected. This implies that PMG estimator is most effective and consistent to estimate the relationships between institutional quality, macroeconomic factors and loan performance.

The evidence of association between institutional quality and loan performance was observed as shown in Table 6. Precisely, the result of the outcome was quite negative. Accordingly, its discovery supports the theoretical perspective that robust institutions lead to less information asymmetry provided as a way of low information cost, better contract enforcement, better regulatory control and monitoring hence efficiency in the credit market. It confirms institutional and governance theories associating superior governance with less credit risk and more stable financial intermediation. In practice, the finding implies that making governance less corrupt, more rule of law, better regulation and better government reduce loan defaults directly. This does not coincide with the current theoretical and empirical findings that were found by Rehman *et al*. (2025) who found positive relationship that exist between institutional quality and loan performance.

It is worth noting that the estimated coefficient of Size of the economy is negative yet significant which implies that SSA countries with larger economies in terms of higher GDP would have better loan performance (lower non-performing loans). This is in line with more diversified credit markets and enhanced risk absorption. This observation is in line with macro-financial theory that economic growth improves the capacity of borrowers to service their debts and improve the quality of assets held by the banks. Bigger economies tend to be more diversified and resilient as well making systemic credit risk smaller. In practice, it implies that loan performance across SSA will improve when there are policies that will foster sustained economic growth, diversification, and productivity. Economies with improved growth have reduced possibilities of defaults, increased credit portfolios and are more stable to allow banks to expand lending to households and firms with greater safety. This conclusion was made in the sequence of the evidence stated by Goyal *et al*. (2023) and Lin (2024).

The coefficient of Inflation was estimated to be positive and statistically significant. The finding was that an increased inflation is always linked to poor performance of a loan. The positive correlation between inflation and NPL provides support to the theory of macroeconomic and credit-risk which states that high inflation reduces the real income, distorts the price signals, weakens the capacity to repay and raises the default risk. It proves that the financial fragility is a direct effect of macro-instability. Our empirical data confirms certain practically-obtained forecasts concerning the connection between inflation and the quality of loans. the result suggests that price

stability is key to protecting the quality of loans. Rebates of inflation in SSA increase the repayment burden of borrowers, banks suffer credit losses, and financial stability is undermined. Tougher monetary regiments and inflation-targeting mechanisms would thus decrease NPLs and make banking systems healthy. Our results cannot support the evidence given by Hamal *et al*. (2025) who reported an inverse relationship. Nonetheless, the empirical response is concordant with the results of Kalu *et al*. (2021) who determined a positive association.

In addition, the panel estimates show that Unemployment rate is not a notable functionality of the loan performance in the context of the SSA under study. Therefore, it clarifies that the rise in unemployment leads to an elevation of borrower stress and an increment in NPLs. Even though the difference is not statistically significant, the likelihood of the positive value is consistent with credit-risk theory postulates that the weakness of the labour-market lowers the household income and raises the difficulty of repayment. The insignificance indicates that unemployment in SSA might not be taken as the main macro channel affecting NPLs in comparison with inflation or institutional intervention.

Further, monetary policy rate had a positive but a negligible relationship with loan performance. In this way, it can be explained that a tight monetary policy is related to increased NPLs. The insignificance is to imply that in SSA, this channel functions moderately or is overwhelmed by the macro-institutional factors. This does not agree with the research of Pamungkas *et al*. (2025) who reported indirect relationship between non-performing loans and monetary policy rate.

The error-correction term (ECM = -0.892, $p < 0.05$) is of the right sign and is highly significant, implying a strong and quick rate of change towards the long-run balance. The coefficient of the adjustment (0.892) suggests that the proportion of the short-run variations in the number of non-performing loan that is removed in one period is almost 89, which validates a strong tendency of the system to revert to its long-run stable state. This indicates that institutional quality and macroeconomic conditions in SSA are sensitive and highly responsive to shocks in the performance of loans and hence the existence of a robust long-run equilibrium relationship. The size of the ECM also indicates that the institutional-macroeconomic framework that dictates NPL dynamics can be described as extremely persistent and self-correcting, which provides great

empirical evidence of the applicability of the panel ARDL model to reflect these adjustment mechanisms.

5 CONCLUSION

The paper investigated institutional quality and macroeconomic influencers of loan performance in 48 Sub-Saharan African countries between 1996 and 2023 with a PCA-constructed institutional quality index, and a panel ARDL (PMG, MG, DFE) model. It was found that PMG estimator which was validated by Hausman test showed strong long-run equilibrium relationship with institutional structure, the macroeconomic fundamentals and the non-performing loans. A number of substantive conclusions can be drawn based on the empirical evidence produced in this study.

The findings indicate that a high institutional quality and the size of the economy play a major role in enhancing the performance of loans, and inflation continues to worsen the quality of the assets. The monetary policy rate and unemployment have weaker effects or indirect effects. The high and considerable error-correction coefficient further validates the quick adaptation to the long-term stability, and the structural consistency of the institutional-macroeconomic environment. On the whole, the results emphasize the importance of institutional governance and macroeconomic stability in enhancing financial stability and credit risk minimization in SSA.

The policy implication of this study is that the quality of institutions is a key tool of minimizing non-performing loans. Institutional strengthening should be central to the financial sector reforms by the SSA policymakers instead of focusing on macroeconomic interventions only.

The results of this research provide essential knowledge regarding the complex processes of the interaction between financial-system stability and the ongoing dilemma of increasing non-performing loans (NPLs). The study highlights the pressing necessity to limit NPLs by highlighting the role that institutional quality and macroeconomic fundamentals have on the performance of loans, as they potentially undermine the resilience of the banking sector, limit the supply of credit, inhibit investment, and suppress the overall development of the economy. Despite the contextual backdrop of the developing African economies, the analytical framework and the empirical findings have

wider generalizability and can be reproduced in other regional or other economic blocs to enhance the insight into the structural and policy determinants of NPL accumulation.

REFERENCES

Akuoko-Konadu, E., & Muhmud, A. (2024). Corruption, Economic growth and Non-performing Loans in Sub-Saharan Africa: An Empirical Analysis (2011-2019). *Journal of Quantitative Economics, 23, 233-251.* https://doi.org/10.1007/s40953-024-00420-y

Altman, E. I., Dai, R., & Wang, W. (2024). Global zombie companies: measurements, determinants, and outcomes. *Journal of International Business Studies*, *55*(6), 723-744. https://doi.org/10.1057/s41267-024-00689-4

Campbell, T. (2012). Corporate social responsibility: Beyond the business and human rights (pp. 47-73). Edward Elgar Publishing. https://doi.org/10.4337/9781781005774.00008

Chibawe, L., & Haabazoka, L. (2025). A study of the Factors influencing Bank Loan Performance in Zambian Commercial Banks. *African Journal of Commercial Studies, 6(2), 167-177.* https://dspace.unza.zm/handle/123456789/9185

Chyrak, I. (2020). Financial stability, financial instability and financial sustainability of the economy. *World of Finance, 2(63), 115-125.* https://doi.org/10.35774/sf2020.02.115

Delis, M. D., Losifidi, M., Kokas, S., Xefteris, D., & Ongena, S. (2020). Enforcement actions on banks and the structure of loan syndicates. *Journal of Corporate Finance, 60, 101527.* https://doi.org/10.1016/j.jcorpfin.2019.101527

Engelmann, B., & Pham, H. (2020). Measuring the performance of bank loans under basel ii/iii and ifrs 9/cecl. *Risks*, *8*(3), 93. https://doi.org/10.3390/risks8030093

Goyal, S., Singhal, N., Mishra, N., & Verma, S. K. (2023). The impact of macroeconomic and institutional environment on NPL of developing and developed countries. *Future Business Journal, 9(1), 45.* https://doi.org/10.1186/s43093-023-00216-1

Hamal, J. B., Sharma, D. R., Budhathoki, P. B., Jha, N., & Chimire, S. R. (2025). Non-performing Loan in Nepalese Commercial Banks: The Role of Internal and External Factors. *Nepal Journal of Multidisciplinary Research, 8(3), 13-32.* https://doi.org/10.3126/njmr.v8i1.76481

Hasan, R., & Ashfaq, M. (2021). Corruption and its diverse effect on credit risk. Global evidence. *Future Business Journal, 7(1), 18.* https://doi.org/10.1186/s43093-021-00060-1

Hausman, J. A. (1978). Specification tests in econometrics. *Econometrica: Journal of the econometric society*, 1251-1271. https://doi.org/10.2307/1913827

Istrefi, K., Odendahi, F., & Sestieri, G. (2023). Fed communication on financial stability concerns and monetary policy decisions: Revelations from speeches. *Journal of Banking & Finance, 151, 106820.* https://doi.org/10.1016/j.jbankfin.2023.106820

Kalu, E. U., Arize, A. C., Malindretos, J., Awa, K. I., & Eze, C. G. (2021). Linear and asymmetric analysis of macro-economic and bank-specific determinants of non-performing loans in West African Monetary Zone (WAMZ). *World Review of Entrepreneurship, Management and Sustainable Development, 17(5), 670-691.* https://doi.org/10.1504/WREMSD.2021.117447

Kao, C. (1999). Spurious regression and residual-based tests for cointegration in panel data. *Journal of econometrics*, *90*(1), 1-44. https://doi.org/10.1016/S0304-4076(98)00023-2

Kripfganz, S., & Schneider, D. C. (2023). ARDL: Estimating autoregressive distributed lag and equilibrium correction models. *The Stata Journal, 23(4), 983-1019.* https://doi.org/10.1177/1536867X231212434

Li, Y. (2025). The Impact of Corruption on Bank Credit Risk in selected Sub-Saharan African. *International Journal of Law and Politics Studies, 7(1), 01-07.* https://doi.org/10.32996/ijlps.2025.7.1.1

Lin, Y. (2024). Determinants of Non-Performing Loans: Evidence from China. Temple University.

Makri, V., & Papadatos, K. (2014). How accounting information and macroeconomic environment determine credit risk? Evidence from Greece. *International Journal of Economic Sciences and Applied Research, 7(1).*

Mbulawa, S., & Chingoiro, S. (2024). Financial development, institutional quality and economic growth in countries in sub-Saharan Africa (SSA). *International Journal of Business Ecosystem & Strategy (2687-2293)*, *6*(1), 51-62. https://doi.org/10.36096/ijbes.v6i1.461

Menegaki, A. N. (2019). The ARDL method in the energy-growth nexus field; best implementation strategies. *Economies, 7(4), 105.* https://doi.org/10.3390/economies7040105

Ndungu, A. M. (2019). Determinants of non-performing loans in commercial banks in Kenya. *International Journal of Economics, Commerce and Management, 1(2), 21-35.*

North, D. C. (1989). Institutions and economic growth: An historical introduction. *World development, 17(9), 1319-1332.* https://doi.org/10.1016/0305-750X(89)90075-2

Nouran, A., & Zertaj, F. (2022). Impact of Bank Lending on Economic growth- An Empirical Study in the Indian Context. *Review of Economics and Finance, 20, 172-179.*

Nwonye, N. G., Okanya, O. C., Olelewe, C., Nwekwo, N. M., & Onuselogu, O. (2023). Impact of Macroeconomic Indicators on Non-Performing Loans in Africa: The role of Governance. *Journal of Xi'an Shiyou University Natural Sciences Edition, 66(04), 50-59.* https://doi.org/10.17605/OSF.IO/SDUJH

Obadire, A. M. (2022). Banking Regulation Effects on African Banks' Stability. *Journal of Financial Risk Management, 11(4), 707-726.*

Okyere, E., & Mensah, A. C. (2022). Macroeconomic and bank-specific determinants of non-performing loans in Ghanaian banking sector. *International Journal of Accounting, Finance and Risk Management, 7(2), 40-48.* https://doi.org/10.11648/j.ijafrm.20220702.12

Osunkoya, M., Ikefan, O., & Olokoyo, F. (2023). Macroeconomic and bank-specific determinants of non-performing loans in Nigeria. *WSEAS Transactions on Business and Economics, 29, 1153-1166.* https://doi.org/10.37394/23207.2023.20.103

Ozili, P. K. (2025). Bank non-performing loans research around the world. *Asian Journal of Economics and Banking, 1-26.* https://doi.org/10.1108/AJEB-09-2024-0103

Pamungkas, P., Septiano, F., Trinugroho, I., Ab-Rahim, R., & Sergi, B. S. (2025). Monetary Policy via Bank Lending channel: Evidence from Lending Decomposition. *Journal of Risk and Financial Management, 18(5), 249.* https://doi.org/10.3390/jrfm18050249

Pedroni, P. (2004). Panel cointegration: asymptotic and finite sample properties of pooled time series tests with an application to the PPP hypothesis. *Econometric theory*, *20*(3), 597-625. https://doi.org/10.1017/S0266466604203073

Pokhrel, S., Dhungana, B. R., Poudel, J., & Sharma, L. K. (2025). Determinants of Non-performing Loans in Nepalese Commercial Bank: An Empirical Analysis. *Kshitiz Management Review, 1(1), 35-47.* https://doi.org/10.3126/kmr.v1i1.78255

Rehman, A., Mehmood, W., & Al Gharaibeh, F. (2025). The nexus between country governance and non-performing loans in South Asian countries. *Discover Sustainability, 6, 607.* https://doi.org/10.1007/s43621-025-01142-8

Ristevska, M. (2020). Determinants of Non-performing Loans and the relationship with macro-economic factors: Evidence from Southeastern Europe. *Journal of Contemporary Economic and Business Issues, 7(1), 57-76.*

Smets, F. (2018). Financial stability and monetary policy: How closely interlinked?. *35th issue (June 2014) of the International Journal of Central Banking.*

Von Bertalanffy, L. (1968). The history and status of general systems theory. *Academy of management Journal, 15(4), 407-426.*

Zheng, C., Bhowmik, P. K., & Sarker, N. (2019). Industry-specific and macroeconomic determinants of non-performing loans: A comparative analysis of ARDL and VECM. *Sustainability, 12(1), 325.* https://doi.org/10.3390/su12010325