The Effect of Macroeconomic and Bank-Specific Factors on the Level of Non-Performing Loans in Ghana: Panel Data Regression Analysis

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ABSTRACT: Non-performing loans has posed persistent challenge in Ghana impacting negatively on financial stability and economic growth. Studies have been conducted on NPLs focusing on external factors. However, the real impact of internal determinants has not been explored in the Ghanaian context. This work investigates the effect of macroeconomic and bank-specific variables on NPLs in the Ghana, using existing data from published financial reports of nine firms from 2008 to 2021. This study focuses on NPLs as proxies for the dependent variable, while GDP growth rate, bank's size, capital adequacy, and unemployment are used as predictor variables. The random effects technique was employed for examination using Ordinary Least Squares. The discoveries prove that GDP has insignificant negative influence on NPLs, whilst bank size and capital adequacy have positive and statistically significant effect on NPLs. Again, unemployment has statistically significant effect on NPLs and bank performance. Banks need to strengthen credit risk management frameworks, particularly for larger institutions, and refine the capital adequacy strategies to align with actual risk exposure. This calls for regulators to adjust capital requirements and explore employment support mechanisms to mitigate the complex relationship between unemployment and NPLs, ensuring that policies are tailored to suit local conditions.

Keywords: Non-Performing Loans, Bank-Specific Factors, Ghanaian Banking Industry, Financial Stability, Economic Growth

INTRODUCTION

The problem of bad debts known as non-performing loans (NPLs) poses a momentous challenge to the financial stability and survival of banks operating in less developed economies, including Ghana, with significant implications for economic progress of the nation as well (Gadzo, 2018). Figures from the Central Bank, and Ghana Bankers Association in recent years paint a gloomy picture of NPLs in the banking sector having recorded 22.8% high in 2018. Notwithstanding the

seeming growth of the Ghanaian economy, the recent banking sector clean-up, and recommendations from earlier researches, NPL has remained a contentious issue in the financial sector. The main determinant and influence of NPLs on banking firms is inconclusive. This article thus investigates the role of macroeconomic and bank-specific factors on NPL using panel data regression model to add to the ongoing discussions on NPLs. Existing works on this topic provide valuable insights worth discussing. For instance, Adusei & Bannerman, (2022); and Gadzo, (2018), assess the impact of bank-specific and key macroeconomic factors on the level of NPLs in the local banking sector, and conclude that the NPL ratio in the banking sector of Ghana averaged 8.13%. This suggests that more than 5% of the loans provided by Ghanaian banks become non-performing and uncollectible against internationally agreed ratios and the pillar two of the Basel Accord (Gadzo, 2018). This leads to financial distress in the banks, potentially resulting in liquidations, failures, takeovers, mergers and acquisitions as occurred in 2017-18 in the financial sector of Ghana.

The recent growth of NPLs across several countries has emphasized the need to evaluate the performance of the sharp credit deterioration, NPLs, and non-accrual loans (Adusei & Bannerman, 2022; Gadzo, 2018). Information asymmetry, moral hazard and competition have been discovered as some of the key determinants of bank NPLs according to Dewi and Srihandoko, 2018; and Olarewaju, 2020. In this regard, borrowers default, rent yield declines, and the long-term analysis yields negative results.

However, it is a fact that banking is an indispensable activity in any economy; it is central to the transmission of monetary policies in any country. For the efficient performance of models of the credit market and policy simulation relating to credit portfolios and NPLs in depository institutions, supervisors and macroeconomists must provide thoughtful, predetermined, accurate forecasts and policy recommendations to bank managements (Dou et al., 2020). It is however crucial that risk management policies keep pace with the swift changes in the banking environment caused by the rapid growth in ICT (Drost & Sikken, 2015). For instance, risks and instability in financial reforms, and the rapid enhancement of technology coupled with stiff competition from non-banking firms, including community and rural banks are major features of the current banking landscape, which have in diverse ways, combined to transform the risk structure of banks.

Consequently, non-performing loans affect the overall fiscal and economic growth of a bank's jurisdiction (Garg, 2016). Depositors are averse to failing banks, and hence, a run on a bank (panic withdrawals), occurs at the slightest indication of a deterioration in bank performance. The outcome of such an occurrence is the impact and channeling of the effect of the performance of banks unto the macroeconomic activity of the respective jurisdictions (Haim, 2008). This study explores some of the key bank-specific and macroeconomic determinants of NPLs in Ghana for the period 2008–2021 to identify and understand the relationship between these factors and non-performing loans. The purpose of the study is to contribute knowledge and literature to this field of study by identifying the key factors of NPLs, providing empirical evidence on the nexus between the key determinants and NPLs, informing policy decisions targeted at reducing NPLs, offering insights into Ghana's banking system, and contributing to the development of credit models and methodologies in managing loans.

This study is crucial because the financial sector of every economy performs vital role in the mobilization of savings and the allocation of scarce financial resources to individuals and corporations for both consumption and investment purposes (Poudel, 2018). However, challenges in credit extensions subsequently result in banks incurring bad debts. Subsequently, the value of issued loans impacts the performance of financial institutions and to large extent the economy. The interest of the bank increases in the issuance of high-quality loans, as the realization of poor loans results in financial losses. In addition, bank's funds that would have been used for alternative investment opportunities are channeled towards loan loss provisions and actual bad debt write-offs; both of which come at an additional cost to banks. Hence, such costs have to be avoided by guaranteeing that the firm operates with a lower level of poor loans.

With the above specific objectives, the study is conducted using existing data from selected banks obtained from the Ghana Stock Exchange (GSE) and the quarterly reports found in the online finance database for the periods 2008-2021. The rest of the paper is structured in the following sections: section two sets out the review of literature and hypotheses; section three presents the methodology employed; section four discusses the empirical result, with the fifth section highlighting the conclusion, policy implications, suggestions, and limitation, and section six rounds off the study with references and appendices.

The greater demand for loans for business investments by banks becomes more awkward, especially in the presence of capital inadequacies. Such banks become reluctant to issue loans based on the unacceptably high interest rates needed to cross-sell other financial services. Banks may also decide to withdraw their deposits, eventually leading to economic growth slump. The degree of change and resulting aggregate outcome, on the other hand, is dependent on various factors, such as bank-specific, industry-specific, or country-specific factors. These factors could equally influence the level of disruptions to some degree in the level of information asymmetry between banks and borrowers in the presence of an inefficient allocation of credit.

In the last few decades, there has been an upsurge in the significance of bank intermediation in promoting economic growth and redistribution of resources. This is mainly because the availability of funds to finance private investments by corporate institutions is direly needed, especially in the newly liberalized and globalized world. The bank lending channel indicates how central bank's actions and monetary policy changes are transmitted to the domestic business cycle. Banks' condition can affect their lending, thereby affecting business investment. The core occupation of banks is to make profits through credit rate margins by matching potential borrowers (hedge) and well-performing investors to use lent funds, probing banks to benefit when the information becomes better. This undermines the borrowers from the negative effect of interest rates, causing it to rise sufficiently above the central bank's rates. Perused lending practices reduce firms' interaction, resulting in the laxity of monetary policies.

In Ghana, researchers are yet to embark on a detailed empirical investigation of this subject matter. Commonly considered bank-specific variables comprise bank size (including total bank assets and number of bank branches), credit policy (policy for sustaining the quality of loans and close monitoring of their credit risk), efficiency (implying dual margins of cost and profit efficiency), collateralization of bank loans (assumed to be related to NPL levels), and income diversification (Gyamerah & Amoah, 2015). This firm-level analysis of NPL rates is particularly relevant and lacks

complex detailed information requirements. However, although micro-based, they exemplarily extract useful individual bank information and assess their risk management effectiveness.

Globally, many studies have established a connection between the NPLs and bank-specific determinants (Kumar et al., 2018). The effect of bank-specific variables on NPLs has been a popular subject in academia for several years. While some expect banks with stable management to perform better in managing their risk than their less stable counterparts, others argue that institutional, size, and regulatory changes differentially alter NPL levels across banks with different ownership types and countries of operations and origins (Mansilla-Fernández, 2020).

This review focuses particularly on bank-specific factors, since the Bank of Ghana intends to take a sectorial tactic to resolving NPLs associated with credit assessment and management practices. Loan interest rate, loan-to-asset ratio, inefficiency ratio, returns on equity, returns on assets, and loan loss provision over reserves all impacted on bank NPLs (Ofori-Abebrese et al., 2016). The results shows that banks with large loan portfolios and loans granted at very high interest rates, on average, experience higher NPLs because of the higher risk of default associated with these lending practices (Ofori-Abebrese et al., 2016). Similarly, banks with low profitability and high cost-to-income ratios tend to have higher NPLs levels. Ofori-Abebrese at al., covered the period of 2008 to 2015 and adopted ADRL, and are commended for the detailed work. But this study extends the period to 2021 to cover current happenings in the field and uses OLS for the analysis, with the advantages of being one of the best linear unbiased estimators, simple to interpret and globally applicable in statistical field.

Martiningtiyas and Nitinegeri (2020), also found that both macroeconomic variables (GDP per capita growth and the real effective exchange rate), and bank-specific variables (loan growth), substantially influence NPLs in the banking system. These studies highlight that both macroeconomic and bank-specific factors are important in explaining the level of NPLs.

The problem of non-performing loans presents substantial obstacles to banks' financial soundness, particularly in evolving economies such as Ghana. A thorough comprehension of the determinants of NPLs involves an evaluation of the macroeconomic indicators and bank-specific factors will go a long way in assisting bank management and regulators to control the incidence of NPLs. This literature review brings together key research findings on these determinants, emphasizing the methodologies, variables, and outcomes. Ghosh (2015) scrutinizes the impact of macroeconomic elements on NPLs in the Indian the banking sector by employing a panel data methodology spanning 1998 to 2012. The study incorporated the rates of GDP growth, inflation rate, and interest rate as the primary variables. Ghosh discovered that elevated inflation and low GDP growth are significantly associated with increased NPL levels. The utilization of fixed-effects and random-effects models enables robust analysis by tackling endogeneity and heterogeneity, thus providing a clear picture of how economic environments influence the value of loan (Ghosh, 2015). Whilst the study of Ghosh (2015), and Martiningtiyas and Nitinegeri (2020) are detailed and comprehensive, they are related to India and Indonesia, foreign economies with conditions that defer from Ghana. The current study will investigate the case in the Ghanaian economy and replicate the result in the local scene.

Morrison and White (2017) conducted a comparable analysis in the European Union, examining the affiliation between macroeconomic variables and bank non-performing loans (NPLs) between 2004 and 2015. Their study employed dynamic panel data models and considered the unemployment rates, real GDP growth, and housing market conditions. The findings indicate that an increase in unemployment and a decline in housing price is strongly related to higher NPLs. This finding highlights the impact of economic downturns on credit risk and emphasizes the need for proactive regulatory interventions (Morrison & White, 2017). Whilst this study is commendable, there is the need to factor in the size of a bank which is a crucial component of bank specific determinants of NPLs, and the current study fills that gap.

Akinlo and Emmanuel (2020) focus on Nigeria, using quarterly data from 2000 to 2018 to investigate the effects of macroeconomic factors on NPLs. Their study adopted autoregressive distributed lag (ARDL) bounds testing tactic and considered exchange rates, inflation, and interest rates. The researchers discovered that exchange rate volatility and inflation significantly predicted NPL levels, suggesting that economic instability directly impacts loan performance (Akinlo & Emmanuel, 2020). The Nigerian economy defers from Ghana and the adoption of OLS gives different dimension to the study in the local economy compared to the ARDL adopted by the researcher.

Furthermore, Kumar and Rajan (2016) studied the causes of bank non-performing loans (NPLs) in Indian firms using cross-sectional data from 2005 to 2014. Their research focuses on determinants such as capital adequacy, size of banks, and management quality. Through a regression analysis, they found that lower capital adequacy ratios and poor management quality were strongly correlated with higher NPL levels. This study emphasizes the importance of effective internal controls and sufficient capital to mitigate credit risk (Kumar and Rajan 2016). Nnanna and Ojo (2018) examined bank-specific factors influencing NPLs in Nigerian financial institutions, using annual data from 2001 to 2016. The key variables in their analysis were the capital adequacy, advance-to-deposit ratio, and asset quality. The panel regression models revealed that higher loan-to-deposit ratios and deteriorating asset quality are linked to an increase in NPLs. Their findings suggest the need for stringent loan underwriting standards and improved asset managing practices (Nnanna and Ojo, 2018). Though commendable, the crucial macroeconomic factors which influence NPLs especially in low-income countries was missing from the variables, and this study fills in the gap by including key macroeconomic factors such as GDP and unemployment in the analysis.

In Ghana, Mensah, and Danso (2021) undertook an investigation on the causes of non-performing loans (NPLs) using a combination of time-series and cross-sectional data from 2006 to 2020. They examine factors such as the size of the bank, profitability, and liquidity by employing a generalized least squares (GLS) approach. The study found that banks with lower profitability and poor liquidity management practices experience higher NPL levels. This study highlights the need for better financial performance monitoring and liquidity management to control NPL risks (Mensah & Danso, 2021). The reviewed studies collectively demonstrated that both bank-specific and macroeconomic factors significantly affect NPL levels. High inflation, economic downturns, and unstable exchange rates are consistently associated with increased NPLs in different contexts. Similarly, factors such as inadequate capital, poor management quality, and high loan-to-deposit

ratios exacerbate banks' NPL problems. The methodologies used in these studies, ranging from panel data analysis and regression models to ARDL and GLS, provide robust evidence of these relationships, although the impact can vary by economic, institutional and banking-sector-specific.

Consequently, the literature finds that the effects of bank-specific variables on NPLs may differ across bank ownership types, bank sizes, economic conditions, and countries of operation. For instance, Martiningtiyas and Nitinegeri (2020) and Ozili (2019) found that the connection between bank size and NPLs is ambiguous, with some scholarships concluding that larger banks have higher NPLs because of their complex organizational structures and weak risk management practices, while others find that larger banks have lower NPLs because of their more diversified loan portfolios and access to better technology and credit assessment skills. The conclusion on the influence of bank size on NPLs remains inconclusive per previous works, and this study adds to the debate on bank size.

Furthermore, it is critical to employ a nuanced style for comprehending the determinants of NPLs. This approach should consider both the broader economic climate and specific banking practices. For banks in Ghana, this insight underscores the necessity of maintaining a dual focus on economic stability and sound internal banking management practices to manage NPLs effectively. Future research could benefit from longitudinal studies and more detailed data to offer a clearer comprehension of these nuances and to inform the development of targeted policy measures on NPL.

METHOD

This research applies panel data regression technique to investigate the influence of bank-specific factors and key macroeconomic variables on the level of non-performing loans in the Ghanaian banking sector. The panel data span the period 2008 to 2021 and encompass nine (9) universal banks operating in Ghana during this period. Though there are other regression techniques including cross-sectional and time series, the panel data approach was adopted for several reasons. The data selected were panel; comprising both cross-sectional and time series data; panel data allows for the analysis of two-dimensional data including cross-sectional and time series; it controls unobserved heterogeneity, it identifies trends and causal association, reduces omitted variable bias, improves accuracy of estimates, and offers efficiency, variability, and robustness of statistical modeling.

Secondary data were used in this study, and they were derived from openly available financial reports of nine chosen institutions covering 2008 to 2021 within the sample. These universal banks were selected because they are listed on the Ghana stock exchange, they meet eligibility criteria, they are representative enough universal banks in Ghana, the result can be generalized, their accounts are audited and they comply strictly with the Bank of Ghana's requirements for banking. Again, their financial reports are reliable source of secondary data, as they are subject to Internationally Accepted Accounting Standards and external auditing to verify their accuracy and reliability. The period between 2008 to 2021 was purposely chosen because of availability of data and to make the study more current and relevant to the ongoing debate on the determinants of NPLs. To mitigate

potential biases, purposive sampling was combined with random sampling method to give each firm the chance of selection, data quality was checked, and sensitivity analysis was adopted to test the robustness of the data.

The objective of this study is to conduct descriptive statistical and regression analyses to examine the relationship and impact of bank-specific variables, and macroeconomic indicators including the GDP growth rate, levels of unemployment, bank size, and capital adequacy ratio on non-performing loans. The descriptive statistics provides a detailed summary and explanation of the investigated data. Conversely, regression technique encompasses evaluation of the linkage between the predictor and the outcome variables, which can be illustrated employing a regression equation. The regression equations below were constructed through the use of a panel regression model to demonstrate the association between bank-specific factors and non-performing loans:

The empirical model is as follows:

$$NPL_{it} = \alpha + \beta_1 GDPGR_{it} + \beta_2 BANKS_{it} + \beta_3 CAR_{it} + \beta_4 UNEMPR_{it} + \varepsilon_{it} \qquad (1)$$

Where:
NPL - is the level of non-performing loans, measured as the ratio of non-performing loans to total loans for bank i in year t.
$GDPGR_{it}$ — GDP growth rate
$BANKS_{it}$: Bank Size as the natural logarithm of total assets for bank i in year t
CAR_{it}: Capital adequacy ratio i in year t
$UNEMPR_{it}$: Unemployed rate.

The facts for this study were obtained from the published annual financial statements (reports) of universal banks operating in Ghana during the study period as well as from the Ghana Association of Banks and the Bank of Ghana's statistical bulletins.

The facts and figures selected for the study are defined and explained below. Many scholars have defined these variables in various ways: to suit their philosophy, purpose and area of study. But, for the purpose of this study, the working definition chosen for these variables did not adopt any particular scholar's philosophy, but to suit the current study. These variables are defined next:

Non-Performing Loans (NPLs): Nonperforming loan is defined as a bank credit or loan that is doubtful or unlikely to be collected within the agreed terms of the contract. It is also a loan in which both the principal amount and the accrued interest have not been honored, or payment is overdue. According to the IMF, nonperforming assets or loans are that aspects of loan portfolio that have not been honoured as scheduled in both interest and principal for a specified time period, normally 90 days or more. Nonperforming loans are measured through the NPL ratio, which is a measure of proportion of the NPL in relation to the total loan portfolio of the particular bank.

Return on Assets (ROA): Return on asset is bank or financial performance method that is calculated to measure how effectively and efficiently a firm applies its resources to engender income for the company. Return on assets is vital performance measurement tool that is applied

in assessing the capability of companies to use their resources to generate earnings for the shareholders to make informed decision about its financial performance and operational strategy. Return on assets is used as an efficiency indicator, for comparative inter or intra-company analysis, or as a formular for making trend analysis. Return on assets is measured as the disposable inflow of the entity divided by its average total assets multiplied by 100%.

Returns on Equity (ROE): This is an economic and financial performance tool calculated to evaluate the viability of an enterprise relative to its total equity shares. The purpose is to evaluate the effectiveness of a firm in generating its return from its available equity shares. Return on equity is measured as the net income divided by the shareholders' equity.

Gross Domestic Product Growth (GDP) Rates: The GDP growth rate of any economy is the annual percentage growth in an economy's GDP, reflecting the economic performance over a specified period of time. The GDP growth rate provides a vital information on the health of the economy and it is an essential indicator for investors, economists, scholars, policy makers and managers of the economy. The GDP is calculated to measure the change in a country's economic output over a given period of time. The annual GDP growth rate of an economy is calculated as the GDP of the preceding economic period less the GPD of the present period over the GDP of the present year multiplied by 100.

Unemployment Rates: Unemployment is an economic condition where individuals who are willing and able to work cannot find jobs. The rate of unemployment of any economy is the portion of the unemployed labor force all over the total labor force in the country times 100.

Capital Adequacy Ratio (CAR): The CAR of an entity, otherwise termed as the capital risk-weighted assets ratio is a measurement tool that calculates a company's investment (capital) in connection to its risk-weighted assets. The CAR is a performance metric adopted by regulatory authorities to make sure that banks have enough assets buffer to cover any potential operating losses and to meet their debt obligations to customers. The purpose of CAR is primarily to secure the fund of bank depositors, promote market and economic sector solidity and to help a company to absorb losses. The CAR is measured by dividing the capital of the company by its risk-weighted assets.

Bank Size: Bank Size is a variable that typically represents the total wealth, assets or equity of a firm, in relation to the total bank population or the market value, influencing its performance due to economies of scale or market power.

Table 1
Variables, Notation, and Proxies of the Research

Determinants/Variables	Notations	Definitions
Outcome / Dependent Variables (Performance Indicators)	ROA	Returns on Assets. This tool measures the viability of a bank relative to its total wealth / assets. ROA = Net Income / Average Total Assets x 100

Determinants/Variables	Notations	Definitions
	ROE	Return on Equity. ROE evaluates a company's the profitability of a firm in relation to its total equity. ROE = Net Income / Average Shareholders Equity x 100
Explanatory / Independent Variables	NPL	NPL (non-performing loans) is a ratio that evaluates the percentage of loans in portfolio classified as non-performing (over-due) to the total value of the loan portfolio. NPLs Ratio = NPLs/ Total Loan x 100
Gross Domestic Product	GDP	GDP Growth Rate for entity. This indicates the rate of economic growth that can influence bank performance. $GDPGR = GDP_{Time}2 - GDP_{Time}1 / GDP_{Time}1 \times 100$
Unemployment	UNEMP	Unemployment rate signifies the number of able and willing people who are not employed at a particular time. UNEMP Rate = Total Number of Unemployed / Labour Force x 100
Capital Adequacy Ratio	CAR	Capital adequacy ratio is a measurement tool that calculates a company's capital in connection with its risk weighted assets. CAR = Total Assets (Capital) / Risk-Weighted Assets
Bank Size	BANKS	Bank Size. This variable typically represents the total assets or equity of a bank, influencing its performance due to economies of scale or market power. The Size of a Bank = The Natural Logarithm of its Total Assets.

RESULT AND DISCUSSION

The table 1 below displays the summary (descriptive) statistics for both the outcome and the predictor variables. The non-performing loan portfolio were utilized as surrogates (proxies) for the dependent variable, whereas bank-specific factors, including working capital management, bank size, capital adequacy ratio, and bank lending rates, served as proxies for the independent variables. Descriptive statistics are depicted in eight observations and rows, including the observation, kurtosis, skewness, maximum, minimum, standard deviation, median and the mean.

Table 2
Descriptive Statistics

	NPL	GDPGR	BANKS	CAR	UNEMP
Mean	10.99039	5.484949	5.042545	14.15583	4.877203
Median	9.600000	5.600000	3.890000	13.85000	4.900000
Maximum	72.00000	13.60000	24.77000	148.0000	8.732000
Minimum	0.000000	0.510000	0.000000	0.000000	2.170000
Std. Dev.	9.436856	2.596319	4.611527	12.95858	1.654323
Skewness	1.658774	1.053370	1.499867	5.943971	0.561947
Kurtosis	8.336961	5.791592	5.531515	59.42804	2.715388
Observations	399	399	399	399	399

Source: Authors Own Creation, 2024

Table 2 provides a detailed overview of the essential financial and economic indicators used to evaluate non-performing loans (NPLs). The presented data encompass a comprehensive range of values for non-performing loans, GDP growth rate, bank size, capital adequacy ratio, and unemployment rate, offering comprehensive insight into their distribution and variability over the observed period.

The average percentage of NPLs amounts to 10.99%, indicating that, on average, nearly 11% of the loans in the sample are classified as non-performing. This average value conceals substantial variability within the data, as evidenced by the extensive range of values. The highest NPL rate of 72% serves as an exceptional instance, in which a substantial portion of loans have defaulted. In contrast, the lowest NPL rate of 0% signifies cases in which no loans have been classified as non-performing, possibly reflecting outstanding loan performance or potential data limitations. The significant gap between the minimum and maximum values highlights substantial disparities in loan performance across various banks and periods, implying potential underlying issues with credit management, lending policies and practices, or economic conditions.

The GDP growth rate over the specified period is approximately 5.48%. This figure suggests moderate economic expansion as it falls within the middle of the range of growth rates. A maximum growth rate of 13.60% indicates strong economic growth, while a minimum rate of 0.51% suggests stagnation or minimal economic expansion. The relatively high average growth rate implies a generally favorable economic environment, but the wide range of growth rates underscores the diverse economic conditions that could potentially impact the performance of loans and banking stability.

Based on the data, the average bank size is 5.04%. This figure may represent various metrics, such as asset size or market share, and reflects the relative scale of banks within the sample. The significant difference between the maximum and minimum values indicates a diverse banking sector with varying operational scales. Large banks with higher maximum values may have

different risk profiles than smaller banks, potentially impacting their Non-Performing Loan (NPL) ratios differently.

The observed average capital adequacy ratio (CAR) is 14.16%, reflecting that proportion of the value (capital) of the bank relative to the bank's risk-weighted assets. The maximum ratio of 148% indicates instances where banks maintain substantial capital buffers well above regulatory requirements, potentially indicating strong financial health or conservative risk management practices. In contrast, the minimum ratio of 0% suggests extreme cases in which banks may have inadequate or no provision at all, for capital reserve relative to their risk exposures, which could be a critical risk factor for elevated NPL levels. The very broad range of capital adequacy ratios illustrates varied financial robustness among banks, which influences their capacity to absorb losses and manage credit risk effectively.

The average unemployment rate is 4.88%, reflecting moderate labor-market conditions. A maximum unemployment rate of 8.73% signifies periods of higher unemployment, which could adversely affect borrowers' ability to repay loans, thereby increasing NPLs. The minimum unemployment rate of 2.17% represents periods of relatively low unemployment, potentially correlating with lower NPL rates owing to improved borrower's disposable income, thus, enhanced repayment capabilities. The range of unemployment rates highlights the variability in the labor market conditions, which can have direct effects on loan performance and banking sector stability.

Table 3
Redundant Fixed Effects Tests

Effects Test	Statistic	d.f.	Prob.
Cross-section F	7.164045	(19,375)	0.0000
Cross-section Chi-square	123.559222	19	0.0000

Table 4
Correlated Random Effects - Hausman Test

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	0.000000	4	1.0000

Based on the null hypothesis, the random effects model is generally deemed the most appropriate option, whereas the alternative hypothesis proposes that the fixed effects model is preferable. The information displayed in Tables 3 and 4 indicates that the random effects model is more suitable for this analysis, as demonstrated by the Hausman test. Hence, this study used a random-effects model for analysis.

Table 5
Panel EGLS (Cross-Section Random Effects)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	11.50495	2.492073	4.616618	0.0000
GDPGR	-0.303987	0.169695	-1.791374	0.0740
BNKS	0.440850	0.137717	3.201136	0.0015
CAR	0.118130	0.034106	3.463620	0.0006
UNEMP	-0.562229	0.273547	-2.055331	0.0405
R-squared	0.082424	Mean dependent var		3.825277
Adjusted R-squared	0.073108	S.D. dependent var		8.226288
S.E. of regression	7.919819	Sum squared resid		24713.07
F-statistic	8.848038	Durbin-Watson stat		0.994476
Prob(F-statistic)	0.000001			

Table 5 displays the regression outcomes that assess the impact of the GDP growth rate, size of bank, capital adequacy, and unemployment rate on bank's non-performing loans (NPLs). The analysis reveals several crucial findings concerning the influence of these variables on NPLs, imparting insights into their roles in determining loan performance. Regression parameter of the coefficient for the GDP growth rate is denoted by $\beta = -0.304$, with a corresponding t-value of -1.791 and p-value of 0.0740. This indicates the negative effect of the rate of GDP growth on NPLs, though it fails to achieve the conventional levels of statistical import of 0.05 or 0.01. The negative coefficient suggests a theoretical converse association between the rate of GDP growth and bank's NPLs, implying that higher GDP growth might be associated with lower NPLs. Nevertheless, given that the p-value surpasses the standard threshold ($p<0.05$) for statistical significance, there is insufficient evidence to conclude that the rate of GDP growth has a meaningful bearing on NPLs. The foregoing suggests that fluctuations in GDP growth do not significantly affect the portion of non-performing loan portfolio in the sample surveyed.

The coefficient for the bank size variable is denoted as β, which is equal to 0.441. The t-value associated with this coefficient was 3.201 and the corresponding p-value was less than 0.001. The direct and statistically substantial bond indicates that bigger financial institutions are inclined to exhibit higher levels of NPLs. Specifically, a 1% increase in bank size was associated with a 44.1% increase in NPLs. This finding suggests that, as banks grow larger, their exposure to credit risk increases proportionally, potentially due to factors such as expanded loan portfolios or increased lending activities. This substantial effect underscores the need for larger banks to implement effective general financial risk management strategies to mitigate the rise in bad debt (NPLs) to align with their expansion.

The rate of capital adequacy in a bank demonstrates favorable and momentous effect on NPLs, with a coefficient of $\beta = 0.118$, a t-value of 3.463, and a p-value below 0.001. This suggests that an upsurge in the capital adequacy is linked with an upsurge in NPLs. Specifically, a 1% increase in CAR corresponds to an 11.8% growth in NPLs. This direct and noteworthy bond between CAR and NPLs is counterintuitive because higher capital adequacy ratios are typically expected to reduce credit risk. The positive coefficient proves that banks with higher capital reserves might also

engross in riskier lending practices or have greater exposure to credit losses, thereby increasing their NPLs.

The regression analysis also reveals a detrimental and statistically substantial impact of the levels of unemployment on NPLs, as indicated by the coefficient of β = -0.562, a t-value of -2.055 and a p-value of 0.0405. This observation signifies that increased joblessness is accompanied by a lower incidence of NPLs. Specifically, a 1% growth in the rate of unemployment corresponds to a 56.2% reduction in NPLs. The above counterintuitive outcome may be attributable to intricate nuances in the relationship between labor market dynamics and loan performance, suggesting that periods of elevated unemployment may coincide with enhanced loan repayment conditions or modifications in borrower behavior that result in reduced NPLs.

Table 5 presents fascinating observations concerning the connections between some key macroeconomic and internal bank-specific factors, against non-performing loans (NPLs). The examination of these connections illuminates the elements that impact the performance of loans within the Ghanaian banking industry, while providing a point of comparison with the existing literature in this field of study.

The insignificant, yet negative impact of the GDP growth rate on NPLs suggests that changes in economic growth does not substantially affect the levels of non-performing in the observed period. This contrasts with much of the existing literature, which typically reports a significantly negative relationship between GDP growth and NPLs. For example, Ghosh (2015), Hasan (2019), and Gaur and Mohapatra (2020) find that higher GDP growth rates are associated with reduced NPLs in the Indian banking sector, attributing this to improved economic conditions leading to better borrower repayment capabilities. Similarly, Morrison and White's (2017) research across European banks, and supports the notion that strong economic growth is correlated with lower NPLs. The lack of significance in this study may reflect unique economic conditions in Ghana, where other factors may overshadow the impact of GDP growth on loan performance, or it may indicate that the economic growth rate alone is not a sufficient predictor of NPL variations. This relationship may also stem from the lagged or weak impact of GDP on NPL and the fact that other variables, more powerful than GDP have significant impact on NPL in the Ghanaian economy. The various banks can take advantage of these nuanced relationships between these variables and implement policies that address specific challenges in their area of operations. These policies may include prudent loan portfolio diversification, quality credit management and monitoring to mitigate risk, influence loan terms, customer behavior, credit-worthiness, and maintenance of regulatory compliance. Bank management should consider other factors aside GDP, diversify the credit portfolios, prioritize proactive risk management and carry out detailed risk assessment and customer evaluation before granting credit.

The connection that exists between the size of a bank and non-performing loans (NPLs) is direct and statistically substantial, indicating that larger banks have higher levels of NPLs. This finding aligns with those reported by Kumar et al. (2018), Agarwala and Agarwala (2019), and Thomas and Thakur (2020), who observed that larger banks, owing to their expanded loan portfolios and increased potential for credit risk exposure, often face enhanced NPLs. This correlation may be ascribed to the increased complexity of managing large-scale operations such as financial

institutions, which can lead to less-effective credit risk management. The positive effect observed supports the view that scaling up operations without proportional enhancements in risk management can exacerbate credit issues and increase NPL levels. These results may be due to the higher appetite of lenders, leading to excessive and aggressive loan practices, large firms having intricate operations, or the fact that bigger firms have large array of credit activities fueling their exposure to risk. There will be both regulatory and industry implication of this finding. Banks should practice stringent governance and control to prevent excessive risk-taking; ensure robust risk management; and strive for loan portfolio diversification. Regulators must of necessity set a higher capital requirement on bigger firms; enforce stricter regulations on large institutions; and increase oversight on these big banks for them to maintain strict regulatory compliance.

The connection existing between capital adequacy ratio and NPLs is substantial and direct, which suggests a higher capital adequacy being associated with increased NPL levels. This finding is somewhat counter-intuitive because a higher CAR is generally expected to mitigate credit risk by providing a stronger buffer against potential losses. Thus, this result diverges from studies such as those by Akinlo and Emmanuel (2020), Abiodun et al. (2020), Sunaryo (2020), and Ikpe et al. (2018), which studies find an inverse nexus between capital adequacy ratio and NPLs in Nigerian banks. The observed direct association in the study might suggest that banks with greater capital ratios engage in riskier lending practices, possibly due to a perceived safety net from their strong capital positions. This could imply that increased capital adequacy might lead banks to take on more credit risk, or relax in aggressively pursuing existing loan defaulters, thus inadvertently contributing to higher NPLs in the face an increased CAR. This outcome implies that banks should ensure good governance, restrict capital allocation decision unless they in consonance with managerial ability and risk appetite, and mitigate potential loses. Regulators should also consider the implementation of risk-based capital requirement, enhance firms' supervision and review banks' capital requirements, whilst enforcing compliance to banking standards and regulation.

The finding which posits unemployment rate to have a negative and statistically remarkable impact on NPLs is particularly noteworthy, but diverges from conventional expectations. Generally, higher unemployment is associated with increased NPLs because unemployed individuals are less likely to meet their loan obligations. Research conducted by Ghosh (2017), Akinlo and Emmanuel (2020), Park and Park (2020), and Abimbola (2020) supports this view, demonstrating a direct affiliation between unemployment and NPLs. However, the negative relationship observed in this study suggests a different dynamic for Ghana in this period and economic condition studied. This could be due to the specific local economic conditions, government interventions or specific government policy, that mitigate the negative impact of unemployment on loan performance in Ghana. For example, if unemployment leads to higher levels of government or institutional support, this might offset the potential increases in NPLs. It may also be that, the unemployed avoid contracting loans altogether, knowing their current conditions. Alternatively, the structural aspects of the Ghanaian economy or banking sector may alter the usual relationship between unemployment and loan performance. The unexpected result may stem from the informal nature of the economy, restricted access to flexible loans, and individuals having access to other sources of income from friends, families or remittances from abroad. The theory of financial exclusion which suggests restricted access to formal sources of funding could also lead to interruption between unemployment and NPLs. This relationship implies that the banks need to ensure capital

buffers to absorb potential fallouts from NPLs, recognize probable susceptibilities and take mitigative actions, monitor credit exposure and diversify their risk exposures. Regulatory authorities also need to implement policies such as loan refinancing to cushion borrowers; prioritize robust credit risk evaluation; and implement micro-prudential strategies to reduce the weight of economic meltdown on the financial industry.

CONCLUSION

The findings presented in Table 5 demonstrate the intricate, and nuanced relationships between macroeconomic indicators and internal bank-specific variables on non-performing assets in the Ghanaian financial system. The insignificant negative correlation between the rate of GDP growth and bad debts (NPLs) indicates that growth in the economy alone will not necessarily be the main determining factor affecting loan performance. This result contradicts the existing literature, which frequently associates robust economic growth with decreased NPLs, suggesting that other variables may have a more substantial impact in this situation.

Conversely, the association between bank size and the prevalence of non-performing assets (NPLs) is positive and substantial, demonstrating that larger banks commonly encounter higher levels of NPLs than the smaller ones. This aligns with previous research, which posits that larger financial institutions frequently face greater difficulties in effectively managing credit risk due to their extensive loan portfolios and heightened exposure to risk. This conclusion highlights the necessity of implementing robust credit risk management practices as banks continue to grow their operations.

The relationship between a bank's capital adequacy ratio and its NPLs presents a counter-intuitive result, as it suggests that higher capital buffers may correlate with increased NPLs. This finding contradicts the typical expectation that higher capital adequacy reduces credit risk and NPLs. This implies that firms with larger capital ratios could involve in riskier lending practices, potentially because of a false sense of security provided by their capital buffers. Lastly, the finding which proves that there is an unexpected indirect affiliation between the rate of unemployment and NPLs warrants further investigation. This deviation from conventional expectations may indicate the presence of unique local economic conditions or support mechanisms in Ghana that mitigate unemployment's negative impact on loan performance.

Theer are practical and policy implications of the foregoing findings. Banks should strengthen credit risk management frameworks, particularly for larger institutions, and refine their capital adequacy strategies to align with the actual risk exposure. Regulators must adjust capital requirements and explore employment support mechanisms to mitigate the complex relationship between unemployment and NPLs, ensuring that policies are tailored to local economic conditions. Local banks should limit the value of loans granted to customers whose credit-worthiness is not guaranteed.

This scholarly work is localized to the banking sector of the Ghanaian economy covering a fourteen-year period between 2008 to 2021. Though, there are other elements affecting bank's non-performing loans, this research focused on GPD and unemployment rate as macroeconomic

factors, and capital adequacy ratio and size of bank as internal bank-specific variables, to respectively influencing the levels of NPL. The ordinary least square method was adopted as the statistical tool of analysis, but there are other methods of regression analysis which were not considered in by the current work. Finally, the study used an existing (secondary) data gleaned from the published financial statements of the selected institutions. Other studies can adopt other methods of analysis, cover different economies and periods, or make use of primary data, and the results could be different.

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