An assessment of the impact of non-performing loans and macroeconomic indicators on bank performance

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ABSTRACT

The purpose is to explores the impact of NPLs and macroeconomic indicators on bank performance in Ghana. Non-performing loans pose significant challenge to banks, with detrimental implications for financial and economic stability. This study used secondary data obtained from financial reports of nine firms in Ghanaian, covering 2007 to 2021. The investigation focused on bank's ROA and ROE as proxies for measuring performance, while NPLs, GDP, bank size, and inflation were adopted as predictor factors. The random effects model was employed, using Ordinary Least Squares and autoregressive methods. The outcomes show insignificant direct, and negative connection between NPLs and bank ROA and ROE respectively. Additionally, the study demonstrates that inflation rate and bank size posit statistically important inverse, and direct influence on ROA and ROE respectively. NPL does not influence bank's ROE and ROA. Inflation and bank size have impact on performance. Considering the diverse influences of NPLs on financial metrics, and the significant impact of inflation and bank size on performance, policymakers and institutional managers must prioritize effective risk management, rigorous customer screening and close monitoring of macroeconomic conditions to ensure that strategic financial planning aligns with current economic environment for sustainable performance.

Keywords: NPLs, Variables, ROA, ROE, Provision, Credit-risk, Financial-stability, Macroeconomic.
JEL Classification: G21; E44

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Highlights of this paper:

- This paper explores the influecne of NPLs and macreoncomic indivators on bank performance, adopting ROE and ROA and performance metrics.
- The results reveal a nuanced relationship among the variables studied.
- Whilst NPLs was found to have no significant impact on performance, inflation and bank size affect bank performance.

1. INTRODUCTION

The problem of the accumulation of bad debt, otherwise known as non-performing loans (NPLs) presents a substantial impediment for the banking industry, with significant implications for a country's financial stability and economic growth (Abimbola, 2020). This study investigates the impact of NPLs and macroeconomic variables on the performance of selected financial firms in Ghana with the goal of providing useful recommendations for policymakers, regulators, and financial institutions to address this problem. While non-performing loans (NPLs) were not the predominant and critical factors contributing to the recent banking and economic crisis in the country, in the past three decades, bad banking practices, including accumulated debts (NPLs), have been responsible for a substantial proportion of commercial bank failures worldwide (Do, Ngo, & Phung, 2020; Msomi, 2022; Olarewaju, 2020). Banks establish specific provisions to cover bad debts; however, as opposed to the market discipline process, these provisions shield lending institutions from losses resulting from bad lending decisions (Affinito, Albareto, & Santioni, 2022; Ayunku & Uzochukwu, 2020). The more reckless banks allow themselves to be coerced to lend to non-credit-worthy customers, and the application of unproductive and inefficient uses of funds, the more likely they are to have bad debt bailed out by the government when crises strike.

Non-performing loans (NPLs) have become a highly relevant topic, serving as a crucial bank-specific risk indicator of NPLs (Zulkifli & Ahmad, 2023). These NPLs have the potential to negatively affect bank performance and the broader economy as whole (Anik, Das, & Alam, 2019). The significant rise in NPLs in recent years has prompted regulatory bodies and bank management to take keen interest in the issue of NPLs (Mohamed, Abd Hamid, Hosin, & Md Isa, 2021). Mohamed et al. (2021) aimed at ascertaining the extent to which the trend in NPLs contributes to the risk profile of the Nigerian banking sector. The variables that cause the occurrence of toxic assets, called non-performing loans include, information asymmetry, adverse selection, moral hazard, and challenges associated with deposit-taking and lending activities. Several reasons support the contention that the banking sector in Ghana relies heavily on interest income and loans (Aboagye, Akoena, Antwi-Asare, & Gockel, 2008a; Aboagye, Akoena, Antwi-asare, & Gockel, 2008b; Adusei & Bannerman, 2022; Alnaa, Ahiakpor, & Abdul-Majeed, 2020; Gambo, Abdul-Rahman, & Ibrahim, 2017; Kusi, Ansah-Adu, & Sai, 2015). A significant decline in a bank's performance with respect non-performing loans (NPLs) could result in losses due to missed interest and principal payments, leading to a negative impact on the Return on Equity (ROE), stability, and safety of the banking industry (Alnaa et al., 2020; Bank of Ghana (BoG), 2009). This can result in insufficient bank capital, leading to an increase in bank failures due to insolvency, and ultimately, a systemic banking crisis, causing depositors' funds to deplete.

The main aim of financial institutions, especially banks, is to improve profitability and increase shareholders' wealth (Gargouri & Boujelben, 2014; Haim, 2008). This is generally accomplished through sound financial performance including higher income, reduced expenses, and efficient asset utilization. However, a management's focus on enhancing shareholder wealth can sometimes result in excessive risk-taking, such as excessive lending, which can lead to an upsurge in toxic loans (Hughes & Mester, 2013). In the records of most literature on banking,

NPLs, bad debt, unrecoverable debts and delinquent loans are terms which are applied interchangeably, and are typically seen as indicators of economic or financial sector instability and distress.

Moreso, bank performance is significantly influenced by several factors, including credit risk, profitability, and capital adequacy (Khairi, Bahri, & Artha, 2021; Mohamed et al., 2021). For banks to thrive and expand over time, their conditions must be evaluated against five operating standards including capital adequacy, accountability, good governance, working environment and capabilities. Successful banks tend to have higher minimum capital-to-asset ratios, whereas well-capitalized banks are generally regarded as less profitable. The measurement of a bank's solvency serves both internal management purposes such as adjusting dividends, and external objectives for depositors, creditors, and potential equity holders (Abou-El-Sood, 2016; Oshinsky & Olin, 2005). The market discipline of depositors and bank creditors is enforced by the individual bank's capital standards. Minimum capital standards help in minimizing the risk of bank failure resulting from insolvency, and the costs associated with failed banks can negatively impact the economy. However, effective supervisory and regulatory controls can help in preventing bank failure (Anggriani & Muniarty, 2020; Gargouri & Boujelben, 2014; Harris, 1954; Kaufman, 1987; Sbârcea, 2017; Wilkinson & Turing, 1996). Effectively managing financial ratios alone is insufficient to address all the issues pertaining to business operations (Franks & Sussman, 2005).

Considering the contrasting theories discussed earlier, this study provides valuable insights into the effect of NPLs and macroeconomic factors on bank performance in the Ghanaian economy. For instance, the estimated total bad debt losses for the Ghana Commercial Bank (GCB) and Merchants Bank (now, UMB), are reported to be equivalent to 120% of the banks' loan portfolio (Ofori-Abebrese, Pickson, & Opare, 2016; Omonijo, Olusola, Anyaegbunam, Nnatu, & Adeleke, 2018). Consequently, this situation allowed customers to acquire good loans from the commercial banks and finance house companies in exchange for a portion of the bank's shares. The current study diverges from previous works as it investigates both existing and defaulted debt that have become non-performing for various reasons, encompassing the entire loan activity of the banks under examination. The aim is to determine the elements that lead to the increasing occurrence of non-performing loans and evaluate the consequences of NPLs on bank performance as has been attempted by some previous works.

The rising level of loans (NPLs), is one of the key financial challenges faced by commercial banks, and this poses significant threats to the efficacy and stability of financial institutions in emerging economies, such as Ghana (Anik et al., 2019; Mohamed et al., 2021). Increasing levels of non-performing loans in the financial sector, are clear indication of the poor management practices of financial entities (Hassan, Ilyas, & Rehman, 2014). This problem is of particular importance in many developing economies, as it hinders the growth of financial intermediaries and impedes the transformation of banking and other economic systems necessary for boosting economic growth (Syed, Kamal, Grima, & Ullah, 2022). Therefore, it is crucial to weigh the extent and influence of NPLs on bank performance as they (NPLs) represent a significant source of revenue for the economy, and the vital role banks as the primary financial intermediaries in the economy. This research suggests that NPLs are the most crucial factor influencing the profitability of the banking sector in any economy.

Based on studies by Barajas, Steiner, and Salazar (2000); Asiedu and Atakli (2020) and Kibet, Nyaoga, and King'wara (2020), non-performing loans have been a major concern for numerous developing countries, particularly those in sub-Saharan Africa, such as Ghana. These loans can result in costs such as debt service, capital losses, and decreases in economic output, by affecting the supply of loans and potentially undermining economic growth prospects. Asset quality is a crucial determinant of commercial bank performance, and lenders are exposed to significant risks when they give out too many performing loans that later become non-performing due to failure of mangemnet to redeem the loans (Ahmed, Mehdi, & Mohamed, 2023; Onyango & Olando, 2020). Banks accept

deposits from the public and engage in credit creation, making it their responsibility to manage these deposits in a manner that ensures a reasonable rate of return and withdrawals, and guarantees the payment of all amounts on demand or on maturity. Consequently, non-performing loans pose a significant threat to financial stability and safety in the banking sector where there is a rise in these bad debts.

Mrindoko, Macha, and Gwahula (2020) and Onyango and Olando (2020)**,** also conducted studies on non-performing loans; and their investigations focused mainly on accounting and econometric aspects, concentrating only on the banks' balance sheets. By contrast, this study explores bad debt or non-performing loans from the standpoint of the loan policies of the banks, loan supervision, regulatory guidelines, and management perspectives. Uncertain loans still remain substandard for a considerable period, with a risk of default (Hassan et al., 2014). Similarly, lost loans are fully written off through the income statement, or they are classified as bad debts, which still bring costs to the firm (Anik et al., 2019). A higher proportion of substandard loans reduces the pool of performing loans (non-defaulted loans), available to banks to generate interest income (Martiningtiyas & Nitinegeri, 2020). Consequently, financial institutions with a significant proportion of substandard loans are generally expected to generate lower interest income, which may lead to higher provisions for future loan defaults.

Unproductive loans are those in which the borrower has failed to meet their obligations to such an extent that the debts must be fully provided for, in accordance with Bank of Ghana's (the regulator's) standard, or provision coverage rules (Gu, Charles, Nsiah, Dwomoh, & Benjamin, 2020; Omonijo et al., 2018). The most commonly used method for accounting for these loans is the equity accretion method, which is supported by evidence from the observed credit decisions. There are four main categories of unproductive loans, each of which is important in assessing the loan risk characteristics of the loan portfolio of banks. It is vital to differentiate between defaulted loans and paid up or reperforming loans. Loans that have been fully defaulted can be written off directly, whereas loans that have not defaulted fully are classified as substandard, doubtful, or lost loans. Substandard loans are loans that have not defaulted, but are over 90 days past due for payment.

Although non-performing loans (NPLs) pose significant risks to the banking and the broader economy of Ghana, there is a gap in understanding the relationship between NPLs and their impact on banks' performance in the local scene. The current research forecasts to tackle this gap by probing the real influence of NPLs on banks in Ghana, and to mitigate the vulnerability and threats associated with NPLs to banks. Although helpful, the statutory management system has not been sufficient to address the detrimental effects of NPLs on bank viability. NPLs reduce holdings and savings, customer trust and confidence in the banks, resulting in additional capital requirements for restructured loans, undermining shareholder consistency and increasing the probability of bank bankruptcy despite stronger regulatory regimes and changes. Banks invest a great deal of time, money, and managerial talent in addressing loan classification conformity. However, empirical results of existing study demonstrates that this problem is evolving in all sectors of the economy. The study aims to detect the causative variables, and the reasons for the ongoing banking firms and economic crisis and how they are related, as banks and regulators do not seem to be working in conformity on these issues facing the sector.

Furthermore, the issue of NPLs to total loans presents a substantial challenge to the profitability of banking firms, which is a global concern (Zulkifli & Ahmad, 2023). Non-performing loans can adversely affect bank stability and efficiency, leading to reduced earnings and customers limited future investment (Martiningtiyas & Nitinegeri, 2020). The financial consequences of non-performing loans are compounded by economic downturns and regulatory changes in the 21st century, which were aimed at addressing the menace but to no avail(Ghosh, 2017). In the light of this, banks aim to maximize profits by minimizing loan losses through various approaches and practices, accounting standards, strategies and policies due to delays in the legal systems.

Githaiga and Yegon (2019); Chiorazzo, Milani, and Salvini (2008) and Ntim (2009) use logit hazard as their estimation model to investigate the connection between income modification (diversification) and NPLs. Their discoveries provide strong evidence that diversifying into non-traditional business lines is detrimental to the banking sector as it leads to mismanagement of traditional banking functions (Chiorazzo et al., 2008; Githaiga & Yegon, 2019). Furthermore, income modification can result in synergistic gains only for financial institutions. Ahmed and N'Dri studied the factors that influence loan defaulters, and found that regulatory weakness, ownership concentration, weak and inadequate loan recovery efforts are the primary factors influencing loan nonperformance in Ghana (Ahmed & N'Dri, 2021). The remainder of this paper focuses on the empirical results by examining the mean values, correlations, and results of the regression analysis.

A number of empirical research have been carried out on non-performing loans in Ghana's banking sector by different scholars in the past (Adusei & Bannerman, 2022; Asiedu & Atakli, 2020; Gu et al., 2020; Ofori-Abebrese et al., 2016; Omonijo et al., 2018). Although previous research has examined various factors contributing to non-performance, the impact of NPLs has not yet been investigated comprehensively. Some studies have focused on the macroeconomic environment, while a brief note published in the Financial Post of the GSC Enclosure (Financial Intelligence) attributed the primary reasons for loan non-performance in Ghana to inadequate regulatory control or enforcement, weak legal underpinnings, and insufficient risk assessment systems. Thes factors lead to early loan loss detection, which also motivates borrowers to default after establishing and enhancing their business operations. Aidoo and Mensah (2018) identified the causes of loan defaults in Ghana as weaknesses in regulatory bodies that create opportunities for insider loans and fraud.

Moudud-Ul-Huq, Ahmed, and Rahman (2021) adopted a panel-data analysis to evaluate the impact of NPLs on bank performance across emerging economies. They employed fixed- and random-effects models to account for unobserved heterogeneity. Their findings reveal that high NPL levels significantly impair bank profitability by increasing credit risk and necessitating higher loan loss provisions, emphasizing the need for effective risk management strategies. Lee and Yoon (2022) employed a dynamic two-step system generalized method of moment's (GMM) estimation technique, grounded on data taken from 32 banks in Pakistan over 2006–2014, to examine the loan growth and risk-taking conduct of the banks during the expansionary periods of lending. The study reveals that loan growth has a momentous influence on macroeconomic and bank-specific variables. Loan growth in the previous year also enhances NPLs and decreases the solvency of banks with a time lag of many years. The pull factor behind this spectacle is weak practical guideline among competitors, the asymmetric information of the borrowers, and, most prominently, that banks underestimate the risk of lending during credit booms.

Bourke (2020) conducted a cross-sectional analysis to investigate the influence of inflation rates on bank's performance employing data from multiple countries. The study adopted ordinary least squares (OLS) regression to examine the relationship between inflation and bank stability. The results indicate that high inflation rates adversely affect bank performance by increasing operational costs and reducing the real value of loan repayments, which erodes profitability. Demirgüç-Kunt and Huizinga (2019) also explored the effect of the size of a bank on bank performance by means of a panel dataset of international banks. They applied a regression analysis to examine how bank size influences profitability and stability, considering variables such as total assets and equity. Their findings reveal that larger banks benefit from economies of scale and market power, thereby enhancing their performance and stability, although very large banks may also face challenges diseconomy of scale related to systemic risk, regulatory scrutiny, and the incidence of the idea of "too big to fail" among large firms.

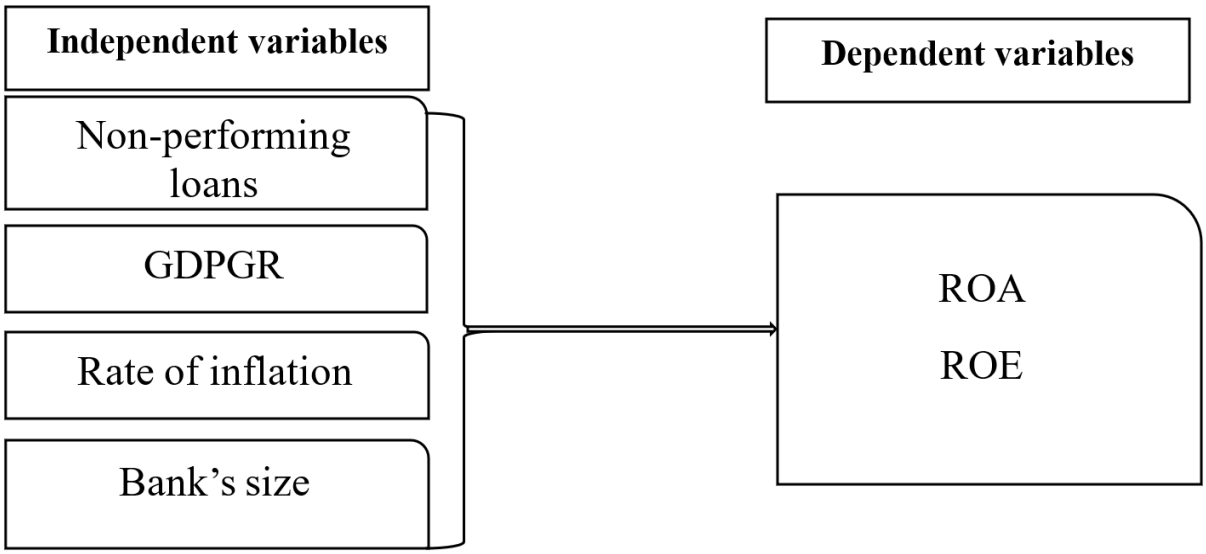

Figure 1. Conceptual framework.

The conceptual framework for the work is summarized in the Figure 1. The framework captures the variables adopted for the study comrpsing the independent and the dependent variables. This figure encapsulates the building blocks upon which the syudy is formulated. The independent or predictor variables include of non-perfroming loans (NPLs), gross domestic product growth rates (GDPGR), annual inflation rates and bank size.

In financial institutions, toxic or non-performing loans are defined as those loans where both the principal and interest payments are overdue for more than 90 days, or are likely to become delinquent in the future. These loans indicate financial stress within a bank, which reduces profitability by increasing loan loss provisions and impairing revenue. High NPL levels also reflect the broader economic conditions that affect banking stability and efficiency. The GDP growth rate measures the pace of economic growth or contraction, and influences corporate profits and banking activities. Higher GDP growth boosts business operations and consumer confidence, leading to increased lending and investment, while a slowdown tightens credit conditions and increases financial risk. The inflation rate measures the upsurge in the over-all price levels of goods and services over a stated period of time, impacting the ability of customers to purchase goods and services with money. For banks, high inflation erodes the real value of loan repayments and affects the rates of interests, whereas lower inflation leads to reduced interest rates and margins on traditional banking products, such as loans and deposits. Bank size, measured by total assets, capitalization, or market share, significantly affects the banking sector's resilience and operational scope. Larger banks benefit from economies of scale, risk diversification, and greater loss of management capacity, but face greater regulatory scrutiny and systemic risk challenges. Smaller banks, while possibly more agile, may have a higher exposure to local economic downturns.

Previous research has reviewed the role of non-performing loans in corporate and universal banks in various contexts, resulting in risky portfolios, unsecured loans, loans without proper or adequate collateral, slow or delayed payments by loan beneficiaries, signed but unexecuted loan renewal agreements, and loan agreements that violate banking laws and regulations (Anik et al., 2019). However, the current research investigates the impact bank's toxic assets, called non-performing loans, macroeconomic variables of GPD growth, inflation rate, and bank size have on the performance of selected banks in Ghana. The precise objectives of this research include, to explore the connection between non-performing loans and bank performance, determine the nexus between the rate of GDP growth and the performance of banks, assess the link between inflation rate and bank performance, and establish a relationship between bank size and bank performance

2. MATERIAL AND METHODOLOGY

The current study adopted panel dataset of the various banking firms from 2007 to 2021. This dataset comprises both cross-sectional and time series qualities. Following the recommendations of Wooldridge (2000), the panel nature of the data helps mitigate multicollinearity, which can arise when certain forms of data are encountered in a regression estimation. Instrumental variable-estimation techniques are typically used to address this issue. Data on the bank performance of the selected firms covering the period from 2007-2021 were independently collected. This study utilized a descriptive and exploratory methodology to scrutinize the consequences of NPLs on the actual performance of the selected banking institutions in Ghana between 2007 to 2021. The study population comprised nine listed banks. These banks were selected because they are listed on the GSE, their accounts are audited and monitored, and the data are publicly available. Researchers have used judgmental and purposive sampling methods to gain comprehensive understanding of this banking sector. The data collection process was guided by validity, convenience and accessibility, leading to the selection of the listed banks on the GES (Ghana Stock Exchange).

This research project relied on secondary data from the annual audited financial reports of the various firms. The information was gathered over the course of 15 years, from 2007 to 2021, including total loans, advances and provisions for loans. Moreover, the same measures utilized in this study were implemented in previous study by Asiedu and Atakli (2020) and Tomi, Emmanual, and Adeyinka (2020).

The purpose of this section is to operationalize the various variables used in the current research. The Table 1 displays a summary of the outcome (dependent) and predictor (independent) variables in this study, where the first column provides a list of the adopted variables and the succeeding columns offer notation and succinct definitions for each variable adopted.

Table 1. Variables, notation, and proxies of the research.

Variable	Notation	Definition
Outcome (Dependent) variables (Performance indicators)	ROA	Returns on assets. This tool calculates the performances of a banks relative to their total assets.
	ROE	Return on equity. ROE measures a company's profitability in relation to its equity.
Explanatory (Independent) variables Gross domestic product inflation Bank size	NPL	NPL (Non-performing loans) is a ratio that measures the percentage of loans in the group that are classified as non-performing (Overdue) to the total worth of the loan portfolio.
	GDPGR	GDP growth rate indicates the rate of economic growth that can influence bank performance.
	INFR	This reflects the rate at which prices rise, which can affect bank profitability.
	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

This study employs a comprehensive descriptive statistical and panel-regression analysis to evaluate the nexus and impact of NPLs, the gross domestic (GDP) growth rate, rate of inflation, and size of bank on the performance of the selected banks. This study examined the connection between the predictor and the outcome variables through a thorough summary and explanation of the examined data using descriptive statistics and regression analyses, as demonstrated by the regression equation. Specifically, a model of panel data regression is employed to formulate the following regression equations to illustrate the influence of NPLs, the GDP growth rate, inflation rate, and bank size on bank performance:

$$ROA_{it} = \beta_0 + \beta_1 NPL_{it} + \beta_2 GDPGR_{it} + \beta_3 INFR_{it} + \beta_4 BANKS_{it} + \epsilon_{it} \quad (1)$$

$$ROE_{it} = \beta_0 + \beta_1 NPL_{it} + \beta_2 GDPGR_{it} + \beta_3 INFR_{it} + \beta_4 BANKS_{it} + \epsilon_{it} \quad (2)$$

Where;

ROAit —Returns on Assets for entity i at time t. This measure evaluates the productivity of banks relative to their total worth / assets.

ROEit — Return on Equity, for company i at time t. ROE values the profitability of companies in consonance to their equity.

NPLit —Non-Performing Loans for entity i at time t. This represents the proportion of loans in default or close to default.

GDPGRit —GDP Growth Rate for entity i at time t. This indicates the rate of economic growth that can influence bank performance.

INFRit—Inflation Rate for entity i at time t. This reflects the rate at which prices rise, which can affect bank profitability.

BANKSit —Bank Size for entity i at time t. This variable typically represents the total assets or equity of a bank, influencing its performance due to economies of scale or market power.

$\beta 0$: Intercept term of the particular data regression model.

$\beta 1$, $\beta 2$, $\beta 3$, and $\beta 4$ are the coefficients depicting the effect of NPLs, the rates of GDP growth, rate of inflation rate, and the size of banks on ROA, respectively.

ϵit: The error term for entity i at time t, capturing unobserved factors affecting the return on assets.

3. PRESENTATION OF THE RESULT

3.1. Descriptive Statistics

The Table 2 provides a detailed summary of the descriptive statistics for both outcome and explanatory variables. The performance tools of returns on assets and returns on equity were utilized as indicators (proxies) for the dependent variable, while non-performing loans, provision for bad debt, inflation, bank size, and GDP acted as proxies for the independent variables. Descriptive statistics are depicted in eight different rows, encompassing the observation, kurtosis. Skewness, standard deviation, minimum, maximum, median and the mean average.

Table 2. Descriptive statistics.

Statitics	ROA	ROE	NPL	GDPGR	INFR	BANKS
Mean	0.94	2.92	2.25	5.37	12.38	6.18
Median	1.09	3.08	2.36	6.20	11.67	4.96
Maximum	1.94	3.87	3.90	13.60	18.13	22.26
Minimum	-3.22	-0.03	-1.45	0.51	7.144	0.53
Std. dev.	0.69	0.72	0.79	2.56	3.61	4.47
Skewness	-2.28	-2.22	-1.15	0.51	0.23	1.48
Kurtosis	10.93	9.11	5.76	4.84	1.68	5.28
Observations	215	215	215	215	215	215

Table 2 shows that typical return on assets amounts to 0.94%. However, within the same time-span, the highest returns on assets were 1.94%, while the lowest were -3.22%. The average returns on equity were roughly 2.92%, showing a peak at 3.87% and the lowest value at -0.03%. Moreover, the NPLs averaged 2.25%, ranging from 3.89% to -1.47%. The average GDP growth rate was approximately 5.37%, with the higher value of 13.60% and the lower value of 0.51%. Furthermore, the average (mean) inflation rate was 12.37%, with a minimum value of 7.14%, and a maximum of 18.13%. Lastly, the mean value for the size of banks was 6.18%, with a minimum of 0.53%, and maximum of 22.26%. These values show the validity and strength of each variable captured for study.

3.2. Regression Analysis- Return on Assets (ROA)

In this study, each bank has its own intercept value in the fixed model, allowing for independent calculation and representation of their specific effects. This approach is advantageous when banks have distinct qualities that influence research outcomes as they identify consistent bank features over time. Conversely, the random effects model assumes a uniform intercept for all banks, with bank-specific intercepts derived from a common distribution and treated as random variables. This method is useful when considering banks as random samples from a larger population, focusing on average impacts rather than on individual effects and efforts. This enables an assessment of the average effects across banks operating in the economy.

The Hausman test is aimed at determining which statistical model, whether the random-effects or fixed-effects model is more appropriate for a given investigation. By comparing their estimates, the test evaluates the null hypothesis which states that there are no consistent variances between models. The rejection of the null hypothesis is an indication that one of the models is superior and the other is inconsistent. The Hausman test assists in selecting between the random- and fixed-effects models based on their estimation accuracy. The random-effects model assumes a common intercept and focuses on average impacts, whereas the fixed-effects model allows for different intercept values, capturing heterogeneity. By comparing the estimated effects of these models (fixed and random effects), the Hausman test identifies the model that is better suited for the study as shown in Tables 3 and 4.

Hn: The random effect model is more suitable.

Ha: The fixed effect model is more fitting.

Another measure is the Chi-square test which is a statistical method that evaluates the significance of variation between observed and expected frequencies in categorical data. One of the tests used in this regard is the Hausman test, which compares random- and fixed-effect models. Assuming that the null hypothesis is not rejected, the p-value reveals the prospect of finding an extreme result similar to the one observed. If the p-value was below the 0.05 threshold, the null hypothesis was rejected and the fixed-effects model was chosen. Conversely, if the p-value is more than 0.05, the null hypothesis is not rejected and the random-effects model is chosen. In this study, the random-effects model was deemed the most appropriate for the data, as its p-value was detected to be above the 0.05 threshold, revealing a non-significant statistical variance between the models. Hence, a random-effects model was recommended for this research. To determine which model was suitable for panel data analysis, fixed and random effects assessments were done, and the outcomes are depicted in the Tables 3 and 4.

Table 3. Redundant fixed effects tests.

Effects test	Statistic	d.f.	Prob.
Cross-section F	3.99	(14,196)	0.00
Cross-section Chi-square	54.0	14.0	0.00

Table 4. Correlated random effects - Hausman test.

Test summary	Chi-sq. statistic	Chi-Sq. d.f.	Prob.
Cross-section random	2.54	4.00	0.64

The null hypothesis suggests that the random effects model is the preferable choice, whereas the alternative hypothesis proposes that the fixed effects model is the more suitable option. The data displayed in Tables 3 and 4 indicate that the random-effects model is the better choice for this study, as demonstrated by the Hausman test amplified by the p-value. Consequently, this study's analysis was conducted using a random-effects model.

Table 5. Panel EGLS (Cross-section random effects) – ROA.

Variable	Coefficient	Std. error	t-Statistic	Prob.
C	0.88	0.29	3.03	0.00
NPL	0.07	0.06	1.23	0.22
GDP	-0.01	0.02	-0.30	0.76
INFR	-0.02	0.01	-1.82	0.07
BANKS	0.03	0.01	2.33	0.02
R-squared	0.05	Mean dependent var		0.44
Adjusted R-squared	0.03	S.D. dependent var		0.62
S.E. of regression	0.61	Sum squared resid		79.2
F-statistic	2.55	Durbin-Watson stat		1.50
Prob(F-statistic)	0.04			

The result displayed in Table 5, presents a positive yet statistically insignificant association between a bank's non-performing loans (NPLs) and its returns on assets (ROA) with a coefficient of $\beta = 0.073$, t-value =1.228, and p-value = 0.221. This implies that NPLs do not significantly affect performance measured by ROA. This conclusion, contrary to the expected negative impact of NPLs on profitability due to increased credit losses and provisioning costs, suggesting that other operational or financial strategies within banks could mitigate these effects. For example, higher interest rates in performing loans, or effective loan loss-recovery mechanisms could offset the negative impacts of NPLs on performance. Moreover, the positive coefficient, although not statistically significant, warrants further investigation into the circumstances under which NPLs may not adversely affect bank profitability. This could encompass factors such as robust risk management practices or the economic environment that influences overall performance. Additional research could delve deeper into these dynamics, possibly by utilizing a larger dataset, or alternative econometric models to corroborate these findings and extend knowledge.

The findings indicate an inverse and a statistically non-significant influence of the GDP growth rate on performance (ROA), with a coefficient these values $\beta = -0.006$, t-value -0.304, and p-value = 0.762. These outcomes suggests that GDP growth does not exert meaningful impact on ROA. This unexpected negative sign might be interpreted as counterintuitive, because a thriving economy (reflected by higher GDP growth) is assumed to enhance business profitability, including that of banks, and improve the disposable income of citizens. However, the statistical insignificance of this relationship implies that other factors, possibly internal to banks or sector-specific economic conditions, play a more pivotal role in determining banks' performance measured by ROA than the general economic environment under which they operate.

The results in Table 5 further reveal that the inflation rate has a negative and statistically substantial impact on assets (ROA) at the 10% significance level as shown here ($\beta = -0.024$, $t = -1.817$, $p = 0.071$),. These results ndicate that a 1% increase in the inflation rate could lead to decrease in performance (ROA) by approximately 2.35%. This relationship suggests that higher inflation might erode bank profitability, potentially because of increased operational costs and reduced real earnings values. This finding highlights the importance of inflation as a key economic factor that negatively influences banks' fiscal performance, underscoring the necessity for effective inflation-controlled and management strategies within financial institutions.

The analysis demonstrates a direct (positive) and statistically substantial effect of bank size on returns on assets (ROA), with a coefficient of $\beta = 0.035$, t-value = 2.329), and p-value of 0.021, indicating succinctly that a 1% surge in bank's size leads to 3.5% growth in performance measured by ROA. This association suggests that bigger banks benefit from economies of scale due to their size, enhanced resource allocation, and greater market reach, all of which contribute to higher profitability. The significant impact of the size of banks on ROA highlights the

advantages of scale in the banking sector, suggesting that larger institutions might manage operational and financial risks more effectively than their smaller counterparts do.

3.3. Regression Analysis - Return on Equity (ROE)

A relative or comparative examination was undertaken to find out the most suitable model for the panel data analysis, comprising random-effect and fixed-effect tests. The outcomes of this assessment are displayed respectively in Tables 6 and 7. This test allows for the selection of the most suitable regression model for the statistical analysis in a study.

Table 6. Redundant fixed effects tests.

Effects test	Statistic	d.f.	Prob.
Cross-section F	3.26	(14,196)	0.00
Cross-section Chi-square	45.0	14.0	0.00

Table 7. Correlated random effects - Hausman test.

Test summary	Chi-sq. statistic	Chi-Sq. d.f.	Prob.
Cross-section random	1.42	4.00	0.84

The null hypothesis posits that the random effects model is a more favorable option, whereas the alternative hypothesis proposes that the fixed effects model is a more suitable choice. The findings in Tables 6 and 7 indicate that the random-effects model is the most fitting option needed for this analysis, as evidenced by the Hausman test. Consequently, the analysis of the current study was conducted using a random-effects model.

Table 8. Panel EGLS (Cross-section random effects) – ROE.

Variable	Coefficient	Std. error	t-statistic	Prob.
C	3.14	0.30	10.4	0.00
NPL	-0.03	0.06	-0.51	0.61
GDP	0.01	0.02	0.56	0.57
INFR	-0.03	0.01	-2.56	0.01
BANKS	0.04	0.02	2.45	0.02
R-squared	0.08	Mean dependent var		1.45
Adjusted R-squared	0.06	S.D. dependent var		0.66
S.E. of regression	0.64	Sum squared resid		84.9
F-statistic	4.49	Durbin-Watson stat		1.78
Prob(F-statistic)	0.00			

The findings of Model Two presented in Table 8 suggested that non-performing loans (NPLs) have a inverse but statistically insignificant influence on returns on equity (ROE) (β= -0.031, t= -0.514, p=0.608). This suggests that although there is a negative association (coefficient), the effect of NPLs on ROE is not statistically significant. This means we cannot conclude that NPLs have an impact on ROE based on this analysis. The negative coefficient of -0.031 indicates that, on average, there is a slight decrease in returns on equity associated with a rise in bank's non-performing loans. Specifically, a 1% upsurge in NPLs was linked with a 3.1% reduction in ROE, although this effect was very minute. It is worthy of note that the results of this investigation do not support the conclusion that non-performing loans have a statistically momentous effect on ROE. While there is an inverse (negative) affiliation between NPLs and ROE per the result, the impact is not statistically significant and, therefore, cannot be relied upon as evidence of a causal association between the two variables studied.

The data in Table 8 show that gross domestic product (GDP) growth rate has a direct yet statistically insignificant influence on returns on equity (ROE) with a coefficient of β = 0.011, p-value = 0.574 and t-value = 0.564. This result implies that within the dataset analyzed, changes in GDP growth do not significantly affect equity holders' profitability, suggesting that other internal or external factors may be more influential on ROE than GPD. A positive coefficient indicates a theoretically expected positive relationship, but its insignificance nature highlights that GDP growth alone may not be a reliable predictor of equity returns in the context of this study.

Again, the outcomes show a clear negative and statistically substantial (significant) effect of inflation rate on return on equity (ROE), with a coefficient (β = -0.034), t-value (2.562), and p-value (0.011). This finding infers that an upsurge of 1% in the inflation rate could condense ROE by 3.4%, underscoring how rising inflation can erode equity holders' profitability. This relationship may be due to the increased costs and reduced consumer purchasing power associated with higher inflation, which typically compresses profit margins and affects overall financial performance. The statistical import which is relevant at the 1% significant level highlights the robustness of the adverse effects of inflation on bank performance measured by equity returns, suggesting that inflation management should be a strategic focus for companies concerned with shareholder value. This discovery is in tune with earlier research findings that conclude a direct (positive) connection between NPLs and ROE as in this study.

The results in Table 8 also indicate a direct and statistically substantial effect of bank size on returns on equity (ROE), with beta value or coefficient (β = 0.037), t-value (2.452), and p-value less than 0.001. This outcome suggests that a 1% surge in bank size is linked with a 3.7% upsurge in performance measured by ROE. This finding implies that bigger financial institutions benefit from economies of scale, enhanced resource allocation, and potentially greater market power, which could in turn lead to higher profitability measures. The statistical relevance at the 1% level highlights the sturdiness of this relationship, indicating that bank size is a crucial factor in enhancing equity returns, likely due to the operational efficiencies, economies of scale, and the diversified revenue streams that bigger banks enjoy in the financial market.

4. DISCUSSION

The foremost purpose of this study was to explore the impact of NPLs and macroeconomic indicators on the performance of selected financial firms in Ghana. The result shows that bad debts called non-performing loans (NPLs) have a positive but statistically insignificant influence on returns on equity (ROE) (β= -0.031, t= -0.514, p=0.608). Some studies, such as those carried by Berger and DeYoung (1997) have found that increases in NPLs do not necessarily result in a decrease in profitability if managed efficiently, or if the bank operates in a high-rated-interest regime in which other revenue streams compensate for the losses on NPLs. These findings align with the idea that broader financial management and operational strategies play crucial roles in determining how NPLs affect overall financial performance. Conversely, numerous empirical scholarships argue a direct inverse connection between NPLs and bank's profitability measures such as the ROE. For instance, Louzis, Vouldis, and Metaxas (2012) demonstrate that NPLs significantly reduce bank profitability because of their higher cost implications and reduced interest income.

The result further reveals that gross domestic (GDP) growth rate has a direct or positive, yet statistically insignificant influence on returns on equity (ROE) with a coefficient β (0.011), t-value (0.564), and p-value (0.574). This result implies that within the dataset analyzed, changes in GDP growth do not significantly affect equity holders' profitability, suggesting that other internal or external factors may be more influential on ROE than GDP. The finding that the rate of GDP growth has a statistically insignificant influence on returns on equity (ROE)

aligns with Berger and Bouwman (2013) who suggest that macroeconomic impacts on bank profitability can be buffered by factors such as diversified revenue streams or strong risk management practices on the part of lenders.

However, this result contradicts the conclusions of Bolt, De Haan, Hoeberichts, Van Oordt, and Swank (2012) who conclude a substantial direct link between GDP growth and bank profitability, highlighting that higher economic growth generally improves asset quality and profitability. Similarly, Salas and Saurina (2002) reported a direct and strong link between economic growth and enhanced ROE, emphasizing increased lending opportunities and reduced default rates when the economy experiences periods of fiscal upturns. The contrasting conclusions illustrate the complex dynamics between variable macroeconomic conditions and bank financial stability or performance, suggesting that other internal or market-specific factors may play more decisive roles in the relationships. This calls for a nuanced approach in establishing this connection and interpreting same in a study.

In addition, the outcomes show a clear negative and substantially significant effect of the inflation rate on equity (ROE), with a coefficient (β = -0.034), t-value (2.562), and p-value (0.011). This finding implies that a 1% increase in the inflation rate could reduce ROE by 3.4%, underscoring how rising inflation can erode equity holders' profitability. The finding that inflation negatively impacts return on equity (ROE) aligns with Cosimano and McDonald (1998) who suggest that inflation erodes the real value of bank assets, while diminishing returns. This finding is supported by the Fisher (1930) theory, which posits that real interest rates decrease as inflation rises, adversely affecting bank profitability. However, these results contradict the work of Kashyap and Stein (2000) who find that banks might benefit from moderate inflation through wider interest rate spreads. English (2002) also suggests that banks can mitigate inflation impacts through financial innovation and adaptive practices, challenging the uniformly negative view of traditional economies and other scholars.

5. CONCLUSION

In conclusion, the regression results as displayed in Table 5 and 8 reveal the clear nuanced associations between non-performing loans, macroeconomic factors on the performance of banks in the local scene. The positive but non-substantial correlation between NPLs, and at the same time the inverse but non-substantial impact of NPL on ROE, indicate the complex interplay between these variables in the economic system. contrary to the theory of negative association between GDP growth and bank's performance. The conclusion depicts an inverse but no significance link between the growth rate of GDP and ROA, but a direct and non-substantial connection between GDP rate and ROE.

The interconnection between the rate of inflation and ROA and ROE reveals an inverse and non-substantial nexus, and an inverse but statistically important association between these sets of variables respectively. These go to prove that inflation rate volatility has a negative impact on bank performance, but the effect is not much significant on ROA, but substantial on the ROE. Finally, the size of a bank exhibits a direct and statistically significant influence on both the ROA and ROE of the financial institutions. Meaning, the bigger the size of a bank the better the performance exhibited by the returns on both assets employed and the reruns on shareholders equity.

The forgoing conclusions have implication and suggestions to bank management, partitioners,customers, and regulators. With the above, banks must continue to prioritize effective assets quality control and management even though the NPLs have an insignificant impact on ROA. Per the regression results, macroeconomic variables (GDP) do not substantially influence bank's performance. But management and policy makers must work hard to maintain macroeconomic stability to boost overall economic growth. Policy makers should promote stiff competition in the banking industry by encouraging the entrance of new players into the sector. Again, policy makers should encourage product diversification and consolidation in the banking system realizing that larger banks aid

performance and profitability. There is a need for further research to be conducted for a dynamic assessment of the relationships between these variables, to compare the results to earlier works, examine the impact of other macroeconomic and bank-specific variables on performance and draw decisive conclusions.

However, the study has certain limitations as well, usual of every research study. Secondary data was adopted for the study, which may contain outliers, measurement and other statistical errors, inaccuracies and less control by the researchers, and these can affect the overall outcome. The study made use of only banks operating in the local economy, and this can also impact the results obtained. Adopting other foreign banks in similar analyses may yield different outcome. A fifteen-year period was used between 2007-2021, so it is feasible that adopting a longer and different economic periods could result in a different conclusion.

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APPENDICES

Appendix A is the table containing the various variables and data gathered for the study as explained in the test. The data captured include the ROA, ROE, NPL, GDP, INFR, BANKS. Appendix A thus presents the data used for the analysis in this study.

Appendix A. Data used for the study.

S_ID	YEAR	ROA	ROE	NPL	GDP	INFR	BANKS
1	2007	0.69	2.34	2.89	6.40	10.9	5.98
1	2008	0.87	2.62	2.52	6.46	12.8	6.01
1	2009	0.54	2.34	2.08	4.84	18.1	5.24
1	2010	1.19	3.144	2.47	4.66	16.0	5.71
1	2011	1.29	3.21	1.90	6.62	8.73	6.39
1	2012	0.86	2.57	2.38	13.60	8.60	5.31
1	2013	1.60	3.36	2.52	7.31	11.7	2.89
1	2014	0.80	2.63	3.15	2.86	15.5	4.25
1	2015	0.00	0.00	3.52	2.12	17.1	3.45
1	2016	0.86	2.62	3.78	3.37	17.5	5.61
1	2017	0.83	2.60	3.76	8.13	12.4	5.95
1	2018	0.82	2.60	3.90	6.20	7.81	6.00
1	2019	0.78	2.57	3.73	6.51	7.14	5.72
1	2020	0.78	2.57	3.54	0.51	9.89	5.46
1	2021	0.77	2.56	3.44	5.26	9.97	5.28
2	2007	0.95	3.04	1.99	6.40	10.9	2.99
2	2008	0.87	3.11	2.788	6.46	12.8	3.23
2	2009	0.68	2.75	2.34	4.84	18.1	3.21
2	2010	0.56	2.44	2.43	4.66	16.0	2.84
2	2011	0.85	2.98	2.45	6.62	8.73	4.17
2	2012	1.45	2.91	3.00	13.60	8.60	2.99
2	2013	1.70	3.48	2.07	7.31	11.7	4.42
2	2014	1.64	3.58	1.82	2.86	15.5	5.34
2	2015	1.56	3.45	1.70	2.12	17.1	5.56
2	2016	-1.61	0.36	2.08	3.37	17.5	5.21
2	2017	1.151	3.07	2.39	8.13	12.4	2.99

2	2018	1.12	3.02	2.08	6.20	7.81	2.99
2	2019	1.12	3.02	2.29	6.51	7.14	2.99
2	2020	1.10	3.03	2.60	0.51	9.89	2.99
2	2021	1.11	3.04	2.42	5.26	9.97	2.99
3	2007	0.76	2.77	1.44	6.40	10.9	14.7
3	2008	0.81	2.90	0.69	6.46	12.8	15.8
3	2009	-0.05	1.41	0.69	4.84	18.1	13.7
3	2010	0.97	3.13	2.71	4.66	16.00	12.0
3	2011	-0.39	2.29	3.26	6.62	8.73	13.0
3	2012	1.54	3.89	2.83	13.6	8.60	0.00
3	2013	1.84	3.87	2.64	7.31	11.7	9.61
3	2014	1.85	3.71	2.30	2.86	15.5	8.36
3	2015	1.67	3.40	2.69	2.12	17.1	7.69
3	2016	1.58	3.38	2.83	3.37	17.5	8.76
3	2017	1.21	3.25	3.07	8.13	12.4	13.8
3	2018	1.20	3.20	2.90	6.20	7.81	12.9
3	2019	1.20	3.20	1.79	6.51	7.15	12.9
3	2020	1.21	3.19	2.16	0.51	9.89	12.6
3	2021	1.24	3.21	2.77	5.26	9.97	12.2
4	2007	0.29	3.23	1.60	6.40	10.9	3.11
4	2008	1.22	3.64	1.38	6.46	12.8	2.70
4	2009	0.01	2.63	1.58	4.84	18.1	2.42
4	2010	-0.01	2.33	1.38	4.66	16.0	2.31
4	2011	0.41	2.86	1.81	6.62	8.73	2.91
4	2012	0.35	2.42	2.16	13.6	8.60	0.00
4	2013	0.53	2.69	2.22	7.31	11.7	2.35
4	2014	0.55	2.84	1.96	2.86	15.5	2.20
4	2015	-0.36	1.92	0.00	2.12	17.1	2.31
4	2016	-0.63	1.73	2.90	3.37	17.4	2.36
4	2017	0.44	3.07	2.88	8.13	12.4	2.55
4	2018	0.43	3.02	2.84	6.20	7.81	2.60
4	2019	0.43	3.02	2.20	6.51	7.14	2.60
4	2020	0.40	2.96	2.78	0.51	9.89	2.58
4	2021	0.36	2.89	3.10	5.26	9.97	2.60
5	2007	1.30	3.71	1.24	6.40	10.9	2.82
5	2008	1.33	3.48	2.56	6.46	12.8	2.44
5	2009	1.28	3.31	2.08	4.84	18.1	2.22
5	2010	1.14	2.48	3.05	4.66	16.0	2.63
5	2011	1.27	2.70	2.50	6.62	8.73	3.06
5	2012	1.42	3.95	2.05	13.6	8.60	0.00
5	2013	1.21	3.48	2.30	7.31	11.7	0.79
5	2014	0.00	0.00	2.32	2.86	15.5	0.87
5	2015	-1.14	1.08	2.35	2.12	17.1	1.58
5	2016	1.01	3.09	2.39	3.37	175	2.09
5	2017	0.94	3.00	2.37	8.13	12.37	2.06
5	2018	0.89	2.87	2.44	6.20	7.81	1.97
5	2019	0.82	2.77	2.42	6.51	7.14	1.92
5	2020	0.76	2.69	2.45	0.51	9.89	1.88
5	2021	0.70	2.71	2.37	5.26	9.97	1.80
6	2007	1.43	3.33	1.43	6.40	10.9	0.53
6	2008	0.76	3.63	1.61	6.46	12.8	1.68
6	2009	1.45	2.62	1.79	4.84	18.1	2.04
6	2010	1.04	2.48	2.08	4.66	16.0	2.36
6	2011	1.74	2.58	1.95	6.62	8.73	2.35
6	2012	1.16	3.30	1.79	13.6	8.60	2.58
6	2013	1.73	3.34	2.50	7.31	11.7	2.66
6	2014	1.69	3.43	2.59	2.86	15.5	2.29
6	2015	1.28	3.26	3.16	2.12	17.1	2.29
6	2016	1.56	3.26	2.99	3.37	17.5	2.24

6	2017	1.56	3.22	1.42	8.13	12.4	1.95
6	2018	1.44	3.19	1.41	6.20	7.81	2.09
6	2019	1.44	3.18	0.98	6.51	7.14	2.23
6	2020	1.49	3.13	2.63	0.51	9.89	2.28
6	2021	1.49	3.16	2.53	5.26	9.97	2.30
7	2007	-1.56	1.5	1.67	6.40	10.9	1.87
7	2008	0.06	3.20	2.30	6.46	12.7	2.11
7	2009	-0.58	1.85	2.64	4.84	18.1	2.58
7	2010	-0.30	2.57	2.22	4.66	16.0	3.69
7	2011	-0.06	2.86	2.03	6.62	8.73	5.46
7	2012	0.73	3.13	2.20	13.6	8.60	5.03
7	2013	0.96	3.35	1.58	7.31	11.7	4.79
7	2014	1.01	3.07	0.90	2.86	15.5	5.98
7	2015	1.28	3.38	1.43	2.12	17.1	6.83
7	2016	-1.05	1.09	2.21	3.37	17.5	6.05
7	2017	0.62	2.60	2.77	8.13	12.4	2.25
7	2018	0.64	2.59	2.10	6.20	7.81	2.25
7	2019	0.65	2.58	0.577	6.51	7.14	2.25
7	2020	0.72	2.63	2.09	0.51	9.89	2.28
7	2021	0.79	2.67	2.11	5.26	9.97	2.30
8	2007	0.69	2.68	0.42	6.40	10.9	2.07
8	2008	0.42	3.03	2.03	6.46	12.8	3.62
8	2009	0.76	2.85	2.58	4.84	182	1.84
8	2010	0.74	2.39	2.54	4.66	16.0	2.05
8	2011	0.83	2.59	2.47	6.62	8.73	2.28
8	2012	0.80	2.33	2.58	13.6	8.60	2.22
8	2013	1.36	3.10	0.67	7.31	11.67	2.66
8	2014	1.41	3.14	2.42	2.86	15.5	2.61
8	2015	0.00	0.00	2.7	2.12	17.1	2.60
8	2016	0.00	0.00	2.86	3.37	17.5	2.69
8	2017	0.76	2.85	3.22	8.13	12.37	2.22
8	2018	0.46	2.21	2.47	6.20	7.81	2.35
8	2019	0.46	2.21	2.46	6.51	7.14	2.35
8	2020	0.40	2.14	2.45	0.51	9.89	2.38
8	2021	0.43	2.16	2.48	5.26	9.97	2.41
9	2007	0.55	2.62	1.83	6.4	10.9	4.42
9	2008	0.00	2.94	2.50	6.46	12.8	.0.00
9	2009	1.42	3.61	1.82	4.84	18.1	3.86
9	2010	-1.08	1.30	2.20	4.66	15.8	4.09
9	2011	-0.15	2.20	3.50	6.62	8.73	4.66
9	2012	0.22	2.45	2.64	13.6	8.60	0.00
9	2013	1.45	3.12	2.94	7.31	11.6	2.89
9	2014	1.23	2.80	3.18	2.86	15.5	4.58
9	2015	1.51	3.10	3.22	2.12	17.15	4.41
9	2016	1.04	2.95	2.69	3.37	17.5	4.28
9	2017	1.01	2.96	2.68	8.13	12.4	4.41
9	2018	1.01	3.00	2.67	6.20	7.81	4.41
9	2019	1.00	2.91	2.65	6.51	7.14	4.38
9	2020	1.00	2.87	2.70	0.51	9.89	4.31
9	2021	1.01	2.90	2.74	5.26	9.97	4.22
10	2007	1.11	3.64	-0.26	6.40	10.9	15.4
10	2008	-0.63	1.79	1.71	6.46	12.8	13.3
10	2009	0.34	2.16	2.28	4.84	18.1	10.3
10	2010	1.29	3.20	3.50	4.66	16.0	9.30
10	2011	1.47	3.27	3.23	6.62	8.73	10.1
10	2012	1.67	3.34	2.8	13.6	8.60	0.00
10	2013	1.82	3.48	2.57	7.31	11.7	6.59
10	2014	1.79	3.61	2.51	2.86	15.5	5.89
10	2015	1.59	3.41	2.96	2.12	17.2	8.00

10	2016	1.75	3.65	2.95	3.37	17.5	7.66
10	2017	1.46	3.52	2.61	8.13	12.4	10.4
10	2018	1.43	3.48	1.97	6.20	7.81	10.1
10	2019	1.46	3.50	1.89	6.51	7.14	10.6
10	2020	1.43	3.45	2.04	0.51	9.89	10.2
10	2021	1.41	3.41	1.97	5.26	9.97	10.0
11	2007	0.95	3.80	1.28	6.40	10.9	8.28
11	2008	1.35	3.73	1.13	6.46	12.8	8.43
11	2009	1.36	3.27	1.16	4.84	18.1	9.70
11	2010	1.35	3.29	1.13	4.66	15.9	8.61
11	2011	1.19	3.3	-0.41	6.62	8.73	11.3
11	2012	1.44	3.45	1.63	13.6	8.6	1.90
11	2013	1.39	3.51	1.77	7.31	11.7	13.1
11	2014	1.70	3.68	0.58	2.86	155	11.2
11	2015	1.60	3.62	0.58	2.1	17.1	10.9
11	2016	1.40	3.53	2.26	3.37	17.5	11.7
11	2017	1.36	3.62	2.26	8.12	12.4	9.57
11	2018	1.36	3.61	2.26	6.20	7.81	9.80
11	2019	1.36	3.61	2.26	6.51	7.14	9.76
11	2020	1.37	3.61	2.26	0.51	9.89	9.92
11	2021	1.38	3.58	2.26	5.26	9.97	10.0
12	2007	1.02	2.96	1.43	6.40	10.9	5.37
12	2008	1.27	3.10	0.22	6.46	12.8	4.20
12	2009	1.21	2.88	250	4.84	18.1	4.11
12	2010	1.04	2.81	2.40	4.66	16.0	3.89
12	2011	1.00	2.72	2.48	6.62	8.73	4.46
12	2012	1.02	2.88	2.64	13.6	8.60	0.00
12	2013	1.11	2.95	2.94	7.31	11.7	3.45
12	2014	1.09	3.11	2.62	2.85	15.5	3.31
12	2015	0.80	2.83	2.70	2.12	17.1	3.33
12	2016	0.96	2.96	2.83	3.37	17.5	3.55
12	2017	1.14	3.03	2.89	8.13	12.4	6.05
12	2018	1.11	3.00	2.69	6.20	7.81	4.96
12	2019	1.11	3.00	2.17	6.51	7.14	4.96
12	2020	1.08	2.97	1.91	0.51	9.89	4.76
12	2021	1.07	2.96	2.03	5.26	9.97	4.52
13	2002	0.11	2.67	2.50	3.60	9.36	1.23
13	2003	0.70	2.33	1.95	4.50	15.2	0.00
13	2004	0.72	2.75	0.00	5.20	23.6	2.38
13	2005	0.63	2.68	0.00	5.60	11.8	2.41
13	2006	1.01	3.19	-0.54	5.90	14.8	2.59
13	2007	1.02	3.67	-1.47	6.40	10.9	4.51
13	2008	1.17	3.47	2.40	6.46	12.8	4.42
13	2009	-1.90	0.18	2.56	4.84	18.1	5.09
13	2010	0.77	2.85	2.11	4.66	16.0	5.01
13	2011	0.93	2.77	1.61	6.62	8.73	6.63
13	2012	1.20	3.19	2.24	13.6	8.60	0.00
13	2013	1.30	3.41	2.20	7.31	11.7	8.31
13	2014	1.40	3.49	2.20	2.86	15.5	7.22
13	2015	1.15	3.22	3.09	2.12	17.15	7.1
13	2016	1.03	3.08	3.20	3.37	17.5	7.84
13	2017	0.91	3.09	2.42	8.13	12.40	4.98
13	2018	0.95	3.11	2.91	6.20	7.10	5.27
13	2019	0.95	3.11	2.00	6.51	7.14	5.27
13	2020	0.97	3.13	2.01	0.51	9.89	5.47
13	2021	0.99	3.16	1.90	5.26	9.97	5.70
14	2007	1.41	3.62	1.39	6.40	10.9	10.6
14	2008	1.21	3.61	1.50	6.46	12.8	9.48
14	2009	1.41	3.58	2.30	4.84	18.1	10.0

14	2010	1.47	3.66	2.48	4.66	15.o	9.47
14	2011	1.37	3.51	2.30	6.62	8.73	10.5
14	2012	1.74	3.77	2.30	13.6	8.60	18.1
14	2013	1.94	3.75	2.77	7.31	11.67	8.47
14	2014	1.78	3.68	330	2.86	15.49	6.92
14	2015	0.67	2.48	3.09	2.12	17.1	5.59
14	2016	1.66	3.37	3.21	3.38	17.5	6.34
14	2017	1.48	3.59	3.26	8.13	12.4	10.5
14	2018	1.48	3.57	3.36	6.20	7.81	9.93
14	2019	1.48	3.57	2.84	6.51	7.14	9.96
14	2020	1.48	3.55	3.21	0.51	9.89	9.6
14	2021	1.48	3.55	3.51	5.26	9.97	9.32
15	2007	-3.22	-0.03	0.00	6.40	10.9	8.19
15	2008	0.90	3.20	0.00	6.46	12.8	8.59
15	2009	0.80	2.83	1.84	4.84	18.1	8.74
15	2010	0.51	2.53	2.60	4.66	16.0	8.82
15	2011	1.21	3.06	2.36	6.62	8.73	8.84
15	2012	1.17	3.07	2.12	13.6	8.60	20.7
15	2013	1.34	3.41	1.59	7.31	11.7	21.4
15	2014	1.50	3.67	1.50	2.86	15.5	21.8
15	2015	1.42	3.19	2.35	2.12	17.1	21.7
15	2016	1.42	3.19	2.36	3.38	17.5	22.0
15	2017	1.32	3.14	1.97	8.13	12.4	22.3
15	2018	1.22	3.06	2.55	6.20	7.81	15.6
15	2019	1.30	3.09	2.80	6.51	7.14	15.7
15	2020	1.46	3.14	1.82	0.51	9.89	6.90
15	2021	0.92	2.65	1.48	5.26	9.97	6.95