Article

Effect of Macroeconomic Dynamics on Bank Asset Quality under Different Market Conditions: Evidence from Ghana

Richard Apau [1,*], Athenia Sibindi [1] and Leward Jeke [2]

1   Department of Finance, Risk Management and Banking, University of South Africa, Pretoria 0003, South Africa; sibinab@unisa.ac.za
2   Department of Economics, Nelson Mandela University, Port Elizabeth 6001, South Africa; leward.jeke@mandela.ac.za
*   Correspondence: owura.apau@yahoo.com

Abstract: This study assesses the dynamic relationship between macroeconomic factors and bank asset quality based on changes in the condition of stock market returns. A dynamic panel two-step system, the Generalized Method of Moments (system GMM) model, is employed using panel data from 18 universal banks spanning the period of 2007 to 2021. The analysis revealed that the real GDP growth rate, the average lending rate, and the real exchange rate represent a set of macroeconomic factors with a marked influence on banks' asset quality, where a unit increase in these variables drive 0.02 percent, 0.98 percent, and 0.27 percent improvement in asset quality, respectively. In addition, a high-inflation rate was found to exert an adverse effect of −0.32 percent on asset quality, as it affects borrowers' financial ability to meet loan repayment obligations. Furthermore, the study verified the existence of a positive relationship between market condition and asset quality, where a rise in the market return drives a 0.07 percent improvement in bank asset quality. This implies that bank performance adapts to changes in market conditions as posited under the Adaptive Market Hypothesis (AMH). Bank managers should consolidate banks' asset bases during conditions of market stability to withstand periodic market fluctuations to boost trading momentum. Policy recommendations are suggested to foster a conducive business environment for bank stability.

Keywords: bank asset quality; real GDP; inflation; average lending rate; real exchange rate; changing market conditions

1. Introduction

Universal banks represent a focal component of the financial system for the intermediation and allocation of financial resources across the sectors of the economy to facilitate socio-economic development (Guru and Yadav 2019; Haralayya and Aithal 2021). The efficiency of the banking industry is vital for the stability of the entire financial system within any economy. However, banks in Ghana, much like their international counterparts, continue to draw criticism for their persistent inability to exhibit superior performance in terms of returns on loans and advances, which constitute the main income-generating assets of banks (PwC 2019; Al Masud and Hossain 2021). Banks in Ghana, nevertheless, continue to experience an increase in the flow of investors and depositors' funds, while universal banking, like other financial enterprises, is premised on the ability to outperform the market. According to the Bank of Ghana (BoG 2021), the combined assets of licensed universal banks stood at GHS 166.4 billion as of the middle of the third quarter of 2021, which represents a notable increase of 16.7 percent compared with the previous year's value of GHS 138.6 billion. Nonetheless, pertinent issues regarding high levels of non-performing loans, risk management, operational efficiency, and liquidity constraints, which have implications for the asset quality and trading stability of the banks, continue to cause concern among analysts and policymakers (PwC 2019; BoG 2021).

The asymmetric asset quality and funds flow interaction of banks distorts information efficiency and allows strategic investors to earn excess returns while assuming minimal risk, which deviates from the underlying assumptions of the Efficient Market Hypothesis (EMH). Explanations suggest that in a robust financial market, the prices of financial assets adequately reflect the available market information on them. A trader can only achieve returns comparable to what the market generally offers, while an extraordinary return is possible only on the assumption of additional risk (Fama 2021). The relationship between inconsistent asset quality and funds flow suggests that their dynamics adapt to changes in market conditions and can be explained by the Adaptive Market Hypothesis (AMH). In terms of the AMH, the interaction between financial and economic variables is subject to changes in market conditions, and their characteristics therefore adapt to period market changeovers (Lo 2012). This activates human evolutionary tendencies such as overreaction, loss aversion, and cognitive bias among investors, who then exhibit trading behaviors that are contrary to established financial planning principles (Urquhart and McGroarty 2016). Therefore, arbitrageurs adopt opportunistic strategies to achieve excess gains regardless of the direction of their current performance.

In the above context, this current research is justified because most of the extant studies on banks' performance dynamics in Ghana do not account for the effect of the change in the condition of stock market returns on asset quality, while it is known in the literature that the performance of banks is linked to the condition of the market return (Boateng 2018; Altavilla et al. 2018; Mei et al. 2019; Elekdag et al. 2020; Bunyaminu et al. 2021). As a result, the extant analysis on bank performance in Ghana is unable to provide explanations for the continuous flow of customers' and investors' funds to persistently underperforming banks. This affects the informational efficiency of the financial system relative to fair asset pricing as universal banking is premised on the ability to outperform the market. Furthermore, the banking industry, much like other businesses in the financial sector, are sensitive to dynamic shocks, which emanate from changes in macroeconomic factors such as GDP growth, inflation, interest rate, and real exchange rate, while their performance is also linked to the condition of the market index. This calls for further investigation as the conditional analysis of the dynamics of asset quality in Ghana remains unexplored in the literature. As such, this study is underpinned by the theoretical framework of the AMH because the interaction between asset quality and the macroeconomic variables adapts to changes in stock market conditions.

Based on the preceding discussions, the purpose of this study is to assess the effect of macroeconomic factors on the asset quality of banks while considering the time-varying changes in the returns of the stock market in Ghana. This study makes significant contributions to the in the following ways. First, it represents a novel attempt of testing the effect of changes in stock market conditions on the asset quality of banks in Ghana. Second, the analysis of the effect of bullish and bearish market conditions on the asset quality of banks will provide useful guidance for investors and bank managers to optimize stock picking and investments under different market conditions. As such, this study presents impetus towards ensuring the stability of the banking industry, considering the changes in market conditions. Moreover, the findings provide a valuable toolkit for bank practitioners, analysts, investors, depositors, and policymakers who require bank data for investment and analysis. The analysis revealed that an increased real GDP growth rate, the average lending rate, and the real exchange rate positively predict asset quality, while a high-inflation rate deteriorates asset quality. The rest of the paper is structured as follows. Section 1 presents the theoretical framework and empirical literature review; Section 2 provides a description of the research methodology and details of the data sources, sampling criteria, and empirical model; Section 3 presents the results and discussion, and Section 4 contains the conclusion and suggestions regarding policy implications.

2. Literature Review

2.1. Theoretical Literature Review

Market fluctuations lead to contrarian investments with bank depositors' and investors' stock-picking decisions being influenced by adaptive tendencies such as overreaction, risk aversion, and overconfidence as against adherence to rational investment principles (Chen et al. 2018). Explanations posited in terms of the EMH imply that the prices of financial instruments, such as banks' assets, adequately reflect the available market information about them in instances where the financial system is informationally robust (Fama 2021). In such a case, excess returns are achieved only when an investor assumes a commensurate higher risk. However, periodic changeover in market conditions distorts the efficiency of the financial market and allows opportunistic traders to achieve extraordinary returns regardless of the direction of their current performance (Lo 2012).

In the above context, the dynamics of bank asset quality may extend beyond bank-level factors to include adaptation to changing market conditions as a means of sustaining trade momentum. In consequence, banks can attract investors' asset allocations despite their persistent inability to exhibit superior performance relative to the market amid significant operational inefficiencies. The banking industry, much like other subsectors of the economy, is subject to changes in fundamentals such as GDP growth, inflation, interest rate, and exchange rate, while these factors drive the direction of bank performance (Batten and Vo 2019). These dynamics suggest the existence of a convex relationship between bank asset quality and funds flow, with asset owners allocating funds disproportionately across recently outperforming and underperforming banks. As such, a conditional analysis is required to obtain accurate inferences about their interactions.

Proponents of evolutionary perspectives in financial planning explain that investors' responses to market updates, such as risk aversion, overinvesting, and anxiety about expected returns, are evidence of human evolution and adaptation to changing conditions (Madaan and Singh 2019). In this context, bank managers and investors alike may adapt to switches in market conditions regarding return volatility and variability while they strategize to sustain trading momentum, as explained under the AMH (Mishra and Mishra 2023). Explanations posited under the AMH suggest that the interaction between economic variables is unlikely to be the same under conditions of uncertainty in the market, as their dynamics change over time (Lo 2012; Obalade and Muzindutsi 2020). Therefore, the AMH represents a bridging theory through which the unpredictable actions of humans and market robustness are linked (Lo 2012; Kumar 2018).

In practice, investors take advantage of instability in market conditions to achieve extraordinary returns through arbitrage investments because the informational efficiency of the financial market is distorted during volatile periods of the market (Paramita et al. 2017). In this context, the unconditional principles underpinning the EMH cannot explain the asymmetric interaction between the asset quality and funds flow of the banks in Ghana. This is because behavioral hazards and reactionary tendencies may influence the trading decisions of bank investors and depositors under changing market conditions, while these dynamics are not factored by the underlying explanations of the EMH. Furthermore, bank performance, much like other financial variables, is sensitive to macroeconomic shocks, while the analysis of this remains a gap in the literature that requires investigation.

Accordingly, this study is purposed at analyzing the effect of the macroeconomic factors on asset quality under different market conditions. The normative guidelines of the AMH imply that the relationship between financial variables is contingent on periodic changes in market conditions, as systemic fluctuations affect the direction of their effect, which may activate adaptive trading and investment behaviors among asset managers and investors based on the current market trend (Lo 2012; Mushinada 2020). In the above context, the AMH represents the suitable theoretical context for testing the impact of the macroeconomic dynamics on the asset quality, considering the changes in the condition of the stock market returns.

2.2. Empirical Studies on the Effect of Macroeconomic Dynamics on Bank Asset Quality

The dynamics of banks' performance, much like other financial time series, are sensitive to changes in macroeconomic indicators and the condition of the stock market, where the return on banks' assets varies across market upturns and downturns (Bhimjee et al. 2016; O'Connell 2023). Employing a system GMM technique, Arrawatia et al. (2019) analyzed the determinants of banks' asset quality in India. The study finds GDP growth and real interest rate to have a positive effect on asset quality while inflation exerts a deteriorating influence on asset quality. This evidence suggests that an increase in national productivity promotes the quality of banks' assets through the expansion of the market to support business growth and liquidity flow and boost borrowers' ability to meet credit repayment commitments, which reduces the level of non-performing loans of banks. However, results obtained by Swamy (2017) showed GDP growth as having a negative effect on asset quality, with this effect being attributed to operational inefficiency and management laxity regarding loan recovery strategies as economic expansion allows investors and debtors to explore other avenues of asset allocation beyond banks. The positive effect of interest rates on asset quality documented by Arrawatia et al. (2019) indicates that an increase in lending rate implies an improvement in the returns on banks' assets, which reflects in enhanced interest margins. This evidence is, however, contradicted by more recent results obtained by Ogundipe et al. (2020), which suggest that an increase in lending rate implies a corresponding increase in non-performing loans and reflects a deteriorating spiral of asset quality.

The evidence obtained by Arrawatia et al. (2019) of the negative effect of inflation on asset quality is to be expected, as an increase in frequency brings about increases in the prices of goods and services, and the factors of production stagnate business growth and profitability while diminishing individuals' disposable income. In this way, the financial capacity of bank debtors is reduced, which has implications for the quality of banks' assets. While this result remains consistent with the explanations provided by Alhassan et al. (2014), it departs from the position adopted by Swamy (2017), who documents inflation as having a positive influence on bank asset quality. The study indicated that inflationary conditions allow banks to charge higher lending rates to improve interest income to offset losses that may accrue from non-performing credits to sustain trading momentum. While the findings of the above analyses make important inferences about the effect of the specific economic indicators on asset quality, they do, however, account for the effect of the stock market returns on bank performance, while changes in the market conditions can affect the quality of banks assets (Mensah and Premaratne 2018), which requires further analysis.

Using a one-step difference GMM approach, Al Masud and Hossain (2021) examined the determinants of non-performing loans to test the quality of bank assets in Bangladesh. Beyond bank-level dynamics, GDP growth, inflation, and interest rate were found to constitute a set of macroeconomic variables with important predictive effects on bank asset quality, all exerting positive influences on non-performing loans. Like the earlier findings of Arrawatia et al. (2019) regarding GDP growth, this evidence implies that economic growth engenders expansion of the market and promotes the rapid growth of businesses and individual incomes to support the ability of borrowers to meet debt service obligations. However, the position of Al Masud and Hossain (2021) and Arrawatia et al. (2019) on GDP growth and asset quality relations runs counter to the earlier results of De Bock and Demyanets (2012), who employed multiple panel regressions, including OLS, fixed effect, difference, and system GMM techniques to analyze the determinants of asset quality of banks across emerging markets. The study documents a significant negative coefficient for the GDP growth variables under all the specified models, which implies that an increase in national productivity deteriorates the quality of banks' credit portfolios because of managerial inefficiencies and cyclical shocks.

The evidence of a positive effect of inflation on asset quality presented by Al Masud and Hossain is supported by the earlier explanation offered by Swamy (2017), which suggested that an increase in the prices of general goods and services and operational overheads presents an opportunity for banks to raise lending rates to enhance interest

revenue to offset the accruing balances from impairment credits to ensure high-asset quality. However, the evidence of a positive effect of interest rates on asset quality put forward by Al Masud and Hossain (2021) is contradicted by the findings of the earlier analysis of Ogundipe et al. (2020), who posit that a rise in the interest rates of banks drives deteriorating trends in the performance of loan portfolios. This is because higher lending rate charges stagnate the growth of businesses and individuals' disposable income, thus affecting the capacity of the borrower to honor loan repayment agreements to improve asset quality. Although the analysis by Al Masud and Hossain (2021) highlights important dynamics of the effect of macroeconomic factors on asset quality, it does not capture the impact of exchange rate fluctuations and benchmark returns on asset quality, even though the performance of banks, much like any other financial variable, is subject to changes in market conditions (Tan 2016; Altavilla et al. 2018); this situation, therefore, calls for further investigation.

Goyal et al. (2023) apply the two-step GMM technique for assessing the drivers of a non-performing asset to check the asset quality of banks across developing countries using a panel dataset spanning the period of 2010 to 2020. The results of their study are similar to the findings of earlier analyses (Arrawatia et al. 2019; Al Masud and Hossain 2021), namely that the credit default portfolios of banks decline with economic growth, as an increase in productivity enhances the ability of borrowers to pay back loans on time as a result of improved cash flows. This reduces the level of non-performing loans and promotes the quality of banks' assets. In addition to the effect of economic growth, Goyal et al. (2023) document a negative relationship between inflation and asset quality, which implies an increase in price instability, which in turn affects the cost of business operations and individual livelihoods and thus deteriorates the financial capacity of borrowers to service loan repayment commitments; this, consequently, diminishes the quality of bank assets. This evidence is consistent with the earlier results obtained by Alhassan et al. (2014) and Arrawatia et al. (2019), which demonstrated that the financial capacity of bank debtors is adversely affected by systemic instability as a result of rising inflation, which suggests a negative implication for the asset quality of banks.

The findings of Goyal et al. (2023) thus provide an important impetus regarding explanations for the effect of specific macroeconomic indicators of GDP growth and inflation on asset quality. However, the analysis is limited in terms of providing explanations for the effect of interest rate and real exchange rate on asset quality, even though these factors are critical economic indicators with the potential to determine the direction of a bank's financial stability. Moreover, the study does not account for the time-varying effect of changes in market benchmark returns on asset quality while the performance of banks is linked to the performance of the stock market (Mensah and Premaratne 2018; Huy et al. 2020).

Results from an autoregressive distributed lag (ARDL) analysis of the macroeconomic determinants of non-performing loans in Bosnia and Herzegovina by Dzidic et al. (2022) show that economic growth leads to a reduction in non-performing loans, which implies an improvement in the asset quality of the banks. Economic expansion is linked to enhanced income levels, which reinforces the financial capacity of individual and corporate borrowers to meet their loan repayment obligations. Also, the findings of the study reinforced the deteriorating effect of higher inflationary rates on asset quality, as known in the literature. Scholars explain that higher inflationary conditions diminish the profitability of businesses and individual incomes, which have consequential implications for lenders in sustaining the quality of their assets.

In a related analysis, Badunenko et al. (2022) investigate the impact of managerial efficiency on the asset quality of banks in Italy. The result suggests that an increase in GDP drives a positive trend in the asset quality of banks. This evidence is consistent with the prior findings of Al Masud and Hossain (2021), which posits an impressive influence of economic growth on non-performing loans, thus enhancing the financial stability of the banks.

Based on the preceding discussions, it is visible that the asset quality is sensitive to the shocks from the macroeconomic factors and the condition of stock market returns, which remains a gap in the literature on bank performance in Ghana. As a result, further analysis is required to elicit explanations for the effect of the macroeconomic indicators on the asset quality of banks under changing stock market conditions. Like other developing and emerging economies, such as India, Nigeria, and Gambia, the performance of the banking industry of Ghana is sensitive to credit risk, net interest margin, capital adequacy, and inflation. Therefore, the findings of this study will provide important toolkits to drive policy formulation and sustainable banking investments in the economies, which have comparable performance dynamics in their banking sectors as Ghana (Boateng 2018; Olokoyo et al. 2019; Barry and Njie 2020). It is hypothesized in the study reported in this paper that the sensitivity of assets to macroeconomic factors is more pronounced under bullish, rather than bearish, market conditions.

3. Methodology

3.1. Data Sources and Sampling

A panel data review of 18 banks (operating with universal licenses) in Ghana spanning the period of 2007 to 2021 was employed for the analysis. Data on market returns and macroeconomic indicators were obtained from the official websites of the Ghana Stock Exchange (GSE) and Bank of Ghana (BoG). The return of the market was proxied by the Ghana Stock Exchange All Share (GSE All-Share Index) and Composite Indices. The Ghana Stock Exchange employed the GSE All-Share Index as the exchange's market index until 2010. However, in 2011 the exchange replaced the GSE All-Share Index with the Ghana Stock Exchange Composite Index (GSECI) as the market benchmark. The sampling criteria in the study involved a minimum requirement of six (6) years of data for a bank to be included in the analysis, while the sample was selected based on data availability. Of the 23 universal banks in Ghana, 18 were included in the sample for analysis, and the selection of the sample period (2007 to 2021) was intended to capture the effect of the global financial meltdown as well as the recent banking sector clean-up in Ghana on asset quality.

3.2. Empirical Model

Following Alhassan et al. (2014), a dynamic panel two-step system GMM mode is employed to analyze the effect of macroeconomic factors on banks' asset quality under time-varying market conditions. From the literature, the one-step difference generalized method of moments (GMM) approach represents a more enhanced estimation technique because it accounts for the endogeneity problems of simultaneity and unobserved heterogeneity associated with OLS models (Arellano and Bond 1991; Wintoki et al. 2012; Kripfganz and Schwarz 2019). However, the predictive ability of the one-step difference GMM is restricted where a small sample of data with limited time scope is employed for the analysis, as it generates all the parameters of the model simultaneously. The two-step system GMM approach is more robust than the difference GMM because the two-step system GMM approach does not allow misspecified assumptions on the time-invariant regressors to influence the estimation results for the coefficients of the time-varying variables (Roodman 2009; Arellano and Bond 1991). Moreover, the two-step system GMM allows estimators to rely on transformations to eliminate unit-specific heterogeneity (Kripfganz and Schwarz 2019). The dynamic panel model adopted is therefore represented as:

$$ASQ_{it} = \alpha_i + \beta_1 ASQ_{it-1} + \beta_2 RGDP_{t-1} + \beta_3 INFL_{t-1} + \beta_4 AVLR_{t-1}$$
$$+ \beta_5 RER_{t-1} + \beta_6 MKTCON_{t-1} + \varepsilon_{it}$$

where the dependent variable ASQ_{it} is the asset quality (ASQ) of bank i in time t. Asset quality is measured as the ratio of non-performing loans to total loan advances where a higher ASQ ratio value indicates a higher portfolio risk of bank assets (Banerjee and Velamuri 2015; Batten and Vo 2019). ASQ_{it-1} is the lag of bank i's asset quality in time $t-1$, while $RGDP_{t-1}$, $INFL_{t-1}$, $AVLR_{t-1}$, RER_{t-1}, and $MKTCON_{t-1}$ represent real gross

domestic product growth rate, inflation rate, average lending rate, real exchange rate, and market condition in time t − 1, respectively. The error term of the equation is denoted by ε_{it}.

RGDP growth rate is incorporated in the analysis to account for the impact of economic growth on bank performance in terms of asset quality, as the resilience and growth potential of the market in which banks operate is reflected by the direction of GDP growth, which has implications for asset quality (Alhassan et al. 2014; Foglia 2022). The level of bank interest charges has implications for the sustainability of businesses and individual livelihoods, as high-lending rates impede the expansion momentum of businesses. This impairs borrowers' ability to service loans on time, which in turn exerts an adverse effect on the quality of banks' assets (Ahamed 2017; Arrawatia et al. 2019). The AVLR is included in the regression to estimate the effect of the average lending rates of banks on asset quality.

INFL is included in the analysis to capture the effect of the inflation rate on the asset quality of banks, as the frequency of increases in general goods and services is suggestive of the trend of the current macroeconomic environment, which drives the determination of lending rates and operational cost of banks (Alhassan et al. 2014; Salike and Ao 2017). The dynamics of inflation thus have important consequences for bank asset quality because the level of inflation (whether high or low) in the economy influences individual and corporate income, and hence determines borrowers' ability to meet credit repayment obligations to minimize loan impairments and improve asset quality.

RER is incorporated in the analysis to estimate the impact of exchange rate volatility on the bank. From the literature, the stability of the macroeconomic environment is determined primarily by the rate at which the domestic currency is traded for foreign currencies (Kiganda 2014; Almaqtari et al. 2019). The domestic currency is expected to attract a higher exchange rate relative to its international counterparts and vice versa if the fundamentals are weak. Given that most universal banks engage in currency trade and foreign transactions for profit, any exchanges in the value of the domestic currency relative to the foreign currencies have implications for the general performance and asset quality of banks, especially regarding letters of credit issued on behalf of business clients.

Market condition (MKTCON) is incorporated into the equation as a dummy variable to test the effect of the stock market dynamics on the performance of banks in terms of asset quality. It is explained in the literature that the performance of universal banks is influenced by the return of the market index, as significant proportions of banks' assets are held in the portfolios traded on recognized stock exchanges (Tan 2016; Altavilla et al. 2018). Also, changes in the stock market returns have implications for the flow of depositors' funds to banks (Lin 2020). In this way, the performance of banks is affected by the return of the benchmark and volatilities, which exert a predictive influence on bank profitability. The market condition variable MKTCON takes the value 1 if the return of the market in the past year is greater than zero, Rm, [t − 1] > 0, denoting a bullish condition, and assumes a value 0 if the market return in the past year [t − 1] is less than or equal to zero, Rm, [t − 1] ≤ 0, reflecting a bearish condition (Fletcher 2000; Jun et al. 2014). Theoretically, a bullish market condition is explained as a period of sustained increase and less volatility in the returns of the financial assets on the market, whereas a bearish condition denotes a period of downward spiral and increased volatility in market returns (Lee et al. 2011; Amar et al. 2022). In the analysis conducted for the study, a positive and significant value (coefficient) of the market condition variable (MKTCON) implied that the asset quality of banks exhibited higher sensitivity to the changes in the macroeconomics under bullish market conditions rather than bearish conditions. A similar interpretation was posited for the sensitivity of asset quality to macroeconomic dynamics under changing market conditions if the value (coefficient) of the market condition variable was negative.

4. Results and Discussion

4.1. Descriptive Analysis

Table 1 provides descriptive statistics of the variables employed for the analysis. As shown from the table, a large difference exists between the maximum and minimum statistics of inflation (INFL), while asset quality (ASQ), real GDP growth rate (RGDP), the average lending rate (AVLR), and real exchange rate (RER) report moderate differences of 0.73 percent and 0.00 percent, 2.64 percent and −0.67 percent, 0.92 percent and 0.87 percent, and 1.80 percent and −0.03 percent, respectively. The highest mean value (12.63) in the sample is reported by inflation while the lowest value (0.048) is reported by asset quality. This implies that the rate of inflation is generally higher compared to the variables in the panel.

Table 1. Descriptive statistics of variables.

	ASQ	RGDP	INFL	AVLR	RER
Mean	0.048	1.543	12.632	0.894	1.113
Maximum	0.733	2.635	19.300	0.917	1.798
Minimum	0.003	−0.673	7.900	0.869	−0.031
Std. dev.	0.072	0.801	3.529	0.012	0.585
Skewness	6.758	−1.493	0.399	−0.417	−0.456
Kurtosis	59.777	4.976	1.837	2.875	1.749
Jarque-Bera	32,785.80	123.409	19.168	6.842	23.061
Probability	0.000	0.000	0.000	0.033	0.000
Observations	231	231	231	231	231
ADF	58.858 ***	104.007 ***	189.116 ***	125.440 ***	168.488 ***
IPS	−2.673 ***	−6.451 ***	−11.855 ***	−8.127 ***	−11.100 ***
LLC	−6.104 ***	−10.061 ***	−12.373 ***	−12.670 ***	−18.163 ***
Durbin–Watson test	2.096				
Breusch–Pagan LM test/(p-value)	170.027/(0.164)				

Source: Authors' estimations (2023). Note: *** denotes 1% significant levels.

Additionally, in Table 1, inflation reports the highest standard deviation value (7.90) while the lowest (0.01) is reported by the variable for average lending rate. This reinforces and indicates the volatility of the inflationary rate of the economy, which impacts the stability of the financial system which includes the banking industry. Also, the skewness of the series in the table is more than zero, while the kurtosis values of all the series in the sample are either higher than or below three. This implies an asymmetric or non-normal distribution of series, which makes it suited for the conditional model employed in this study. The skewness takes the value zero if the series is symmetrically or normally distributed. A positive skewness is reflected in a long-right tail while a negative skewness is reflected in a long-left tail (Ho and Yu 2015; Mishra et al. 2019). On the other hand, a given sample is assumed to follow a normal distribution if the value of the kurtosis statistic is three (Ausloos and Cerqueti 2018). In this context, the given series distribution is said to be flat or peaked, respectively, as compared to the normal if the kurtosis statistic value is below or above three. Furthermore, the *p*-values of the Jarque-Bera (JB) statistics of all the series in the panel are significant, which verifies the non-normal distribution of the data sample to make the conditional model of this research valid. JB statistics is a metric for ascertaining the goodness-of-fit test for a normal distribution of a sample and it is computed under the null hypothesis of a normal distribution. The significant *p*-values of the JB statistic of the series reported in Table 1 imply the rejection of the normal distribution assumption (Bai and Ng 2005; Zahid et al. 2012).

In addition, unit root tests are conducted using the Im et al. (2003), Augmented Dicky–Fuller (ADF)–Fisher, and Levin et al. (2002) techniques to test the stationarity of the variables to make the estimated model valid (Bilgili et al. 2010; Sehgal et al. 2013). As

shown in Table 1, all the variables report significant *p*-values for the different tests, which implies a rejection of the null hypothesis of non-stationarity of the panels. Moreover, the autocorrelation test results in Table 1 show the non-existence of serial correlation among the variables. The Durbin Watson statistic (2.096) falls within the acceptable range of 1.5 and 2.5, which means that the series employed in the study are noted as serially correlated (Vahid et al. 2017; Mahadevan and Ming 2019). Furthermore, the *p*-value (0.164) of the Breusch–Pagan LM test statistic is insignificant, which implies the non-existence of heteroskedasticity in the model (Halunga et al. 2017; Uyanto 2022).

4.2. Correlation Analysis

Table 2 presents the correlation matrix and variance inflation factor of the independent variables. From the literature, correlation analysis is conducted to determine the presence of multicollinearity issues among the independent variables, as highly intercorrelated regressors would generate spurious estimation results (Dormann et al. 2013; Gieure et al. 2019). Furthermore, correlation analysis helps to establish the association between the independent variables to determine how changes in one directly affect the other. A correlation value of 0.7 and below is indicative of the non-existence of multicollinearity problems between the independent variables. In Table 2, the highest correlation value (0.61) is reported between the average lending rate (AVLR) and inflation (INFL); this is below the acceptable level of 0.7. The highest value (2.56) of the variance inflation factor (VIF) reported for AVLR falls within the theoretically accepted limit of 10 and below (Saeed 2014). The problem of multicollinearity among the regressors is eliminated to ensure the reliability of model estimates. Beyond the multicollinearity considerations, important correlations exist between the independent variables. Inflation (INFL) reports a negative correlation with real GDP growth rate (RGDP), which implies that increased inflation impedes economic growth. This is consistent with the position taken in the literature in which high-inflation rates hamper a business's ability to expand because of an increase in operational costs (Salike and Ao 2017). This contradicts economic growth because of low productivity. Likewise, the real exchange rate (RER) reports negative correlations with RGDP, INFL, and AVLR. These relationships imply that exchange rate volatility affects economic growth adversely and causes the prices of goods and services to rise while it exerts downward pressure on the interest earnings of banks. It is known from the literature that increased fluctuation in the exchange rate causes significant instability in the macroeconomic fundamentals and affects the performance of businesses (Almaqtari et al. 2019). It is shown in Table 2 that the AVLR reports positive relationships with RGDP and INFL, indicating that an increase in the lending rates of banks drives economic growth, as the interest earnings and revenue of the banks improve, enhancing the general productivity of the economy. In much the same way, an increase in loan interest helps to moderate the increase in the prices of goods and services, as the amount of money in circulation in the economy is reduced. As explained in the literature, this keeps the rate of inflation at a slower pace (Taylor 2019).

Table 2. Correlation matrix.

	RGDP	INFL	AVLR	RER	VIF
RGDP	1.000				1.543
INFL	−0.211 ***	1.000			2.061
AVLR	0.269 ***	0.608 ***	1.000		2.558
RER	−0.443 ***	−0.148 **	−0.519 ***	1.000	1.651

Source: Authors' estimations (2023). Note: *** and ** denote 1% and 5% significant levels, respectively.

4.3. Results of the Empirical Model Estimation and Discussion of the Findings Relative to the Position of Prior Studies

Table 3 presents the system GMM model estimates for the effect of macroeconomic factors on bank asset quality under changing market conditions. ASQ_{t-1}, RGDP, INFL,

AVRL, RER, and MKTCON denote variables for lagged asset quality, real gross domestic product growth rate, inflation rate, real exchange rate, and market condition, respectively. From the table, lagged asset quality reports an insignificant negative relationship with current asset quality. This result implies that the past asset quality of the bank does not influence its future asset quality. This evidence contradicts the earlier results obtained by Alhassan et al. (2014), which found a significant positive relationship between lagged asset quality and non-performing loans and identified deteriorating credit portfolios as adversely affecting the performance of banks.

Table 3. Effect of macroeconomic dynamics on asset quality under different market conditions.

Independent Variables	Dependent Variable: ASQ		
	Coefficients	Standard Errors	*p*-Values
ASQ_{t-1}	−0.188	0.122	0.124
RGDP	0.022 **	0.009	0.014
INFL	−0.325 **	0.137	0.018
AVLR	0.981 ***	0.362	0.007
RER	0.270 ***	0.089	0.002
MKTCON	0.074 **	0.032	0.021
AR (2) test (*p*-value)		0.302	
Hansen test of over-identification (*p*-value)		0.371	
Diff-in-Hansen test of Exogeneity (*p*-value)		0.629	

Source: Authors' estimations (2023). Note: *** and ** denote 1% and 5% significant levels, respectively.

As shown in Table 3, the variable for the real gross domestic product (RGDP) reports a significant positive coefficient. This result suggests that a unit increase in national productivity drives an improvement in asset quality by 0.02 percent. This relationship is expected because improved GDP boosts individual income and avails more opportunities for business sustainability and rapid expansion (Alam et al. 2021). This evidence contradicts the findings of Foglia (2022) which indicates that economic growth drives a deteriorating effect on bank asset quality. However, intuitively, economic expansion is expected to support borrowers' ability to repay loans on time, which minimizes non-performing loans and enhances asset quality owing to an improvement in the standard of living. Practically, the direction of GDP growth indicates the size of the economy and the potential for market growth, which affects the performance of banks in terms of their ability to recover loan principals with interest from borrowers in the context of the prevailing economic conditions.

In Table 3, the variable for inflation rate (INFL) reports a significant negative relationship with asset quality. The result suggests that one unit increase in the inflation rate will exert an adverse effect of −0.33 percent on the asset quality of banks. This evidence supports the prior findings of Athanasoglou et al. (2008), as well as Sahyouni and Wang (2018), which explain that business growth is supported by a conducive macroeconomic environment where the cost of doing business is moderated by low prices of inputs and infrastructure to ensure profitability because of low inflation. In this way, a higher inflationary trading environment impedes the performance momentum of banks and their ability to expand because of high-operational costs. Also, the income flow of borrowers is deteriorated by the high cost of living, which affects their ability to meet loan repayment obligations to the banks (Sahyouni and Wang 2018). Ultimately, this leads to the accumulation of more non-performing loans and, consequently, poor asset quality.

The variable for the average lending rate (AVLR) reports a significant positive coefficient. This evidence implies that a unit increase in banks' interest on loans drives an impressive 0.98 percent improvement in asset quality. This finding is consistent with the explanations of Al Masud and Hossain (2021) in which higher lending rates improve interest income and the trading stability of banks. Banks will set lending rates based, primarily, on

the policy rate of the central bank to ensure operational stability and profitability (Florian et al. 2019). Thus, an increase in the lending rate improves profit margins while ensuring that adequate returns are generated on existing assets to offset losses accruing from non-performing and impaired loans. However, sustained higher lending rate charges can be counterproductive to the performance of the bank. This is because higher interest rates hamper the growth of businesses and diminish the financial capacity of borrowers to meet loan repayment commitments, which in turn deteriorates the quality of the banks' assets (Ogundipe et al. 2020).

From the table, the variable for the real exchange rate (RER) reports a significant positive relationship with asset quality. The results indicate that a unit increase in the real exchange rate will result in a 0.27 percent improvement in the asset quality of the banks. This result is consistent with the findings of Alhassan et al. (2014), which document a positive relationship between real exchange rate and asset quality. Through currency trade, the asset quality of banks is bolstered where there is a significant disparity between the price of foreign and domestic currencies for which borrowers are required to pay a higher price at commercial rates from the banks. In this context, the higher currency interest charges by the banks owing to the exchange rate volatility increase their interest income on financial assets and reinforce their stability under unstable market conditions. However, persistence in exchange rate volatility tends to stagnate bank performance, as the operational cost is increased because the forex fluctuations drive inflation (Almaqtari et al. 2019).

In Table 3, the market condition variable (MKTCON) reports a significant positive relationship with asset quality. The results show that a unit increase in the returns of the stock market will lead to an improvement in bank asset quality by 0.07 percent. This evidence supports the findings of prior studies (Bhimjee et al. 2016; Altavilla et al. 2018; Lin 2020) in which the performance of banks is linked to the direction of the market index, where the return on bank assets and quality is boosted under bullish conditions but deteriorates under bearish conditions. The returns of the market index have important implications for the performance and asset quality of banks. This is because a significant proportion of banks' investments are held in assets traded on market exchanges, while investors' reactions to changes in market trends affect banks' asset flows, thus implying a close connection between the dynamics of the stock market and bank performance (Shahzad et al. 2019). Moreover, this evidence supports the study's hypothesis that the sensitivity of asset quality to macroeconomic factors is more evident under bullish, rather than bearish, conditions.

5. Conclusions

The study was conducted to examine the effect of macroeconomic factors on asset quality under different market conditions in Ghana. Using panel data of 18 universal banks spanning the period of 2007 to 2021, a dynamic panel system, the GMM model, was used for the analysis. The real GDP growth rate, the average lending rate, and the real exchange rate were found to exert considerable predictive influence on banks' asset quality, considering changes in market conditions. This implies that real economic growth enhances business expansion and individuals' purchasing power to support the ability of the various categories of borrowers to meet loan repayment obligations on time, and to promote the asset quality of banks. The evidence for average lending rate and real exchange rate indicates that the return on banks' trading assets improves under high-interest regimes of industry, as well as periods of significant depreciation of the domestic currency where the banks sell foreign currencies at premium prices to corporate and retail clients. The interest income achieved by banks because of the increased volatility in exchange rates and high-loan interests serves as a stabilization buffer to offset losses that may accrue from impaired and non-performing loans.

In addition, an increase in the inflation rate exerts depressing pressure on the bank's asset quality, as frequent hikes in the prices of general goods and services deteriorate the cash flows of businesses and individuals owing to the high cost of operation and reduction

in the value of consumers' disposable income. This affects borrowers' ability to honor the contracted timelines for loan repayments and thus sustain the quality of banks' assets. Furthermore, the market condition was found to have a positive relationship with bank asset quality. This evidence verifies the close connection between the direction of benchmark return and the performance of banks. It further affirms that the interaction between macroeconomic dynamics and asset quality changes are in line with changes in market conditions, which supports the normative guidelines of the Adaptive Market Hypothesis.

As a policy recommendation, it is suggested that banks' efforts should focus on ensuring managerial efficiency while they consolidate their asset base during periods of market stability. This is because changes in market conditions can exert a spillover effect on bank performance as the level of non-performing loans worsens. Also, banks should exercise maximum constraint in the implementation of loan interest and foreign currency sale charges, as higher charges can affect borrowers' capacity to service loan repayment commitments on time, which has implications for asset quality. Moreover, policymakers should ensure that a conducive macroeconomic environment is sustained, as changes in the systemic factors suggest a predictive influence on the direction of bank performance and asset quality.

The limitation of this study pertains to the use of annual observations, which minimizes the data points employed in the analysis owing to data availability issues. Future studies could refine the results of this study by using high-frequency data such as monthly and quarterly data points. Future research can test the time-varying effect of non-performing loans on the financial stability of banks, as the explanations regarding the drivers of banks' stability remain inconclusive, and further investigations are therefore called for. This subject was not dealt with in the study under review, as it falls outside the objective and focus of the current analysis.

Author Contributions: Conceptualization: R.A.; methodology: R.A. and A.S.; software: R.A.; validation: R.A. and A.S.; formal analysis: R.A. and A.S.; investigation: R.A.; resources: R.A., A.S. and L.J.; data curation: R.A. and A.S.; writing—original draft preparation: R.A. and L.J.; writing—review and editing: R.A., A.S. and L.J.; visualization: R.A.; supervision: A.S. and L.J.; project administration: A.S. and L.J. All authors have read and agreed to the published version of the manuscript.

References

Ahamed, Mostak M. 2017. Asset quality, non-interest income, and bank profitability: Evidence from Indian banks. *Economic Modelling* 63: 1–14. [CrossRef]

Alam, Md Shabbir, Mustafa Raza Rabbani, Mohammad Tausif, Tausif Rumzi, and Joji Abey. 2021. Banks' performance and economic growth in India: A panel cointegration analysis. *Economies* 9: 38. [CrossRef]

Alhassan, Abdul Latif, Charles Andoh, and Anthony Kyereboah-Coleman. 2014. Asset quality in a crisis period: An empirical examination of Ghanaian banks. *Review of Development Finance* 4: 50–62. [CrossRef]

Almaqtari, Faozi A., Eissa A. Al-Homaidi, Mosab I. Tabash, and Najib H. Farhan. 2019. The determinants of profitability of Indian commercial banks: A panel data approach. *International Journal of Finance & Economics* 24: 168–85. [CrossRef]

Al Masud, Abdullah, and Mohammad A. Hossain. 2021. Determinants of Non Performing Loan (NPL): A Case of an Emerging Economy. *Southeast Business Review* 10: 46–60.

Altavilla, Carlo, Miguel Boucinha, and José-Luis Peydró. 2018. Monetary policy and bank profitability in a low interest rate environment. *Economic Policy* 33: 531–86. [CrossRef]

Amar, Amine B., Stéphane Goutte, and Mohammad Isleimeyyeh. 2022. Asymmetric cyclical connectedness on the commodity markets: Further insights from bull and bear markets. *The Quarterly Review of Economics and Finance* 85: 386–400. [CrossRef]

Arellano, Manuel, and Stephen Bond. 1991. Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations. *The Review of Economic Studies* 58: 277–97. [CrossRef]

Arrawatia, Rakesh, Varun Dawar, Debasish Maitra, and Saumya Ranjan Dash. 2019. Asset quality determinants of Indian banks: Empirical evidence and policy issues. *Journal of Public Affairs* 19: e1937. [CrossRef]

Athanasoglou, Panayiotis P., Sophocles N. Brissimis, and Matthaios D. Delis. 2008. Bank-specific, industry-specific and macroeconomic determinants of bank profitability. *Journal of International Financial Markets, Institutions and Money* 18: 121–36. [CrossRef]

Ausloos, Marcel, and Roy Cerqueti. 2018. Intriguing yet simple skewness: Kurtosis relation in economic and demographic data distributions, pointing to preferential attachment processes. *Journal of Applied Statistics* 45: 2202–18. [CrossRef]

Badunenko, Oleg, Aristeidis Dadoukis, Giulia Fusi, and Richard Simper. 2022. The impact of efficiency on asset quality in banking. *The European Journal of Finance* 28: 596–620. [CrossRef]

Bai, Jushan, and Serena Ng. 2005. Tests for skewness, kurtosis, and normality for time series data. *Journal of Business & Economic Statistics* 23: 49–60. [CrossRef]

Banerjee, Sreejata, and Malathi Velamuri. 2015. The conundrum of profitability versus soundness for banks by ownership type: Evidence from the Indian banking sector. *Review of Financial Economics* 26: 12–24. [CrossRef]

Barry, Muhammed Alieu, and Matarr Njie. 2020. Performance of Conventional Banking and Islamic Banking in the Gambia: A Comparative Study Using Financial Ratio Analysis. *International Journal for Research in Engineering Application & Management (IJREAM)* 6: 191–206.

Batten, Jonathan, and Xuan V. Vo. 2019. Determinants of bank profitability—Evidence from Vietnam. *Emerging Markets Finance and Trade* 55: 1417–28. [CrossRef]

Bhimjee, Diptes C., Ramos B. Sofia, and Dias G. José. 2016. Banking industry performance in the wake of the global financial crisis. *International Review of Financial Analysis* 48: 376–87. [CrossRef]

Bilgili, Faik, Yalçın Pamuk, and Nadide Sevil Halıcı Tuluce. 2010. Short run and long run dynamics of residential electricity consumption: Homogeneous and heterogeneous panel estimations for OECD. *MPRA Paper* 3: 113–26.

Boateng, Kwadwo. 2018. Determinants of Bank Profitability: A Comparative Study of Indian and Ghanaian Banks. *Journal of Emerging Technology and Innovative Research* 5: 643–54. Available online: https://ssrn.com/abstract=3358818 (accessed on 29 March 2022).

BoG. 2021. Bank of Ghana Annual Report and Financial Statements. Available online: https://www.bog.gov.gh/news/2021-annual-report-and-financial-statements/ (accessed on 11 September 2022).

Bunyaminu, Alhassan, Ibrahim Nandom Yakubu, and Shani Bashiru. 2021. The Effect off Financial Leverage on Profitability: An Empirical Analysis of Recapitalized Banks in Ghana. *International Journal of Accounting & Finance Review* 7: 93–102. [CrossRef]

Chen, Qiwei, Xiuping Hua, and Ying Jiang. 2018. Contrarian strategy and herding behaviour in the Chinese stock market. *The European Journal of Finance* 24: 1552–68. [CrossRef]

De Bock, Reinout, and Alexander Demyanets. 2012. Bank asset quality in emerging markets: Determinants and spillovers. International Monetary Fund Working Paper WP/12/71. Available online: https://www.imf.org/external/pubs/ft/wp/2012/wp1271.pdf (accessed on 22 May 2023).

Dormann, Carsten F., Jane Elith, Sven Bacher, Carsten Buchmann, Gudrun Carl, Gabriel Carré, Jaime R. García Marquéz, Bernd Gruber, Bruno Lafourcade, Pedro J. Leitão, and et al. 2013. Collinearity: A review of methods to deal with it and a simulation study evaluating their performance. *Ecography* 36: 27–46. [CrossRef]

Dzidic, Ante, Igor Zivko, and Anela Colak. 2022. Macroeconomic Factors of Non-Performing Loans: The Case of Bosnia and Herzegovina. *Ekonomska Misao i Praksa* 31: 421–38. [CrossRef]

Elekdag, Selim, Sheheryar Malik, and Srobona Mitra. 2020. Breaking the bank? A probabilistic assessment of Euro area bank profitability. *Journal of Banking & Finance* 120: 105949.

Fama, Eugene F. 2021. Efficient Capital Markets: A Review of Theory and Empirical Work. *The Journal of Finance* 25: 383–417. [CrossRef]

Fletcher, Jonathan. 2000. On the conditional relationship between beta and return in international stock returns. *International Review of Financial Analysis* 9: 235–45. [CrossRef]

Florian, Heider, Farzad Saidi, and Glenn Schepens. 2019. Life below zero: Bank lending under negative policy rates. *The Review of Financial Studies* 32: 3728–61. [CrossRef]

Foglia, Matteo. 2022. Non-performing loans and macroeconomics factors: The Italian case. *Risks* 10: 21. [CrossRef]

Gieure, Clara, Maria del Mar Benavides-Espinosa, and Salvador Roig-Dobón. 2019. Entrepreneurial intentions in an international university environment. *International Journal of Entrepreneurial Behaviour and Research* 25: 1605–20. [CrossRef]

Goyal, Shikha, Jaya Mamta Prosad, Nandita Mishra, and Nikita Singhal. 2023. Non-performing Assets and Institutional Quality Indicators: Evidence from Developing Countries. *Vision* 1–13. [CrossRef]

Guru, Biplab Kumar, and Inder S. Yadav. 2019. Financial development and economic growth: Panel evidence from BRICS. *Journal of Economics, Finance and Administrative Science* 24: 113–26. [CrossRef]

Halunga, Andreea G., Chris D. Orme, and Takashi Yamagata. 2017. A heteroskedasticity robust Breusch–Pagan test for Contemporaneous correlation in dynamic panel data models. *Journal of Econometrics* 198: 209–30. [CrossRef]

Haralayya, Bhadrappa, and Perdoor Sreeramana Aithal. 2021. Implications of banking sector on economic development in India. *George Washington International Law Review* 7: 631–42.

Ho, Andrew D., and Carol C. Yu. 2015. Descriptive statistics for modern test score distributions: Skewness, kurtosis, discreteness, and ceiling effects. *Educational and Psychological Measurement* 75: 365–88. [CrossRef] [PubMed]

Huy, Dinh T., Bui T. Ngoc, Loan Thu, and Anh P. Tuan. 2020. Impact of selected factors on stock price: A case study of Vietcombank in Vietnam. *Entrepreneurship and Sustainability Issues* 7: 2715. [CrossRef]

Im, Kyung So, M. Hashem Pesaran, and Yongcheol Shin. 2003. Testing for unit roots in heterogeneous panels. *Journal of Econometrics* 115: 53–74. [CrossRef]

Jun, Xiao, Mingsheng Li, and Jing Shi. 2014. Volatile market condition and investor clientele effects on mutual fund flow performance relationship. *Pacific-Basin Finance Journal* 29: 310–34. [CrossRef]

Kiganda, Evans O. 2014. Effect of macroeconomic factors on commercial banks profitability in Kenya: Case of equity bank limited. *Journal of Economics and Sustainable Development* 5: 46–56.

Kripfganz, Sebastian, and Claudia Schwarz. 2019. Estimation of linear dynamic panel data models with time-invariant regressors. *Journal of Applied Econometrics* 34: 526–46. [CrossRef]

Kumar, Rakesh. 2018. Risk, uncertainty and stock returns predictability—A case of emerging equity markets. *Journal of Financial Economic Policy* 10: 438–55. [CrossRef]

Lee, Jen-Sin, Chin-Tai Kuo, and Pi-Hsia Yen. 2011. Market states and initial returns: Evidence from Taiwanese IPOs. *Emerging Markets Finance and Trade* 47: 6–20. [CrossRef]

Levin, Andrew, Chien-Fu Lin, and Chia-Shang James Chu. 2002. Unit root tests in panel data: Asymptotic and finite-sample properties. *Journal of Econometrics* 108: 1–24. [CrossRef]

Lin, Leming. 2020. Bank deposits and the stock market. *The Review of Financial Studies* 33: 2622–58. [CrossRef]

Lo, Andrew W. 2012. Adaptive markets and the new world order (corrected May 2012). *Financial Analysts Journal* 68: 18–29. [CrossRef]

Madaan, Geetika, and Sanjeet Singh. 2019. An analysis of behavioral biases in investment decision-making. *International Journal of Financial Research* 10: 55–67. [CrossRef]

Mahadevan, Ananthalakshmi, and Hsiang Y. Ming. 2019. Impact of training methods on employee performance in a direct selling organization, Malaysia. *IOSR Journal of Business and Management* 21: 7–14.

Mei, Cheng L., Kwabena N. Takyi, Richard Barfi, and Osei-Assembly B. Mandella. 2019. Credit risk and bank profitability of commercial banks in Ghana. *International Journal of Research and Development* 4: 74–83. [CrossRef]

Mensah, Jones O., and Gamini Premaratne. 2018. Dependence patterns among Asian banking sector stocks: A copula approach. *Research in International Business and Finance* 41: 516–46. [CrossRef]

Mishra, Prabhaker, Chandra M. Pandey, Uttam Singh, Anshul Gupta, Chinmoy Sahu, and Amit Keshri. 2019. Descriptive statistics and normality tests for statistical data. *Annals of Cardiac Anaesthesia* 22: 67.

Mishra, Pramod K., and Sudhir K. Mishra. 2023. Do banking and financial services sectors show herding behaviour in Indian Stock Market amid COVID-19 pandemic? Insights from quantile regression approach. *Millennial Asia* 14: 54–84. [CrossRef]

Mushinada, Venkata N. C. 2020. How do investors behave in the context of a market crash? Evidence from India. *International Journal of Emerging Markets* 15: 1201–17. [CrossRef]

Obalade, Adefemi A., and Paul F. Muzindutsi. 2020. Validating the adaptive market hypothesis in the Tunisian stock market. *International Journal of Trade and Global Markets* 13: 42–51. [CrossRef]

O'Connell, Michael. 2023. Bank-specific, industry-specific and macroeconomic determinants of bank profitability: Evidence from the UK. *Studies in Economics and Finance* 40: 155–74. [CrossRef]

Ogundipe, Adeyemi S., Francis A. Abolade, and Olaoye S. Adebayo. 2020. Interest rates and loan performance of deposit money banks in Nigeria. *International Journal of Economics and Business Review* 8: 13–20. [CrossRef]

Olokoyo, Felicia, Oyakhilome Ibhagui, Abiola Babajide, and Chika Yinka-Banjo. 2019. The impact of macroeconomic variables on bank performance in Nigeria. *Savings and Development* 43: 1–13.

Paramita, Santi V., Bahri Jafar, and Ifan Wicaksana Siregar. 2017. Market timing and stock selection performance of mutual fund in bull and bear market condition. *International Journal of Monetary Economics and Finance* 10: 309–21. [CrossRef]

PwC. 2019. Ghana Banking Survey 2019. Available online: https://www.pwc.com/gh/en/assets/pdf/ghana-banking-survey-2019 .pdf (accessed on 12 October 2022).

Roodman, David. 2009. How to do xtabond2: An introduction to difference and system GMM in Stata. *The Stata Journal* 9: 86–136. [CrossRef]

Saeed, Muhammad S. 2014. Bank-related, industry-related and macroeconomic factors affecting bank profitability: A case of the United Kingdom. *Research Journal of Finance and Accounting* 5: 42–50.

Sahyouni, Ahmad, and Man Wang. 2018. The determinants of bank profitability: Does liquidity creation matter? *Journal of Economics and Financial Analysis* 2: 61–85. [CrossRef]

Salike, Nimesh, and Biao Ao. 2017. Determinants of bank's profitability: Role of poor asset quality in Asia. *China Finance Review International* 8: 216–31. [CrossRef]

Sehgal, Sanjay, Wasim Ahmad, and Florent Deisting. 2013. A re-assessment of the role of the financial sector in driving economic growth: Recent evidence from cross country data. *International Journal of Economics and Finance* 5: 133. [CrossRef]

Shahzad, Syed Jawad H., Thi Hong Van Hoang, and Jose Arreola-Hernandez. 2019. Risk spillovers between large banks and the financial sector: Asymmetric evidence from Europe. *Finance Research Letters* 28: 153–59. [CrossRef]

Swamy, Vighneswara. 2017. Determinants of bank asset quality and profitability: An empirical assessment. *Applied Economics Quarterly* 63: 97–135. [CrossRef]

Tan, Yong. 2016. The impacts of risk and competition on bank profitability in China. *Journal of International Financial Markets, Institutions and Money* 40: 85–110. [CrossRef]

Taylor, John B. 2019. Inflation targeting in high inflation emerging economies: Lessons about rules and instruments. *Journal of Applied Economics* 22: 103–16. [CrossRef]

Urquhart, Andrew, and Frank McGroarty. 2016. Are stock markets really efficient? Evidence of the adaptive market hypothesis. *International Review of Financial Analysis* 47: 39–49. [CrossRef]

Uyanto, Stanislaus S. 2022. Monte Carlo power comparison of seven most commonly used heteroscedasticity tests. *Communications in Statistics-Simulation and Computation* 51: 2065–82. [CrossRef]

Vahid, Fariba, Karim Nemati, and Mohammad Kheiry. 2017. The impact of financial constraints on the relationship between cash flow and external financing of companies listed in Stock Exchange. *HELIX* 7: 937–43.

Wintoki, Babajide M., James S. Linck, and Jeffry M. Netter. 2012. Endogeneity and the dynamics of internal corporate governance. *Journal of Financial Economics* 105: 581–606. [CrossRef]

Zahid, Faisal M., Shahla Ramzan, and Shumila Ramzan. 2012. A parametric and non-parametric approach for testing random walk behavior and efficiency of Pakistani stock market. *International Journal of Science and Technology* 2: 316–22.