Macroeconomic Uncertainties and Bank Lending in Nigeria

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Abstract

For some decades, macroeconomic uncertainties have constituted a significant factor shaping the behaviour of lending among financial institutions in Nigeria. This has therefore served as a cog in the wheel of progress limiting their financial intermediation roles. Based on the foregoing, an examination into bank lending and macroeconomic uncertainties in Nigeria using secondary quarterly time series data for twenty three years (1996Q1-2018Q4) were investigated. Autoregressive distributed lag (ADRL) and Toda Yamamoto non-granger causality tests were employed. Findings from the study reveal that economic uncertainties, economic growth and macroeconomic variables have a long-run relationship with bank lending in Nigeria. The study further reveals that in the short and long run, economic uncertainties negatively affect bank lending. Again, findings reveal that economic growth exerts positive impacts on bank lending both in the short and long run. Results from the study also indicate that macroeconomic variables exert noticeable effect on bank lending. Toda Yamamoto non-granger causality result demonstrates the existence of unidirectional causal relationship running from economic uncertainties to bank lending. Based on these findings, the study recommends that it is important for monetary authority to make suitable choice of monetary policy reaction functions with vast information set and close attention so as to stabilise the macro-economy variables within the country.

Keywords: Macroeconomic Uncertainties, Bank Lending, Domestic Credit, Money Supply.

JEL Classifications: E32, E51

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1. Introduction

Financial institutions, particularly banks, often experience a significant level of uncertainties arising from the content of policy changes and timing. No one could overwhelmingly cast doubts that macroeconomic uncertainty has attracted researchers' interest. The global financial crisis of 2007 to 2009 permeates nations' world over; the turmoil that raged during the crisis period has led to recessions in Africa, Europe, America, and many other parts of the world. Recently, is the COVID 19 pandemic which shook the world, the occurrence has left a significant imprint on world financial system, particularly in the area of bank lending (Caglayan & Xu, 2019).

Consequently, banks tend to be highly cautioned and repugnance to uncertainty (Gissler, Oldfather, & Ruffino, 2016). Banks are traditionally in the business of collecting deposits from customers and making out loans to various economic agents such as individuals, companies, organisations, and the government. They assist in undertaking viable investments and developmental initiatives that will help in the socio-economic improvement of the country (Olokoyo, 2011). Banks lend for various maturity periods, ranging from short term, medium term, to long-term. However, consequent upon the unstable macroeconomic condition and weak economic growth, investors cannot predict the outcome of their return, and this raises the lending rate due to the increase in loan defaults by customers. Despite series of economic recovery strategies, Nigeria's macroeconomic environment remains under significant uncertainty as the country continues to experience various instability and volatility in macroeconomic factors (Marshal, 2017). This pace of uncertainty also affects bank lending. According to Valencia (2016), during uncertainty and bad times, banks tend to increase their capital buffer due to higher costs of external financing.

Specifically, studies relating to macroeconomic uncertainty and bank lending behavior abound in literature. Ivakhnenkov, Hlushchenko and Sverenko (2020); Yitayaw (2021); Rossi, Borroni, Piva and Lippi (2019); Eickmeier, Worms, and Hofmann (2009) Baker, Bloom and Davis (2016); Somoye and Ilo (2009); Marshal (2017); Ujuju and Etale (2016); Ladime, Kumankana and Osei (2013); Malede (2014) among others have provided evidence of relationship between the two variables with conflicting outcome. Therefore, the debate is still open to further studies due to the inconclusive result and the growing wave of uncertainty in economic variables of developing countries like Nigeria. This study differentiates itself from previous studies in Nigeria that are limited in scope and coverage. We specifically employed macroeconomic variables (economic uncertainty, unemployment rate, trade openness, growth rate of gross domestic product, inflation rate, real effective exchange rate, credit to private sector, money supply and government consumption expenditure) that is peculiar to Nigerian economy. Economic uncertainty as a variable was specifically added as it measures the level of the index of economic uncertainty posed by aggregate economic variables in a country. In the same way, bank lending was measured as the ratio of total loans to total assets of deposit money banks. This assists in accounting for the extent of intermediation roles of banks in a given economy.

Again, divergence was noticed in the studies conducted across developed and developing economies; while some established positive association between economic uncertainty and bank lending (Eickmeier, Worms & Hofmann, 2009; Chi & Li, 2017; Whyte, 2020), others established negative relationship (Tran, 2020; Caglayan & Xu, 2019; Nguyen & Vo, 2018; Lodenius, 2017; Bordo, Duca & Koch, 2016; Bhattarai, 2019; Yakubu, Omosola & Obiezue, 2018. However, most of the macroeconomic variables employed in these studies do not consider the peculiarity of Nigerian economy characterized with incessant movement in economic variables. This might have noticeably contributed to the inconsistencies in their results conducted across the globe. Hence, it becomes urgent and relevant for this study to be carried out with the view to specifically investigate macroeconomic uncertainty and bank lending in Nigeria.

2. Literature Review

2.1. Conceptual Review

2.1.1. Macroeconomic Uncertainty

From an economic perspective, uncertainty is often generally described as the conditional volatility of a phenomenon that makes it impossible to forecast (Yitayaw, 2021). Uncertainty is defined as the conditional volatility; the component of the future value of multiple series which cannot be forecast. Specifically, macroeconomic uncertainty is defined as the common variations across many series rather than any single series, as suggested by the uncertainty-based business cycle theories (Gupta, Olasehinde-Williams, & Wohar, 2020). According to Henzel and Rengel (2014), macroeconomic uncertainty refers to the common movement of time-varying behaviour surrounding the dynamics of a broad range of variables. Macroeconomic uncertainty is the degree of unpredictability for the future direction of the economy, ranging from several topics, the monetary and fiscal policies in each country, and the trade friction between any two countries (Yitayaw, 2021; Wu, Li, Zheng, & Liu, 2020).

2.1.2. Macroeconomic Uncertainty and Bank Lending

Bank lending according to Ivakhnenkov et al., (2020) is the totality of credit or the extent of credit made available to different economic actors in the country. Lodenius (2017) defined bank lending as the aggregate amount of money provided by the banks in an economy. Churchill (2014) showed that bank loan behaviour is influenced by macroeconomic factors prevalent in the economy. The uncertain nature of these factors and the general performance of the economy showed by macroeconomic aggregates such as inflation, money supply, industrial capacity utilisation, employment level, exchange rate, interest rate, and real GDP, among others, are determinants of the general loan behaviour of a bank. Talavera, Caglayan and Xu (2019) predict a non-monotonic relationship between bank lending and macroeconomic uncertainty.

Bank lending to the private sector may be influenced not only by monetary policy actions and the movements of macroeconomic aggregates but also may vigorously respond to variations in

macroeconomic uncertainty stirred by expected variation in monetary policies (Yitayaw, 2021). In particular, macroeconomic uncertainty will affect the cross-sectional distribution of deposit money banks' loan-to-asset ratios. If banks are profit-maximising enterprises that must acquire costly information on borrowers, then the decision to extend loans to new or existing customers will be affected by both the current and near-term expected state of the macro-economy as dictated by variation in monetary policies (Rossi, et al., 2019).

2.2. Theoretical Framework

The theoretical framework for investigating the relationship between macroeconomic uncertainty and bank lending is underpinned on the uncertainty-credit hypotheses introduced by Bernanke, Cara and Friedman (1991) in Rossi, et al., (2019). These hypotheses contributed to the numerous postulations on bank lending that capital constraint contributes to the unwillingness to lend and hence occasioning slow credit expansion. The theory is based on theoretical discussion with no evidence of mathematical model/derivation. According to the theory, an essential factor underlying a bank's loan pricing policy is its impact on the bank's stock of loyal customers, as well as on those customers' deposits. The quality of a depositor's relationship is the primary consideration in determining the availability and pricing of credit to customers. A positive balance of sustained cash flow provides an incentive for banks to extend credit to the borrower (Rossi, et al., 2019).

2.3. Empirical Review

Bashir and Ibrahim (2020) assessed the effects of macroeconomic variables on bank credit in Saudi Arabia. Time series data spanning twenty three years (1993 to 2019) was harnessed. The autoregressive distributed lag model (ARDL) method of econometric technique was used to analyse the short and long-run relationship between major macroeconomic variables and bank credit. Findings from the study showed that the real exchange rate and money supply have positive long-run effects on bank credit relatively to the negative relationship between inflation and bank credit. The study also determined that Gross domestic product (GDP) has a negative association with total bank credit. In the short-run, the effect of GDP on bank credit is negative, whereas inflation has a positive influence on bank credit.

Fachrurrozie and Anisykurlillah (2020) investigated the determinants of non-performing loan in the Republic of Indonesia. The quantitative research method was adopted in the study. The Regression estimation approach was adopted in the study. Results from the study revealed that capital adequacy risk and net interest margin did not influence nonperforming loan, credit risk and loan to deposit ratio had a positive effect on non-performing loan; the study noticed that loan monitoring moderated the effects of net interest margin on non-performing loan. Girma (2020) analysed the factors that determine lending reactions in commercial banks of Ethiopia. The panel based research method was adopted in the study. Panel data spanning eight years (2010-2017) was gathered for eleven banks in Ethiopia. The panel regression analysis - fixed effect regression technique was used

in the study's estimations. Findings from the study indicated that deposit ratio and bank ownership depicted significant positive effect on lending behaviour of banks under the investigation; liquidity ratio, bank size and efficiency ratio have negative but statistically insignificant on bank lending. While exchange rate, lending rate and gross domestic product exert positive insignificant effect. The study's result also suggested that reserve requirement ratio and inflation rate have negative but insignificant relationship with lending behaviour of banks under the investigation.

Havidz and Obeng-Amponsah (2020) examined banking industry specific and macroeconomic determinants of credit risk in Indonesia. The panel based approach was adopted in the study. Quarterly data covering 2014 to 2019 was called from the Bank scope database of world development indicators. Data amassed in the study were analysed using GMM approach; this is towards accommodating lagged determinant variable used in the model. Findings from the study revealed that bank-specific variable have stronger influence to credit risk compare to macroeconomic variable; the study also established that banks in this study maintain a prudent management in managing its credit risk.

Hosen, Broni, and Uddin (2020) examined bank specific and macroeconomic elements on non-performing loans in Bangladesh. The panel based method was adopted in the study. Data spanning five years (2015-2018) was gleaned for twenty-six conventional banks and four Islamic banks in Bangladesh. The study employed the Panel Ordinary Least Square (OLS) approach in analyzing data and findings revealed insignificant positive effect of macroeconomic elements on non-performing loans. Hoque, Alam, Burman and Alam (2020) specifically assessed the evolution and determinants of spread of interest rate in commercial banks operating in Bangladesh and determined how the spread of interest rate is influenced by bank characteristics, banking industry characteristics and macroeconomic variables. The panel based research method was adopted in the study. Panel datasets for 30 listed banking firms spanning twelve years (2006 to 2017) was gathered in the study. The fixed and random effect estimation was used in analysing data gathered in the study. Findings from the study revealed that credit risk, bank size, and net interest rate income ratio maintained positive relationship with spread of interest rate.

In Saudi Arabia Miyajima (2020) determined factors that influence bank lending. The panel approach was employed in the study. Panel datasets spanning sixteen years (2000-2015) was gathered from various banks in the country. The study adopted the generalized method of moments in estimating data gathered in the study, findings from the study revealed that bank lending is associated with strong bank balance sheet conditions (high capital ratio, and growth of nonperforming loan, provisioning and deposits), and higher growth of both oil prices and non-oil private sector gross domestic product. The study also determined that lower bank concentration encourages bank lending.

In Nigeria, Sanni, Salami and Uthman (2020) assessed the determinants of bank performance. Adopting the panel based approach, the study gleaned data from 17 Nigerian deposit money banks and macroeconomic data spanning seven years (2012-2018). The study adopted the Arellano-Bover

one-step system GMM estimation technique in estimating data gathered in the study. Findings from the study revealed that higher probability of investors, depositors and other stakeholders being indecisive when analyzing banks performance. Tran (2020) investigated a channel through which economic policy uncertainty may harm the real economy through bank lending behaviour. Applying a dataset of US bank holding companies over the period 2000:Q1 to 2017:Q4, the study documented a negative relationship between economic policy uncertainty (EPU) and banks' lending decisions.

In Nigeria, factors that determinant bank lending were studied by Oyebowale (2019) for the period between 1961 and 2016 using the ARDL-ECM estimator together with VECM Granger causality. The study found that a long-run unidirectional causality running from bank lending growth to loan-to-deposit ratio in Nigeria. Furthermore, short-run bidirectional causality exists between growth in loan-to-deposit ratio and growth in bank lending in Nigeria. A short-run unidirectional causality runs from growth in broad money to growth in bank lending. Thus, the results indicated that inflation coupled with growth of loan-to-deposit ratio determine bank lending in Nigeria.

Also in Nigeria, Marshal (2017) examined bank lending and the dynamics behaviour of macroeconomic for the period 1976-2016. Applying the ARDL estimator, it reported a long-run equilibrium relationship between macroeconomic variables and bank lending behaviour in Nigeria. Furthermore, the ratio of bank capitalisation serves as crucial bank internal variable that explains lending behaviour, given the nature of macroeconomic dynamics. In addition, the money supply is an essential macro-variable that explains bank lending behaviour. Lodenius (2017) investigated the effect of macroeconomic uncertainty on the loan supply. Panel data of 21 Nordic banks from 1997Q1 to 2016Q3 were gleaned. Adopted in the analysis are ordinary least square regressions and GARCH models to estimate data gathered. Findings from the study indicated the macroeconomic uncertainty and loans supplied by Nordic banks' related negatively.

Ujuju and Etale (2016) investigated the relationship between interest rate, economic growth, and bank lending in Nigeria. The study gleamed secondary time-series panel data on variables from the Central Bank of Nigeria (CBN) Statistical Bulletin for the period 1985 to 2014. The study employed the Ordinary Least Squares (OLS) technique to analyse data. The study found that interest rates had a negative relationship with bank lending in Nigeria, while economic growth had a positive correlation with bank lending in Nigeria.

Ndubaku, Ifeanyi, Nze, and Onyemere (2017) examined the impact of monetary policy regimes on the performance of deposit money banks in Nigeria. The study used descriptive and ex-post facto research design. It utilised time series data collected from the Central Bank of Nigeria Bulletin. The study covered the SAP Period (1986 to 1999) and Post-SAP Period (2000 to 2013). The study utilised Multiple Regression and Pearson Product Moment Correlation techniques to analyse the data collected while it tested the hypotheses using the t-test statistic. The monetary policy rate was the independent variable, while total assets value, deposit mobilisation, loans and advances, and credit to

the private sector were the dependent variables in different regression equations. The study discovered that the monetary policy rate during the SAP period did not have a significant impact on the total assets value, deposit mobilisation, loans and advances, and credit to the private sector. Furthermore, the monetary policy rate during the Post SAP period had a significant impact on the total assets value, deposit mobilisation, loans and advances, and credit to the private sector, respectively.

3. Methodology

The analysis was first conducted with unit root test; this was followed by ARDL Bounds Test, and the Toda-Yamamoto non-Granger Causality Tests. The study employed secondary data sourced from various issued of CBN Statistical Bulletin and the World Uncertainty Index database. The data from these sources span from 1996 to 2018. Brief descriptions of the methods are:

3.1. Unit Root Analysis

A time series is stated as non-stationary if the mean and variance of the time series changes over time. On the other hand, a time series is stated as stationary if the mean and variance are constant over time. In estimating a regression model, it is important to ensure that all time-series data are stationary with constant mean and variance over time. Moreso, the test is employed to check the order of integration-I(d) for each variable as this will suggest the exact regression model that should be estimated. Therefore, the stationarity of all the variables in this study is confirmed using the Augmented Dickey-Fuller Unit Root test (ADF-URT).

3.2. Autoregressive Distributed Lag (ADRL) Model Test

This study adopts the ARDL bounds testing procedure which was proposed by Pesaran and Shin (1999) and espoused by Pesaran, Shin, and Smith (2001) to determine the existence of long-run equilibrium relationships among the variables which will ensure the soundness of estimation results and conclusions about the parameters of the model. The ARDL bounds testing approach to co-integration does not require classification of the order of integration of the series since the co-integration test can be performed regardless of whether the series is I(0) or I(1), or fractionally co-integrated, that is I(0)/I(1). The ARDL approach is suitable even for studies dealing with small sample analysis.

3.3. Toda Yamamoto non-Granger Causality Test

The principal objective of this study is to establish the causal direction between macroeconomic uncertainties and bank lending in Nigeria using the Toda and Yamamoto (1995) causality test. Accordingly, the Toda-Yamamoto (T-Y) non-Granger causality test is employed to check the existence of a causal relationship between these two variables.

3.4. Model Specification

In examining the nexus between macroeconomic uncertainty and bank lending in Nigeria from 1996 to 2018, this study modifies the model of Lodenius (2017). The study investigated the relationship between macroeconomic uncertainty and banks' loan supply in the Nordic countries. The study specified an empirical model as follows:

$$LTA = f\left(MU, I, \frac{CE}{TA}, IP, TA, FED\right) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3.1)$$

Where: the dependent variable, LTA, is the ratio between gross loans and total assets. MU is equal to the macroeconomic uncertainty. Furthermore, I is inflation, $\frac{CE}{TA}$ is the ratio of common equity and total assets, IP stands for industrial production, TA is the logarithm of total assets, FED is the effective federal funds rate.

This study modified the model of Lodenius (2017) by making use of country-specific macroeconomic variables applicable to Nigeria's economic policy landscape. The modification is important considering the vagaries of macroeconomic uncertainty that is more noticeable in a developing country like Nigeria. The study captured the subset measures of economic growth, economic uncertainty and macroeconomic variables which are GDP per capita growth (GDP), economic uncertainty (MUI) and macroeconomic variables which is decomposed into money supply (M2), inflation (INFR), real exchange rate (EG), government expenditure (GEXP) and unemployment rate (UNE). Domestic credit to the private sector (CPS) and trade openness (OPEN) are used as control variables in the study's estimations. However, loan to total assets was maintained as proxy for bank lending (Dependent Variable) denoted as (BKL) while the study excluded industrial production because of insufficient observations on the variable. For simplicity, the functional model for this study is presented as follows:

$$BKL = f\,(MUI, UNE, OPEN, GDP, INFR, EXG, CPS, M2, GEXP) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3.2)$$

Where: BKL represents the ratio of total loans to total assets of deposit money banks, MUI is macroeconomics uncertainty, UNE is unemployment rate; OPEN is trade openness; GDP is the growth rate of GDP; INFR is the inflation rate; EXG is a real effective exchange rate; CPS is domestic credit to the private sector; M2 is the money supply; Furthermore, GEXP is government consumption expenditure.

3.5. Variable Description and Measurements

Bank Lending (BKL):- This is the aggregate amount of money provided by the banks in an economy. It is measured as the ratio of total loans and total assets and represents the dependent variable. Total loans are defined as gross loans minus impaired loans.

Economic Uncertainty:- This refers to the index of economic uncertainty posed by aggregate economic variables in a country. It was measured by the level of the index of economic uncertainty in a country released in the world uncertainty index database.

Gross Domestic Product (GDP) per capita:- It is the annual percentage growth in GDP per capita in constant 2010 U.S. dollars. It is measured as the ratio of GDP to the midyear population.

Money Supply (M2):- This is the total value of monetary assets available in an economy at a specific time and measured by broad money supply.

Inflation Rate (INFR):- This is used to test macroeconomic stability. Rising inflation distorts economic agents' decisions. Hence, they are discouraged from investing in the economy. It is measured as the annual % change in the consumer price index.

Unemployment Rate (UNE):- This is a measure of the prevalence of unemployment, and it is calculated as a percentage by dividing the number of unemployed individuals by all individuals currently in the labour force.

Real Exchange Rate (EXG):- It indicates the variations in the value of a country's currency at constant prices measured in terms of the product of the value of its domestic currency. It is measured as real effective exchange rate.

Domestic credit to the private sector (CPS):- Domestic credit to the private sector (DCPS) refers to financial resources provided to the private sector by deposit-taking institutions. It is a quantity-based measure of financial sector development, which indicates the depth of the financial sector. It is measured as a percentage of GDP.

Government Consumption (GEXP):- It refers to the role of government in promoting economic productivity. It is a measure of the size of the government activities relating to current expenditures for purchases of goods and services. It is measured as the general government final consumption expenditure relative to GDP.

Trade Openness (OPEN):- It shows the level of openness of the Nigerian economy to trade with the rest of the world. It is measured as the percentage contribution of the ratio of the total value of import and export of goods and services to GDP

4. Findings and Discussion

4.1. Unit Root Test

The ADF unit root test is performed with constant and linear trend. Table 1 presents the results of the ADF unit root tests.

Table 1. ADF unit root test results

	Level		First Difference		
Variable	Constant	Constant + Trend	Constant	Constant + Trend	Decision
BKL	-1.288	-3.972**	----------	----------	I(0)
	(0.632)	(0.013)			
MUI	-3.541***	-4.687***	----------	----------	I(0)
	(0.009)	(0.001)			
UNE	0.498	-0.761	-9.584***	-9.894***	I(1)
	(0.986)	(0.965)	(0.000)	(0.000)	
OPEN	-2.104	-2.675	-9.385***	-9.332***	I(1)
	(0.244)	(0.249)	(0.000)	(0.000)	
GDP	-1.511	-1.158	-2.774*	-3.541**	I(1)
	(0.524)	(0.912)	(0.083)	(0.038)	
INFR	-4.138***	-4.001**	----------	----------	I(0)
	(0.001)	(0.012)			
EXG	-2.487	-2.355	-9.402***	-9.433***	I(1)
	(0.121)	(0.400)	(0.000)	(0.000)	
CPS	-1.902	-1.602	-9.419***	-9.497***	I(1)
	(0.330)	(0.785)	(0.000)	(0.000)	
M2	-1.596	-1.901	-9.579***	-9.589***	I(1)
	(0.481)	(0.646)	(0.000)	(0.000)	
GEXP	-1.170	-1.663	-9.472***	-9.516***	I(1)
	(0.393)	(0.760)	(0.000)	(0.000)	

***, ** & * denote rejection of H_0 at 1%, 5% and 10% significance levels, respectively.
Also, figures in brackets are p-values and the variables are used in logarithm form except inflation.
Source: Author's computation (2022)

Table 1 reveals that BKL, MUI and INFR are stationary at level while UNE, OPEN, GDP, EXG, CPS, M2 and GEXP are stationary after first differencing. This indicates that BKL, MUI and INFR are integrated in the zero order, that is I(0) series, while UNE, OPEN, GDP, EXG, CPS, M2 and GEXP are integrated in the first order, that is, they are I(1) series. It can be observed that the variables are integrated in different order and they are a mix of I(0) and I(1) series. For the reason that all the variables are not all I(0) series and there is no I(2) series, the condition for using the ARDL modelling approach is satisfied.

Table 2. ARDL bounds test result

		Critical value bounds	
F-statistic	Significance level	Lower bound	Upper bound
	1%	2.65	3.97
3.371	5%	2.14	3.3
	10%	1.88	2.99

Source: Author's computation (2022)

Table 2 shows that the F-statistic is greater than the upper bound critical value at 5% level, thus indicating that the null hypothesis can be rejected. This indicates that there is cointegration (long-run relationship) among the variables in the model.

4.2. ARDL Model Estimation

The ARDL model estimation provides the short and long-run estimations. As their names imply, the short and long-run estimations show the short and long-run effects of the independent variables, respectively.

Short Run Estimation

The short-run estimation results show the short-run dynamics and the speed of adjustment. The lags included in the short run estimation were automatically selected by the Akaike information criterion. Table 3 presents the short-run estimation result

Table 3. Short run estimation results

Variable	Coefficient	p-value
ΔMUI	-0.022	0.002***
ΔUNE	0.014	0.839
ΔUNE_{t-1}	0.148	0.035**
ΔOPEN	0.030	0.157
ΔGDP	0.209	0.003***
ΔINFR	-0.001	0.578
ΔEXG	0.013	0.426
ΔCPS	-0.100	0.041**
ΔM2	-0.015	0.656
ΔGEXP	-0.015	0.206
CointEq(-1)	-0.139	0.079*

Δ is the first difference operator and the variables are used in logarithm form except inflation. Also, ***, ** and * indicate statistically significant at 1%, 5% and 10% significance level.
Source: Author's computation (2022)

Table 3 shows that the coefficient of the contemporaneous MUI is -0.022 with a p-value of 0.002, indicating that the contemporaneous MUI has a negative effect on BKL in the short-run which is statistically significant at 1% significance level. This finding indicates that 1% increase in MUI would cause BKL to decline by 0.022% in the short-run. The coefficient of the contemporaneous UNE is 0.014 with a p-value of 0.839. This indicates that the contemporaneous value of UNE has a positive effect on BKL in the short-run albeit not statistically significant. However, the coefficient of the

lagged UNE is 0.148 with a p-value of 0.035, indicating that the lagged UNE has a positive and statistically significant effect on BKL in the short run at 5% significance level. This finding suggests that 1% increase in the UNE in the previous period increase BKL by 0.148% in the short-run. The coefficient of the contemporaneous OPEN is 0.030 with a p-value of 0.157, suggesting that the contemporaneous OPEN has a positive but insignificant effect on BKL in the short run.

The coefficient of the contemporaneous GDP is 0.209 with a p-value of 0.003, indicating that the contemporaneous GDP has positive effect on BKL in the short run which is statistically significant at 1% significance level. This finding indicates that 1% increase in GDP would cause BKL to increase by 0.209% in the short run. The coefficient of the contemporaneous INFR is -0.001 with a p-value of 0.578. This indicates that the contemporaneous value of INFR has a negative effect on BKL in the short run but not statistically significant. The coefficient of the contemporaneous EXG is 0.013 with a p-value of 0.426. This finding suggests that the contemporaneous EXG has a positive effect on BKL in the short run. However, this effect is not statistically significant.

The coefficient of the contemporaneous CPS is 0.100 with a p-value of 0.041, indicating that the contemporaneous GDP has positive effect on BKL in the short run which is statistically significant at 5% significance level. This finding indicates that 1% increase in GDP would cause BKL to increase by 0.100% in the short run. The coefficient of the contemporaneous M2 is -0.015 with a p-value of 0.656. This indicates that the contemporaneous value of M2 has a negative effect on BKL in the short run but not statistically significant. Similarly, the coefficient of the contemporaneous GEXP is -0.015 but with a p-value of 0.206. This indicates that the contemporaneous value of GEXP has a negative effect on BKL in the short run but not statistically significant. The error correction term (ECT) denoted by CointEq(-1) has a negative coefficient of -0.139 with a p-value of 0.079, indicating that the ECT is statistically significant at 10% significance level. This finding means that disequilibrium from the previous quarter slowly adjusts back to the long-run equilibrium in the present quarter at the rate of 13.9%. The negative and statistically significant coefficient of the ECT also validates the presence of the long run relationship (co-integration) among the variables.

4.3. Long Run Estimation

Table 4 presents the long run estimation results obtained from the ARDL model.

Table 4. Long run estimation results

Variable	Coefficient	p-value
Constant	-9.179	0.085*
MUI	-0.159	0.064*
UNE	0.095	0.571
OPEN	0.218	0.328
GDP	1.503	0.028**
INFR	-0.004	0.610
EXG	0.094	0.287
CPS	0.666	0.045**
M2	-0.110	0.635
GEXP	-0.108	0.209

***, ** and * indicate statistically significant at 1%, 5% and 10% significance level. Also, the variables are used in logarithm form except inflation.
Source: Author's computation (2022)

As shown in Table 4, MUI has a coefficient of -0.159 with a p-value of 0.064. This indicates that MUI has a negative and statistically significant effect on BKL in the long run. This finding indicates that 1% increase in MUI causes BKL to reduce by 0.159% in the long run. The coefficient of UNE is 0.095 with a p-value of 0.571. This indicates that, in the long run, UNE has a positive but statistically insignificant effect on BKL. OPEN has a coefficient of 0.128 with a p-value of 0.328, indicating that OPEN has a positive and statistically insignificant effect on BKL in the long run.

GDP has a coefficient of 1.503 with a p-value of 0.028, indicating that GDP has a positive and statistically significant effect on BKL in the long run. This finding indicates that a percentage increase in GDP would lead BKL to rise by 1.503% in the long run. The coefficient of INFR is -0.004 with a p-value of 0.610. This indicates that, in the long run, INFR has a negative effect on BKL in the long run although the effect is not statistically significant. The coefficient of EXG is 0.094 with a p-value of 0.287. This indicates that, in the long run, EXG has a positive effect on BKL which is not a statistically significant effect.

The coefficient of CPS is 0.666 with a p-value of 0.045, suggesting that CPS has a positive and statistically significant effect on BKL in the long run. This finding connotes that, in the long run, an increase in CPS by 1% would result in a 0.666% increase in BKL. M2 has a coefficient of -0.110 with a p-value of 0.635, indicating that M2 has a negative and statistically insignificant effect on BKL in the long run. Also, GEXP has a coefficient of -0.108 with a p-value of 0.209. This finding indicates that GEXP has a negative and statistically insignificant effect on BKL in the long run.

4.4. Residual Diagnostic Tests

Serial correlation and heteroskedasticity are common problems in model estimations which can lead to misleading statistical inferences. Thus, it important to diagnose the model residuals for the presence of serial correlation and heteroskedasticity.

4.4.1. Testing for Serial Correlation

It is important that the residuals are serially uncorrelated; therefore the Breusch-Godfrey serial correlation Lagrange Multiplier (LM) test is performed. The hypothesis of the test is that there is no serial correlation. Table 5 presents the results of the Breusch-Pagan serial correlation LM test at lag order 1 and 2.

Table 5. Breusch-Godfrey serial correlation LM test

ag	F-statistic	p-value
1	1.227	0.272
2	1.265	0.288

Source: Author's computation (2022)

The result of Breusch-Godfrey serial correlation LM test shows that the hypothesis cannot be rejected at lag order 1 and 2, thus indicating that there is absence of first and second order serial correlation in the model. Therefore, it can be inferred that the estimation results obtained from the ARDL model are free from serial correlation.

4.4.2. Test for Heteroskedasticity

Heteroskedasticity occurs when the variance of residuals in a model is non-constant. It causes the estimates of the standard error to be biased, leading to unreliable hypothesis testing. The hypothesis for the test is that the residuals are not heteroskedastic. Table 6 reports the heteroskedasticity test performed with the Autoregressive Conditional Heteroskedasticity (ARCH) test.

Table 6. ARCH Test

Lag	F-statistic	p-value
1	1.583	0.212
2	0.743	0.479

Source: Author's computation (2022)

Table 6 shows that the hypothesis that the residuals are not heteroskedastic cannot be rejected, thus implying that the ARDL model estimations are not biased due to heteroskedasticity.

4.5. Vector Autoregressive (VAR) Model Lag Order Selection Test

It is important to determine the VAR model lag order in order to select the optimal lag length (k) appropriate for the Toda-Yamamoto Granger causality test. While performing the VAR model lag order selection test, the maximum lag order is set at 5.

Table 7 presents the results obtained from the VAR lag order selection criteria.

Table 7.VAR lag selection order

Lag	LR	FPE	AIC	SC	HQ
0	NA	0.016500	1.571387	1.628074	1.594213
1	299.8497	0.000510	-1.906299	-1.736236*	-1.837820
2	15.53947*	0.000462*	-2.003851*	-1.720413	-1.889719*
3	5.872370	0.000471	-1.985301	-1.588488	-1.825517
4	3.049483	0.000497	-1.932443	-1.422255	-1.727006
5	3.349691	0.000522	-1.884564	-1.261001	-1.633474

* denotes optimal lag order chosen by criterion. Also, each test is performed at 5% significance level.
Source: Author's computation (2022)

As shown in Table 7, the sequential modified LR test statistic, Final Prediction Error (FPE), Akaike Information Criterion (AIC) and Hannan-Quinn (HQ) select the optimal lag order to be 2 while Schwarz Information Criterion (SC) selects the optimal lag order to be 1. Since the optimal lag order of 2 is mostly selected by the lag order selection criteria, the lag order of 2 is used for the VAR model.

4.6. VAR Residual Serial Correlation Test

The VAR residual serial correlation test is also used to confirm the appropriateness of the optimal lag order. It is expected that the residuals of VAR model should not be serially correlated at the chosen optimal lag order of 2. The null hypothesis for the test is that there is no serial correlation. Table 4.8 shows the results of the serial correlation LM test performed between lags 1 and 5.

Table 8: VAR residual serial correlation test

Lags	LM-Stat	p-value
1	5.186	0.269
2	5.603	0.231
3	1.545	0.819
4	5.037	0.284
5	4.395	0.355

p-value obtained from chi-square with 4 degree of freedom.
Source: Author's computation (2022)

It can be observed from Table 8 that the null hypothesis of no serial correlation is rejected at the optimal lag order of 2, indicating that the VAR model is free from residual serial correlation. Similarly, it can be seen that the null hypothesis can be rejected at lower and higher lags.

4.7. VAR model stability test

To check for the stability of the VAR model, the AR roots graph is plotted. Fig. 1 shows the AR roots graph for the VAR model with optimal lag length of 2.

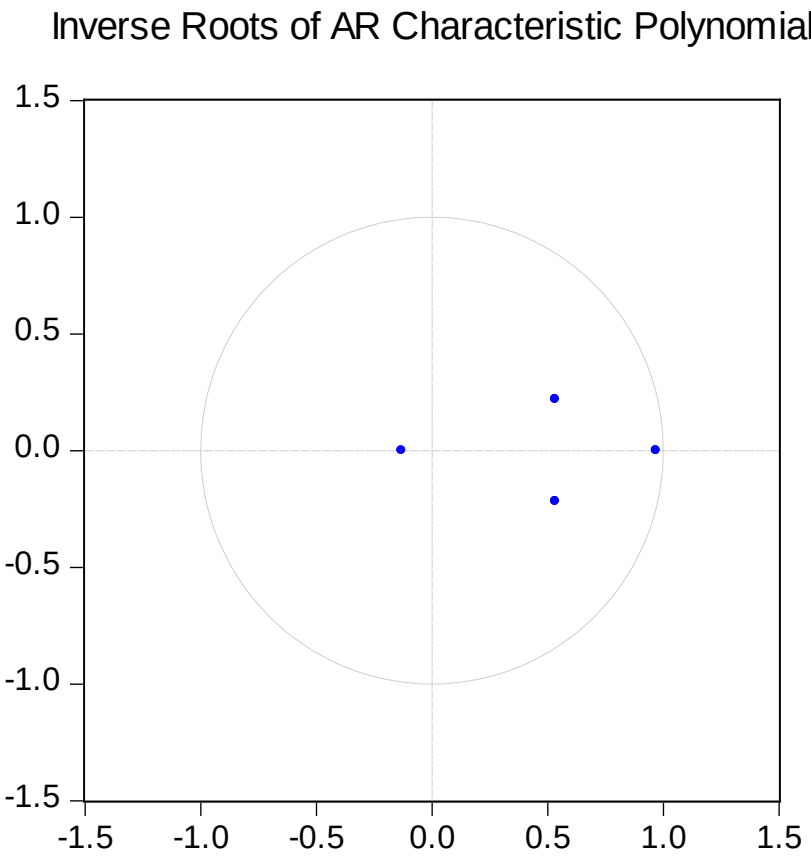

Figure 1. AR roots graph

Source: Author's computation. (2022)

The AR roots graph confirms that the VAR model is dynamically stable and not wrongly specified because there is no root that lies outside the unit circle. In other words, the values of roots obtained from the VAR model lie between -1.0 and +1.0.

4.8. Toda-Yamamoto Granger causality test

The Toda-Yamamoto Granger causality test relies on a modified Wald (MWALD) statistic. To obtain the MWALD statistic, the optimal lag length of the VAR model is augmented with an extra lag(s). The maximum order of integration (dmax) among the variables determines the number of extra lags to be added to optimal lag length. In this study, the optimal lag length is 2 and the dmax is 1. Thus, the number of lags used in the Toda-Yamamoto Granger causality test is 3. Table 9 presents the results from the Toda-Yamamoto Granger causality test.

Table 9. Toda-Yamamoto Granger causality test

Null hypothesis	MWALD statistic	p-value
MUI does not Granger cause BKL	1.802	0.0462
BKL does not Granger cause MUI	1.270	0.0598

Source: Author's computation (2022)

It can be deduced from Table 9 that the hypothesis that MUI does not Granger causes BKL cannot be rejected while the hypothesis that BKL does not Granger cause MUI is rejected. This

finding indicates that the flow of relationship is from MUI to BKL and by implication; there exists a unidirectional causality between economic uncertainty and bank lending.

4.9. Discussion of Findings

From the results, economic uncertainty exerts negative significant impact on bank lending in Nigeria both in the short and long-run. This finding suggests that a reduction in economic uncertainty in Nigeria will occasion noticeable increase in bank lending in Nigeria. This finding emphasises the implication of the dominance of economic uncertainties in Nigeria and it shows the weak and ineffectiveness of monetary authorities in tracking and reducing the frequent macroeconomic uncertainties. It also possibly shows the nature of Nigeria's economy of overdependence on oil. Following the nation's overreliance on crude oil earnings, increase in oil price through increasing prices of petroleum products directly triggers inflation and results in increase in interest rate. This finding agrees with the works of Dada, Ajayi and Daramola (2022), Sanni, et al., (2020), Oyebowale (2019) among others.

Further discovery from the study indicates that growth rate of gross domestic product in Nigeria impacts positively on bank lending in Nigeria both in the long and short-run. This result implies that as economic growth of Nigeria increases, bank lending tends to increase. The steady increase in economic output of a country over time places inflation at a desired level and puts the economy on a good path for economic growth. This finding agrees with the affirmation that stemmed from the findings of Brasliņš, Orlova and Brauksa (2013) and Mamman and Hashim (2014) but contradicts Whyte (2020), who find that gross domestic product does not affect bank lending.

The study also ascertained that money supply exerts negative impact on bank lending in Nigeria both in the short and long-run. This finding suggests that from the short run into the long-run, decrease noticed in the past realisation of money supply noticeably caused massive increase in bank lending. The findings of Jegede (2014) and Mohammed (2006) support this result but negate the work of Buchholz and Tonzer (2015). Additionally, the study finds that inflation rate exerts negative effect on bank lending in Nigeria both in the short and long-run. This finding stresses the significance of lowered inflation and the potentials it guarantees. This finding is consistent with the results of Caglayan and Xu (2019) and Tinoco-Zermeño, Venegas-Martínez & Torres-Preciado, (2014) but negates Rossi, Borroni, Piva and Lippi (2019) and Hosen, Broni and Uddin (2020) works.

Again, the study discovered that both in the short and long-run, the past realisation of real exchange rate exerts positive impact on bank lending in Nigeria. The finding suggests that an increase in exchange will command increase in commercial bank lending in Nigeria. This result although evinces that the past realisation of real exchange rate has been steadily increasing over time and it corroborates the findings of Owoeye and Ogunmakin, (2013) and Bhattarai (2019) but negates Yitayaw (2021) and Ivakhnenkov et al., (2020) works.

In addition, discovery from the study established that in the short-run, domestic credit to private sector exerts negative impact on bank lending in Nigeria; but in the long-run, its effect turns positive on bank lending in Nigeria. This finding suggests that in the short-run, as domestic credit to private sector falls, bank lending tends to increase but in the long-run, as domestic credit to private sector increases, commercial bank lending also increases alongside. Most often, especially in times of economic instability, commercial banks placed on hold all forms of loans, particularly short-term loans in their bid to maintain prudency and control liquidity shocks.

Result from the study further revealed that government expenditure negatively impacts on bank lending in Nigeria both in the short and long-run. This implies that a unit fall in government expenditure will cause a unit increase in bank lending in Nigeria. This finding supports the discovery of Talavera et al. (2012). Additionally, result obtained in the study revealed that trade openness positively affects bank lending in Nigeria both in the short and long-run. This finding connects with the discovery of Gozgor et al. (2019), Foley and Manova, (2014) but negate the work of Buchholz and Tonzer (2015).

Lastly, result of further estimation in the study revealed in Table 9 the hypothesis that MUI does not Granger cause BKL cannot be rejected while the hypothesis that BKL does not Granger cause MUI is rejected. This finding indicates that the flow of relationship is from MUI to BKL and by implication; there exists a unidirectional causality between economic uncertainties and bank lending

5. Conclusion and Recommendations

In principle, the ability of banks to extend credit to the domestic economy is stifled in the presence of high levels of economic uncertainty. In other words, bank lending is expected to decline when economic uncertainty is high. This study concluded that economic uncertainty, economic growth, inflation, credit to private sector, money supply, trade openness, government expenditure and exchange rate have a long-run relationship with bank lending in Nigeria and that the uncertainty of the economy negatively and significantly related to bank lending in Nigeria. In this line of direction, the study recommends that it is important for monetary authority to make suitable choice of monetary policy reaction functions with vast information set and close attention so as to stabilise the macro-economy variables within the country.

5.1. Contributions to Knowledge

This study adds novel evidence to literature by showing empirically that economic uncertainty has serious and statistically significant negative effect on bank lending in Nigeria. In addition to this, the study established a unidirectional causality between economic uncertainty (MUI) and bank lending in Nigeria. Causation runs from macroeconomic uncertainties to bank lending.

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