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EDITORIAL

Dear Esteemed Readers,

The Institute's Journal of Banking, Volume 12, No. 2 of 2024 featured five (5) thought-provoking papers that delve into critical aspects of economic and financial systems, offering robust insights across local and global contexts. These studies address topics ranging from price uncertainty and regulatory impacts to broader geopolitical and environmental factors affecting markets. The first paper, titled **"Uncertainty of Prices and Economic Output in Nigeria**," investigates the interplay between price volatility and Nigeria's economic output. The study examines how uncertainties in fuel pump prices, exchange rates, consumer prices, and maximum lending rates influence economic productivity, revealing that price instability significantly impacts output levels and suggesting targeted policy interventions to stabilize these variables.

The second paper, "**Monetary Policy and Bank Lending to the Agricultural and Manufacturing Sectors in Nigeria,"** explores how monetary policy instruments shape bank lending to critical sectors. The research underscores the importance of fine-tuning monetary policies to enhance credit availability for agricultural and manufacturing activities, sectors pivotal for Nigeria's economic diversification and resilience. This study covers over three decades, spanning from 1990-2022.

In the third paper, **"Corporate Transparency and Financial Markets Performance in Nigeria,"**. The authors analyze the nexus between transparency and the performance of entities listed on the Nigerian Exchange (NGX) over a 41-year period (1981–2022). Their findings highlight that enhanced corporate transparency is strongly correlated with improved financial market performance, advocating for stricter disclosure policies to foster investor confidence.

The fourth paper, **"Regulatory Policy Guidelines and Deposit Money Banks' Performance,"** examines the role of the apex bank regulations in shaping the performance of Nigeria's commercial banks from 1981 to 2022. The research demonstrates that well-structured regulatory frameworks positively impact deposit money banks' stability and profitability, emphasizing the need for adaptive and inclusive regulatory policies to sustain financial sector growth.

The fifth paper, **"Responsiveness of Global Food Prices to Carbon Emissions Futures, Geopolitical Risk, and Oil Price Shocks: A Global Evidence from Soft and Grain Commodity Markets,"** adopts a SVAR model to investigate the influence of environmental and geopolitical factors on food prices. By analyzing daily data during the Russia-Ukraine conflict (November 1, 2021 – April 10, 2023), the study reveals significant sensitivities of agricultural commodity prices to carbon emissions futures, geopolitical tensions, and oil price volatility, offering policy recommendations to mitigate these risks.

The sixth paper titled, **"The Impact of Agricultural Value Chain Finance on Economic Growth in Nigeria [2010–2019],"** investigates the intricate relationship between agricultural financing and economic growth by focusing on the agricultural value chain (AVC). Using quarterly time series data from 2010 to 2019, the study synthesizes information from the NBS to derive the Agricultural Value Chain Gross Domestic Product (AVCGDP). The paper offers a comprehensive exploration of how agricultural finance permeates various sectors, including industry, trade, and services, to stimulate broader economic growth. The authors emphasize that effective agricultural value chain finance not only enhances productivity within the agricultural sector but also fosters intersectoral linkages that amplify economic growth.

Finally, the seven and last paper, **"Effect of Micro-Finance Credit, Agricultural Credit Scheme Fund on Nigeria's Agricultural Sector,"** employs secondary data sourced from the Central Bank of Nigeria (CBN) and the National Bureau of Statistics (NBS) to examine the effects of micro-finance credit and agricultural credit scheme funds on the nation's agricultural sector. The study provides a detailed analysis of how targeted credit interventions influence agricultural productivity. By leveraging robust datasets, the authors evaluate the extent to which micro-finance institutions and government credit schemes, such as the Agricultural Credit Guarantee Scheme Fund (ACGSF), have succeeded in alleviating funding constraints for farmers.

In general, these papers collectively underscore the diverse factors influencing economic performance, financial markets, and global commodity dynamics. The authors provide compelling evidence to inform policy decisions and strategic planning across multiple domains, bridging the gap between research and practical applications. I hope you derive valuable insights from the reading.

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Uncertainty of Prices and Economic Output in Nigeria

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Abstract

The magnitude and direction of unpredictable changes in domestic prices on economic output in Nigeria had received little attention in the empirical literature. In order to reduce the empirical gap, we broadly seek to determine the effects of uncertainty of prices on economic output in Nigeria. The specific objectives of the study are to analyse the effect of uncertainties of fuel pump price, exchange rate, consumer prices and maximum lending rate on economic output in Nigeria. Data are obtained from the Central Bank of Nigeria database for 2010Q1 – 2022Q4 and were analysed using the Generalised Auto Regressive Conditional Heteroskedasticity (GARCH) and Generalised Method of Moments (GMM) econometric techniques. The study found that exchange rate is the most volatile price indicator while other prices are also volatile, evidence showed that their respective volatility clustering may die off slowly soon. The regression results (GMM) at 5% level of significance suggest that uncertainties of consumer price index (-3.22) and maximum lending rate (-0.074), significantly affected output negatively. But exchange rate (2.83) and fuel pump price (2.93) significantly affected output positively. The study concluded that uncertainty of prices significantly affected economic output in Nigeria. Based on the findings by the study, we recommend as follows; due to the negative effects of inflation rate and maximum lending rate on output, government should consider the re-introduction of price control boards in order to stabilize agricultural output prices that can mitigate domestic inflationary trends especially on non-durable consumer goods. In addition, the government should through the central bank make

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policies that ensure stable lending rate that is low enough to support new and existing investment ventures.

KEY WORDS: Economic Output; GARCH; GMM; Uncertainty of Prices
JEL Classifications: E23; C51; C32: E32

1.0 Introduction

The magnitude and direction of unpredictable changes in domestic prices on economic output in Nigeria had received little attention in the empirical literature over time. In order to fill the empirical gap, the study investigated how uncertainty of some price indicators (exchange rate. lending rate, fuel pump price and consumer price) affected output in Nigeria in the period 2010Q1 – 2022Q4. Nigeria's economy has been facing continuous financial and commodity price spikes in the last two decades such that economic agents are uncertain of the next price hike. Being an import depend nation with mono export product, it is important to note that uncertainty of different price indicators may further weaken domestic and foreign trade relations as well as prospects for new investment in the country. Existing firms also face some challenges on the issue of continuous increase in factor prices due to the unpredictable changes in these price indicators. However, the effects of the estimated magnitude of the unpredictable price changes on economic output has received little empirical attention. This is the gap the study intends to fill. In some advanced countries studies have affirmed that uncertainty of price shocks can cause some changes in aggregate variables such as output and inflation (see; Bloom (2007); Bloom (2009); Born and Pfeifer (2014); Kliesen, and OwyangIn (2019); Carlos, Lader, Jose and Jorge (2023)). Prices represent an important aspect for determining the supply-side input cost of firms. Therefore, unpredictable price movement can affect the productive activities of firms. For illustration, rising prices of input may cause firms to delay or postpone their investment actions. If this delay does not affect current demand it will affect future supply of the firm. Second, due to the unpredictable pattern of the domestic exchange rate (declining value of the domestic currency) in a country that is largely import dependent firms may be restrictive to enter into fresh export markets and the shortfall would not contribute to the current period output.

Third, fuel pump price and lending rate if they cannot be predicted, it might result to negative effects for both demand and supply sides of the economy with emphasis on the supply side being cost of inputs to firms. For example, lending rate uncertainty affect financial decisions of both investors and lenders. Lenders tend to tighten credit by charging a premium rate due to uncertainty and investors are careful to ask for credit at a premium.. Fourth, in the presence of wage rigidity in Nigeria, uncertain commodity and service prices may affect inter-temporal allocation of resources, which might affect capital stock available for productive activities. In view of the foregoing, all of these situations or a combination of part of it may lead to possible decline in productive activities and consequently economic output. The magnitude of such effects due to uncertainty deserves empirical analysis.

Knight (1921) in Guerron-Quintana (2012) refers to uncertainty as situations where the information available to a decision-maker is too imprecise to be summarized by a probability measure. Thus the term "lack of clarity" is another phrase to describe uncertainty. Inflation rate uncertainty, as measured by Stuber (2001), is the degree to which the future inflation rate is unknown in the sense of not being predictable, given past performance. Uncertainty about the position of an economy according to Giannonni (2007) refers to inexact knowledge of policymakers about the actual past, current and future position of the economy. Knightian uncertainty (Frank Knight-1885-1972) signifies a risk that is immeasurable or impossible to estimate. Consequent on this, Issing (1999) says the ''Knightian'' uncertainty that confronts central bankers relate to those risks, which probability distribution cannot be easily measured. If any of the aggregate prices (commodity or financial) considered in this study becomes unpredictable, price change(s) might arises from exogenous or endogenous sources. Such shocks are also termed shock uncertainty, which affect firms and individuals business and production projections in the immediate period.

Several papers on Nigeria have investigated the relationship between output and aggregate prices but we are not aware of a Nigerian study on uncertainty of prices and output using GARCH and GMM

techniques. For example; Nwankwo (2023); Ufoezei et al (2018), investigated exchange rate and output, Abdullahi (2023); Omoke (2010), were on how inflation affected output. Mgbomene and Igben (2023); Hashim and Mamman (2014), investigated lending rate and output. Finally, Adebisi and Alenoghena (2023)**;** Ocheni (2015), examined how fuel pump price affected output in Nigeria. This is a novel study on the pattern of uncertainty of aggregate prices and their contemporaneous effect on economic output in Nigeria using a different econometric techniques for analysis. The rest of the paper is structured as follows; Sector 2 is on the literature review, section 3 discusses the methodology and section 4 is on the results. Section 5 concludes the paper with policy recommendations.

2.0 Literature Review

2.1 Theoretical Framework

Macroeconomic Economic uncertainty is a condition that signals an unpredictable pattern in the behaviour of aggregate indices such as financial and commodity prices for both households and firms. Therefore, uncertainty connotes that in predicting a phenomenon the probability density function for describing the distribution of the future event is impossible to construct (Bank of England, 2013). Friedman (1977) posits that inflation uncertainty leads to higher uncertainty of the inflation rate on one part. Second, rising inflation uncertainty negatively affects the price mechanism resulting in wrongful allocation of resources which attenuates economic growth. Friedman's view is a fundamental theoretical exposition on how inflation uncertainty affects people's welfare and economic output.

Further on Friedman's proposition on inflation rate uncertainty, the nominal inflation rate uncertainty affects nominal interest rate (credit price), which often rises to compensate for the inflation rate premium. Inflation uncertainty also affects the real cost of production and eventually the relative increase in the prices of final goods and services. Uncertainty of loan rate might lead to a reduction of loans made available by the banking institutions in the credit market (Bank of England, 2013). The contraction of credit by extension reduces loans available for both new

and existing investments. Gilchrist, Sim and Zakrajsek (2010) affirms that in an environment of uncertainty "seed capital" that are usually provided by banks for business innovation is otherwise not provided due to uncertainty of the credit market price.

2.3 Empirical Review

Investigating uncertainty of macroeconomic variables in advanced and emerging market economies has gained attention especially after the financial crisis of 2008. But evidence based studies on this phenomenon on specific countries in Africa especially Nigeria is relatively scarce.

In view of this, most of the studies reviewed are on developed and emerging market economies. Carlos et al., (2023), on Latin American countries examined the effects of uncertainty shocks on fourteen countries. The study found that macro uncertainty of whatever type has a higher and consistent effect on the gross domestic product of the countries heterogeneously. Using Italy's financial data (equity prices and spreads) Alessandri, Gazzani and Vicondoa (2021) affirm that impact of uncertainty shocks on output and inflation are significant. Joonseok (2020) used quarterly data of United States of America (USA); he was able to show that output reduces as a result of uncertainty shocks. Zhang et al., (2020) on China found that uncertainty shocks cause economic stagnation. The study on China used a time-varying volatility mode in a Dynamic Stochastic General Equilibrium (DSGE) model.

Kliesen, and OwyangIn (2019) analysed USA data and some countries in Europe. They found that uncertainty have magnified effect on real economic variables. The outcome of the study is similar to what Carlos et al., (2023) found in some developing countries. In specific terms the USA study found that the routes through which uncertainty affect aggregate variables such as output is mostly through household consumption and firms' investment. In the Euro Area and USA, Meinen and Röhe (2018) found that financial uncertainty shocks significantly influence changes in output. However, if prices do not move at the same time with output, it can weaken the effect of financial uncertainty shocks on real economic activities. Bloom (2007), similar to the findings of Jackson, Kliesen, and OwyangIn (2019) found that macro uncertainty shocks can cause an

increased reduction in aggregate output and employment due to a short-time reduction in the investments level of firms. Bredin and Fountas (2004) investigated the relationship between economic uncertainty and performance. The study used the multivariate GARCH-M model unlike most of the studies earlier reviewed that used various VAR model families. The study focused on monthly data for G7 countries and they found that uncertainty of the inflation rate is not particularly detrimental to economic growth. The outcome of the study on G7 countries on uncertainty of inflation and output might be due to the level of development and stable domestic prices experienced in these countries. Arising from the theory and outcome of evidence reviewed in this paper on uncertainty and output in some advanced and emerging countries, it is important to find out how the unpredictable changes in some price indicators affect aggregate output in developing economies like Nigeria.

3.0 Methodology

3.1 Identification Strategy

In this study, the identification strategy that captures the response of economic output to uncertainty of prices relies on the generalized autoregressive conditional heteroskedasticity (GARCH) and generalized method of moments (GMM) estimators. These two methods were proposed by Hansen (1982) and Engle (2001) respectively. Due to the need to determine the uncertainty of changes in the price indicators considered in the study, prices data were transformed by estimating the simple linear regression of the original data for each price indicator and the residuals were used to determine the level of volatility as a measure of uncertainty using the GARCH econometric technique.

Engle (1982), proposed the ARCH model to capture serial correlation in volatility in the form:

$$\sigma^2 = \omega + \alpha(L)\eta_t^2 \quad . \ . \ . \qquad (1)$$

Where: $\alpha(L)$ is the polynomial lag operator and $\eta_t / \Psi_{t-1} \sim N(0, \sigma_{t-1}^2)$ is the innovation of the variable of study. Bera and Higgins (1993) explain that the ARCH model characterizes the distribution of the stochastic error *t* conditional on the realized values of the set of variables

$\Psi_{t-1} = \{y_{t-1}, x_{t-1}, y_{t-2}, x_{t-2} \ldots\}$. Computational problems may arise when the polynomial presents a high order but to facilitate such computation, Bollerslev (1986) proposes the GARCH model. The model is a weighted average of past squared residuals of a series of data whose volatility is being measured. Although it has declining weights which never go completely to zero, it has proven surprisingly successful in predicting conditional variances (Engle, 2001). The widely used GARCH specification, asserts that the best predictor of the variance in the next period is a weighted average of the long run average variance. The GARCH model initially developed by Bollerslev (1986) can be represented in the form:

$$\sigma^2 = \omega + \beta(L)\sigma_t^2 + \alpha(L)\eta_t^2 \quad . \quad . \quad . \qquad (2)$$

Where the lag operator is expressed as $\beta(L) = \beta_1 L + \cdots \beta_q L^q, \sigma(L) = \alpha_1 L + \cdots \alpha_q L^q$ however the study uses GARCH (1, 1) as stated in equation (3)

$$\sigma^2 = \omega + \beta(L)\sigma_{t-1}^2 + \alpha(L)\eta_{t-1}^2 \quad . \quad . \quad . \qquad (3)$$

The GARCH (1, 1) is one of the simplest and most robust of the family of volatility models (Engle).

The Generalised Method of Moments (GMM) estimator that is used for regression analysis in this study provides estimates of the parameters for economic variables without imposing additional restrictions on the data generating process other than those specified by the model. The estimator simply combines the time series study data with the moment conditions for determining the unknown coefficient estimates of the baseline model. According to Zsohar (2012), the study data series is described as follows; $[x_i; i = 1,2, \ldots n]$. From the sample the study estimated the unknown vector of parameters $\theta \in R^p$ with the true value of θ_0. If f (x_i, θ) is continuous continuously differentiable $R^p \rightarrow R^d$ function of θ. Based on the assumption that E$\{f(x_i, \theta\}$ exists and finite for all i and θ_0. If these relationships subsist, the population moment conditions are expressed as $E\{f(x_{i,}\theta_0)\} = 0$. The sample moment can be stated in the form;

$$f_n(\theta) = \frac{1}{n}\sum_{i=1}^{n} f(x_i, \theta) \quad \ldots \quad (4)$$

Therefore, the method moments estimated θ_0 taking the population moment into consideration can be expressed in the form $E\{f(x_{i,}\theta_0)\}$. this provides the answer to the method of moment's baseline equation – (15). The theoretical outcome of the moment's method is stated in equation (5).

$$y_t = h(X_t;\theta) + \varepsilon_t \quad \text{t} = 1,\ldots\text{T} \quad \ldots (5)$$

Where y_t is the dependent variable which is determined by a function *h* of independent variables, matrix X_t and parameter matrix θ of the correct dimension, ε_t is the vector of the error term and T is the sample length.

3.2 Empirical Model

The empirical models for this study are in two parts. Uncertainties of prices were derived based on the GARCH (1, 1) method (Bollerslev (1986); Engle (2001)). Second, the GMM technique is used to estimate the response of aggregate output to uncertainty of prices (Hansen, 1982). The estimates are derived from the time-series mean equations and the uncertainty estimates were derived from variance equation models of each of the price data. The mean equations for the study are 6, 8, 10 and 12. While the conditional variance models are expressed by equations 7, 9, 11 and 13 respectively.

$$\ln exr_t = \delta_0 + \delta_1 \ln exr_{t-1} + \ldots + \delta_{t-p} \ln exr_{t-p} + \varepsilon_t \quad \ldots \quad (6)$$

$$\sigma^2_{exr} = \phi_1 + \phi_2\varepsilon^2_{t-1} + \phi_3\sigma^2_{exr-1} \quad \ldots \quad (7)$$

Where $\ln exr$ is the log of exchange rate, *t* is the time series component, $\delta_0, \delta_1, \delta_{t-p}$ are parameter estimates of the exchange rate (6). And ε_t is the error term that is white noise. σ^2_{exr} represent the variance of the exchange rate and ϕ_1, ϕ_2, ϕ_3 are parameter estimates of the exchange rate uncertainty model (7).

$$\ln fpp_t = \alpha_0 + \alpha_1 \ln fpp_{t-1} + \ldots + \alpha_{t-p} \ln fpp_{t-p} + \mu_t \quad \ldots \quad (8)$$

$$\sigma^2_{fpp} = \varphi_1 + \varphi_2\mu^2_{t-1} + \varphi_3\sigma^2_{fpp-1} \quad \ldots \quad (9)$$

Where $\ln fpp$ is the log of fuel pump price, *t* is the time series component, $\alpha_0, \alpha_1, \alpha_{t-p}$ are parameter estimates of fuel pump price (8). And μ_t is the error term that is white noise. σ^2_{fpp} is the variance of the fuel pump price and φ_1 , φ_2, φ_3 are parameter estimates of fuel pump price uncertainty model (9).

$$\ln aicpi = \eta_0 + \eta_1 \ln aicpi + ... + \eta_{t-p} \ln aicpi_{t-p} + \vartheta_t \quad \text{....} \quad (10)$$

$$\sigma^2_{aicpi} = \lambda_1 + \lambda_2 \vartheta^2_{t-1} + \lambda_3 \sigma^2_{aicpi-1} \quad \dots \quad (11)$$

Where $\ln aicpi$ is the log of all items consumer price index, *t* is the time series component, $\eta_0, \eta_1, \eta_{t-p}$ are parameter estimates of all income consumer price index (10). And ϑ_t is the error term that is white noise. σ^2_{aicpi} is the variance of all income consumer price index and $\lambda_1, \lambda_2, \lambda_3$ are parameter estimates of the all income consumer price index uncertainty model (11).

$$mlr = \beta_0 + \beta_1 mlr_{t-1} + ... + \beta_{t-p} mlr_{t-p} + \xi_t \quad \dots \quad (12)$$

$$\sigma^2_{mlr} = \upsilon_1 + \upsilon_2 \xi^2_{t-1} + \upsilon_3 \sigma^2_{mlr-1} \quad \dots \quad (13)$$

Where *mlr* is the maximum lending rate, *t* is the time series component, $\beta_0, \beta_1, \beta_{t-p}$ are parameter estimates of maximum lending rate (12). And ξ_1 is the error term that is white noise. σ_{mlr} is the variance of the maximum lending rate and $\upsilon_1, \upsilon_2, \upsilon_3$ are parameter estimates of maximum lending rate uncertainty model (13).

The second part of the model is the GMM model, which was used to analyze how Nigeria's output respond to uncertainty of prices in the period 2010 -2022 using a quarterly data. The explicit form of the GMM empirical model is expressed in equation (15), which is the baseline model for estimation in this study.

$$y_t = exr_t + fpp_t + aicpi_t + mlr_t \quad \ldots \quad (14)$$

Where *y* is the gross domestic product and uncertainty of prices are *exr* is the exchange rate price, *fpp* is the fuel pump price, *cpi* is the all items consumer price index *mlr* is the maximum lending rate and *t* is the time series component of the study variables. Equation (15) can be expressed in the econometric GMM form as follows;

$$y_t = \beta_0 + \beta_1 exr_t + \beta_2 fpp_t + \beta_3 aicpi_t + \beta_4 mlr_t + Z_t + \epsilon_t \ldots \quad (15)$$

Where the impulse variables are as previously defined, β_0 is the intercept, β_1 to β_4 are parameter estimates, Z_t represents the instruments for estimating the GMM model. Finally, ϵ_t is the error term that is white noise with mean of zero and constant variance.

3.3 Data: Sources and Description

The data for this study are obtained from the Central Bank of Nigeria Database CBN (2024) for the period 2020Q1 – 2022Q4. The proxy for Nigeria's economic output is the quarterly market price gross domestic product (GDP) at current market prices expressed in billions of domestic currency. It was transformed to natural logarithm in order to ensure that it is on the same base with other explanatory variables of the study. The fluctuating pattern of the GDP is normalized using the Hodrick-Prescott filter (Hodrick and Prescott, 1997). The reason for the normalization of the explained variable is to smooth the data in order to remove the short term fluctuations in the GDP data for the period of the study.

Explanatory variables for the study are; exchange rate, which is the proxy for the average exchange rate of the Nigerian currency per US dollar. The average exchange rate was used to represent the mean condition of the market. The fuel pump price is the proxy for the price of petroleum motor spirits (PMS). This is a major commodity whose price affects both on the demand and supply side of the economy for production and consumption. All Items Consumer price index (AiCPI) is the proxy for prices of all basket composition of composite consumer goods and services[3]. The base

period for computing the CPI index was November 2009. Inflationary trend is reflected in the composite index. Domestic price instability affect investment plans of both firms and households in Nigeria. And the maximum lending rate is the proxy for the loans market price between commercial banks and the private sector; it represents the cost of loans obtained by firms and households by low net worth customers that represent over 90 percent of bank customers. This is the reason for the choice of the rate over the premium lending rate applicable to multinationals and few high net worth customers. Prime lending rate and the farm produce consumer price index are instrumental variables (IV) for the study.

4.0 Results

4.1 GARCH Results

4.1.1 Variance Equation Results

Uncertainty of the study variables are proxy by the findings based on GARCH (1, 1) results. This is shown in Table 1 as the conditional variance of the volatility measures of each of the explanatory variables.

Table 1: Variance Equation Results:

Variable	Coefficient	Std.error	t.statistic	p.value
EXR				
arch(-1)	1.9308	0.3158	6.1148	0.0000
garch(-1)	-3.63E-06	0.1014	0.0000	1.0000
FPP				
arch(-1)	-0.051315	0.005051	-10.15849	0.0000
garch(-1)	0.572052	0.595027	0.961388	0.3364
AICPI				
arch(-1)	0.716848	0.368472	1.945462	0.0517
garch(-1)	-0.148654	0.30074	-0.494295	0.6211
MLR				
arch(-1)	0.302678	0.308639	0.980686	0.3267
garch(-1)	0.203955	0.499713	0.408145	0.6832

Source: Authors computation (2024)

EXR –exchange rate; FPP – Fuel Pump Price; AICPI – All items consumer price index; MLR – Maximum lending rate;

The results in Table 1 suggest that market prices of commodities, fuel pump price, foreign exchange rate and loan market are volatile (uncertain) at various magnitudes. A sum of the ARCH and GARCH coefficient affirms that exchange rate is the most volatile price indicator with a coefficient sum of 1.931. This shows that exchange rate pattern is highly uncertain. The result suggests evidence of overshooting and it may not die off slowly soon. Fuel pump price also indicate a moderate uncertainty. The coefficient of the ARCH and GARCH sum for fuel pump price is 0.5208. This is marginally above average. It implies uncertainty persistence, which may die off slowly over time. The result differs from the exchange rate uncertainty which is above unity. The comparison further suggests that fuel pump price is not as volatile as the exchange rate price in Nigeria. The coefficient of aicpi is 0.5681 while the mlr is 0.5067. The results of the two price indicators also suggest that these price indicators exhibit similar uncertainty like the fuel pump price.

4.2.2 Graphical Illustration of Uncertainty Results

The measure of uncertainty of the explanatory variables is determined using the GARCH econometric technique and the illustrations are based on the pattern of the movement of the residuals of each of the proxy for prices uncertainty. In this section we also discussed the normalization of the trend of the explained variable (lnGDP), which is determined using the Hodrick-Prescott (H-P) filter to smooth the trend of the variable (Hodrick and Prescott, 1997).

Figure 1 shows the uncertainty of the changes in the exchange rate in the study period. The movement of the rate is indeed volatile within a range 0.254 and – 0.024 per cent. This suggests that the pattern of movement of the exchange rate is quite unpredictable as it never maintained an equilibrium position throughout the period of the study. The relative stability that seemingly swings between narrow margins was experienced in the period 2012 - 2014 and 2017 - 2019.

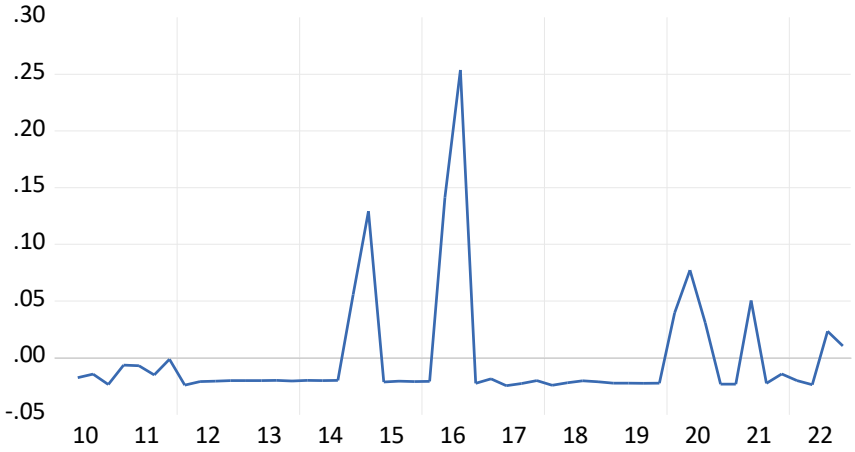

Figure 1
Exchange rate: Pattern of Uncertainty 2010Q1 -2022Q4

Source: Central Bank of Nigeria Database 2020Q1 – 2022Q4.

The highest spike was in 2016 while the least movement of the exchange rate though negative was in the period 2010 – 2011. Figure 2 describes uncertainty in the movement of fuel pump price in the period of the study in Nigeria. Unlike the exchange rate the fuel pump price appears to suggest relative instability because the spikes are relative higher than the exchange rate spikes. The margin of changes in the fuel prices ranges between 0.48 and -0.13 in 2016Q2 and 2020Q2 respectively.

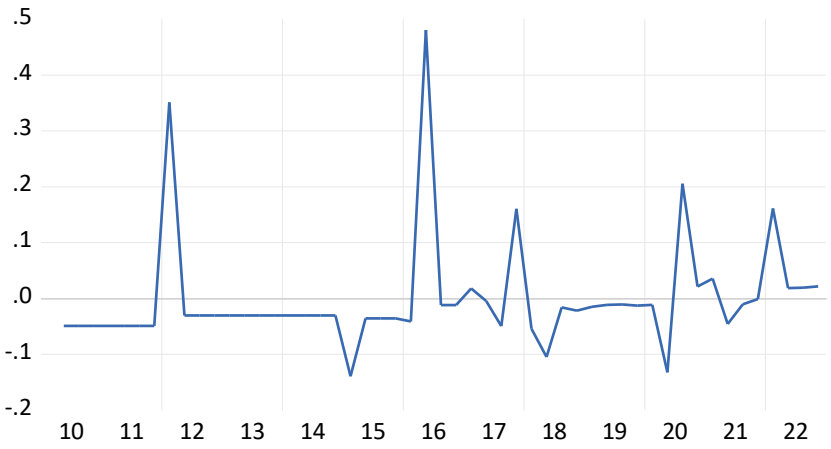

Figure 2
Fuel Pump Price: Uncertainty of Fuel Pump Price 2010Q1 -2022Q4

Source: Central Bank of Nigeria Database 2020Q1 – 2022Q4.

The pattern of changes in the fuel pump price was stable in 2010 to 2011. It rose sharply in 2012Q1 and remained reasonably stable in the period 2012Q2 to 2014Q4. This was at a time the government increased the fuel price (2012Q1) without any notice. And it was resisted by Nigerians. It dropped slightly in 2015Q1 but rose sharply in 2016Q2. This represented the highest spike of the pump price in the period of the study. From 2017 the price had remained unstable moving between positive and negative swings without achieving an equilibrium condition.

Figure 3 describes the all items consumer price index pattern of changes. The uncertainty of the proxy for measuring the aggregate prices as shown by the residuals indicates a worse condition compared to exchange rate and fuels prices. The weighted average of aggregate prices quarter on quarter appears uncertain as it cannot be predicted by either individuals or firms. The range of uncertainty is 0.037 and -0.018 in 2012Q1 and 2011Q4. One of the major reasons

for the spike in aggregate prices was as a result of increase in fuel pump price in 2012Q1 by the ruling government.

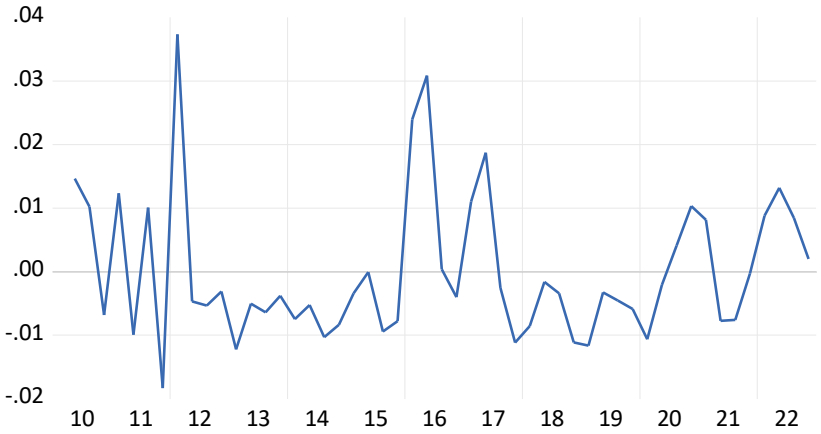

Figure 3
All items consumer price index; Uncertainty of aicpi 2010Q1 -2022Q4

Source: Central Bank of Nigeria Database 2020Q1 – 2022Q2.

It dropped in 2013Q1 but rose to another high level in 2016Q2. It maintained a fluctuating pattern which appears unpredictable till 2022.

Figure 4 shows the uncertainty of the pattern of maximum lending rate in the period of the study. The rate is the price of the loan market in Nigeria for individual customers with a low net worth capturing small and medium scales firms that dominates the informal sector. The pattern of movement is unpredictable. In line with other variables the highest spike was experienced in 2013Q2 (1, 9) and the lowest was in 2013Q1 (-2.5). The changes in the loan price in 2013 might not be unconnected with changes in the fuel pump price and unpredictable pattern of the consumer price index.

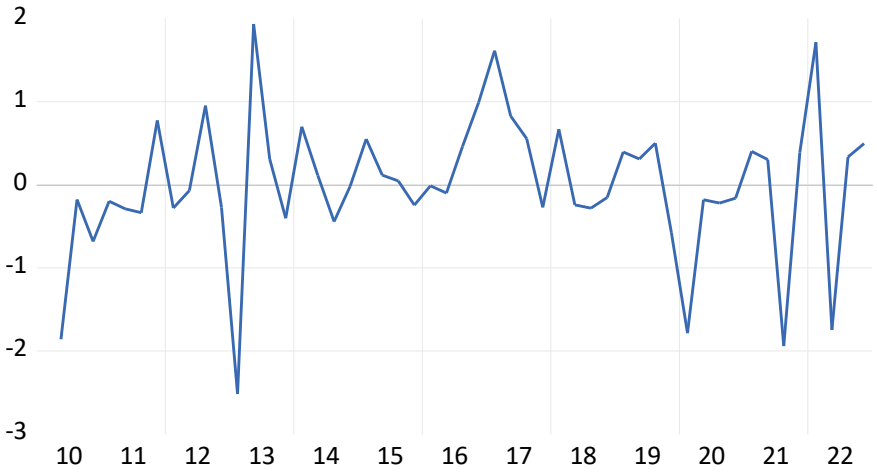

Figure 4
Maximum Lending Rate: Uncertainty of MLR 2010Q1 - 2022Q4
Source: Central Bank of Nigeria Database 2020Q1 – 2022Q2.

Figure 5 shows the smooth data of the response variable (lnGDP) using H-P filter.

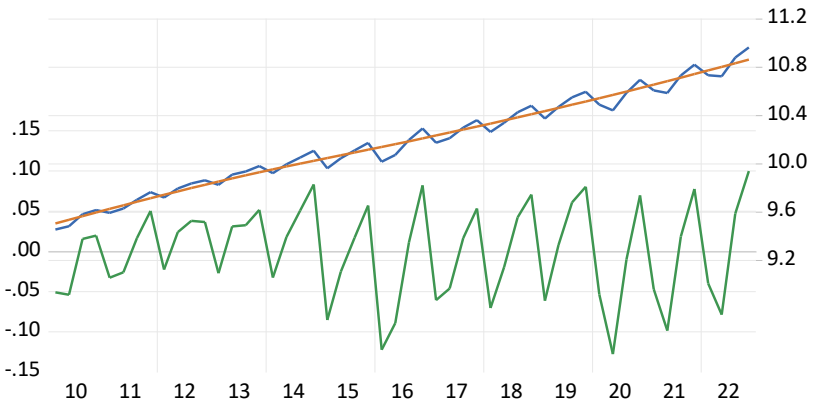

Figure 5
Gross Domestic Product: Hodrick-Prescott Filter 2010Q1-2022Q4
Source: Central Bank of Nigeria Database 2020Q1 – 2022Q2.

The essence of filtering the data (lnGDP) is to remove the short-term variation in the time series data for robust analysis**.** The trend of the data after filtering is represented by a straight line while the cyclical pattern is represented by the fluctuating curve. They are as shown in Figure 5.

4.2 Unit Root Result

Table 2 contains the result of the unit root tests of the study variables. The explanatory variables represent uncertainty estimates of exchange rate, fuel pump price, all items consumer price index and maximum lending rate.

Table 2: Unit Root Result

Variables	ADF Test	Critical Value	Level of Integration
lnGDP	0.174157	-2.925169	I(0)
EXR	-5.215059	-3.57131	I(0)*
FPP	-7.511116	-3.568308	I(0)*
AICPI	-3.914689	-3.574446	I(0)*
MLR	-7.904814	-3.568308	I(0)*
FPCPI	2.571316	-3.574446	I(0)
PLR	-1.356439	-3.56543	I(0)
lnGDP	-3.424096	-2.925169	I(1)**
FPCPI	-12.64115	-3.57131	I(1)*
PLR	-3.7084	-3.57131	I(1)*

Source: Authors Computation (2024)

(*) (**) (***) Indicate 1%, 5% and 10% level of significance respectively.

ADF: Augmented Dickey FullerTest

LnGDP - Log of Gross domestic product; EXR –exchange rate; FPP – Fuel Pump Price; AICPI – All items consumer price index; MLR – Maximum lending rate; FPCPI –Farm price consumer price index; PLR – Prime Lending rate

These variables are stationary at 1 per cent level of significance while the explained variable (lnGDP), and the instrumental variables are FPCPI and PLR are stationary in first difference at 5 percent and 1 percent level of significance respectively.

4.3 GMM Results

The regression results in Table 3 suggest that the unpredictable pattern of different prices considered in this study affected economic output in terms of magnitude and direction. At 1 per cent level of significance, exchange rate, fuel pump price and all items consumer price index significantly affected output while maximum lending rate affected output at 5 percent level of significance.

Table 3: GMM Results

Variable	Coefficient	std.error	t.statictic	p.value
EXR	2.8344	0.4134	6.8548	0.0000*
FPP	2.9326	0.6048	4.8486	0.0000*
AICPI	-3.2217	0.4076	-7.9048	0.0000*
MLR	-0.0737	0.0337	-2.1831	0.0343**

Source: Authors Computation (2024)

(*), (**) - Significant 1% and 5% respectively

J. Statistic: 6.062949

Probability (J-Statistic): 0.809947

Instrument Rank: 14

All items consumer price index and maximum lending rate negatively affected output during the period of the study. An increase of 1% in the consumer price index (inflation) will lead to a decline of 3.22 per cent in aggregate output in Nigeria. The result suggest that unstable commodity prices tend to affect the aggregate supply side and factor prices. These led to a reduction in aggregate output. This in turn might lead to reduction in productive activities with likely consequent effect on increase in unemployment if the situation persists. Alternately, rising prices may lead to hoarding by major distributors with the hope of further increase in prices so as to make increased return on the goods. Hoarding was experienced in Nigeria in the early part of 2024 when changes in the prices

of commodities were unpredictable and the economy experienced simultaneous changes in the price of foreign currency exchange rate, withdrawal of fuel price subsidy and increase in the Central bank minimum lending rate within the first quarter of 2024. Although the period of coverage by the study is 2010Q1 – 2022Q4.

In respect of maximum lending rate, the variable negatively affected output significantly at 5 per cent level of significance. This implies that an increase of 1 per cent in the loan rate will reduce economic output by 0.07 percentage points. The outcome of the study on lending rate and output linkage conforms to the Keynesian economic theory (IS-LM model). Although the effect of changes in the lending rate on output is not as high as the effect of changes in consumer prices on output. Uncertainty of exchange rate and fuel pump price cause output to increase by 2.8 and 2.9 percentage points respectively if each of the prices increased by 1 per cent respectively. The effect of exchange rate on output may be peculiar to Nigeria being an import dependent economy. As the exchange rate devalues cost of import rises and the value of import absorbed by the economy rises. This may eventually lead to increase in market prices of output resulting in a positive relationship between the exchange rate and output. The fuel pump price is a factor cost for many firms due to poor energy supply in Nigeria. As the fuel pump price rises, it is included in the cost of production and this may lead to increase in the aggregate economic output.

The evidence from this study on the effect of uncertainty of prices on aggregate output is similar to the outcome of the study by Carlos et al., (2023), their study was based on Latin American countries. The study found that macro uncertainty of whatever type has a higher and consistent effect on the gross domestic product of fourteen countries considered for the study differently. In the USA, Joonseok (2020) analysed quarterly data and he was able to show that output reduces as a result of uncertainty shocks. But, Bredin and Fountas (2004) used monthly data for G7 countries (the data span is possible due to the countries' level of advancement) and found that uncertainty of the inflation rate is not particularly detrimental to economic growth. The outcome of Bredin and

Fountas (2004) differs from the evidence on Nigeria. This may be due to high level of industrialization in G7 counties and their advancement in the production of finished goods, which is grossly deficient in Nigeria.

4.4 Post Estimation Tests Results

Post estimation tests conducted for this study are the probability of *J. statistic* test, instrument orthogonality test and over-identification tests.

4.4.1 Result of J. Statistic and Instrument rank

Additional information (J.statistic, Probability of J.statistic and instrument rank) listed under Table 3 affirms the robustness of our results. The results of the *J. statistic* and probability of *J. statistic* are 6.0629 and 0.8099 respectively. The probability of *J. statistic* at 0.8099 infers that the study fails to reject the null hypothesis that the study satisfies the over-identification restrictions. In addition, the *J. statistic* suggests that at 1 per cent level of significance, the model of the study is not mis-specified and the instruments used to proxy the violation of the exogeneity condition are appropriate. In respect of over-identifying restrictions of GMM analyses the order condition of identification of equations. The condition is satisfied for this study because the instruments are more than the parameters $(L \geq K)$ estimated. With an instrument of 14, the model is indeed over-identified for an estimated 4 parameters listed in Table 3.

4.4.2 Instruments Orthogonality C Test

Table 4 contains the results of the instruments orthogonality test. In view of the exogeneity assumption between the explanatory variables and the errors of the GMM model, the instruments variable Z_t is included in the GMM model estimation to induce changes in the independent variables. This action allows the study to capture the causal effect between the dependent and independent variables. The probability values of the instruments tests results excluding the constant affirmed that the study fails to reject the null hypothesis, which states that all the instruments used for the GMM model are valid at all levels of significance.

Table 4: Instrument Orthogonality Test Results

Instruments	p.value
LNEXR(-1) LNEXR(-2) LNFPP(-1) LNFPP(-2)	0.8845*
LNAICPI(-1) LNAICPI(-2) MLR(-1) MLR(-2) LNFPCPI	0.9683*
LNFPCPI(-1) PLR PLR(-1) PLR(-2)	0.8654*

Source Authors Computation (2024)

{*} Significant at 1 % level.

5.0 Conclusion and Policy Recommendations

The paper employs the GARCH and GMM econometric methods to determine the effects of uncertainties of some price indicators on economic output in Nigeria. Evidence from the GARCH estimates avers that the entire explanatory variables exhibit various levels of uncertainty but uncertainty of exchange is the most persistent and it may not die off slowly in the immediate future. The GMM regression results suggest that inflation and lending rates significantly affected economic output negatively while fuel pump price and exchange rate have significant positive effect on economic output. Based on the findings from the study, we concluded that uncertainty of inflation and maximum lending rates have negative significant effect on economic output while fuel pump prices and exchange rate significantly exert positive effects on economic output in Nigeria

The following policy recommendations are desirable:

i). the study found that uncertainty of exchange rate is very high without the possibility of dying off soon. In view of this the study recommends that government should support export oriented firms especially in the agricultural sector and other allied sectors (minerals and iron and steel and gas sector) in order to improve the foreign exchange earning capacity of the nation and to curb imported inflation through exchange rate uncertainty;

ii). Due to the negative effects of all share consumer price index (inflation) on economic growth the study recommends the re-introduction of a price control board for major commodities like grains in order to stabilize agricultural output prices that can

mitigate domestic inflationary trends especially on non-durable consumer goods.

iii). Furthermore, the government should through the central bank policy guidelines to other banks ensure stable lending rate that is low enough to support new and existing investment ventures due to the negative effect of lending rate on economic output.

iv). Finally, to mitigate uncertainty of fuel pump price, fuel processing licences should be granted by government to investors who intend to set up modular refineries to augment local production of petroleum products in order to improve domestic supply.

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Monetary policy and bank lending to the agricultural and manufacturing sectors in Nigeria

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Abstract
This study examined the effects of monetary policy on bank lending to the agricultural and manufacturing sectors in Nigeria. The study covered the period 1990 to 2022 and applied the autoregressive distributed lag (ARDL) estimation technique. The results indicate that monetary policy does not impact the agricultural and manufacturing sectors in the short run. However, the estimates show that monetary policy impacts agricultural and manufacturing sectors in the long run. Monetary policy rate (MPR) and directed loans to agricultural and manufacturing sectors are the most impactful monetary policy tools influencing agricultural and manufacturing sectors in the long run. Further, liquidity ratio has negative effect on the manufacturing output. Lastly, monetary policy seems to have stronger effect on the manufacturing sector than the agricultural sector. The study recommends that the Central Bank of Nigeria (CBN) should lower MPR and provide directed loans to the agricultural and manufacturing sectors to boost output in the long run
Keywords: Monetary policy; Agricultural sector; Manufacturing sector; Bank lending; ARDL
JEL: E52; E58; G38;

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Monetary policy and bank lending to the agricultural and manufacturing sectors in Nigeria

1. Introduction

The agricultural and manufacturing sectors are vital for economic growth and development in Nigeria. While the agricultural sector remains the major employer of labour in the rural areas, providing food for the teeming population, and serving as a veritable source of industrial linkages and development, the manufacturing sector is the main tool for industrialization of the economy, an avenue for increasing productivity, channel for export expansion and import substitution, raising foreign exchange earning capacity; and increasing employment. Improved growth in these sectors are necessary given that agriculture and its associated value-added agribusinesses and services play an essential role in national food security and job creation while robust manufacturing sector expands technological boundaries, increases employment, enhances growth, and improves the standard of living of the people (Nnyanzi, et al, 2022; Lawal et al, 2022; Anyanwu, 2018). However, these sectors performances have been dismal and have not served as catalysts for growth and development in Nigeria. To address this inefficient performance and spur accelerated growth in the agricultural and manufacturing sectors, Nigerian government has formulated and implemented various macroeconomic policies, specifically fiscal and monetary policies. Studies, however, have shown that fiscal policy has a negative effect on the agricultural sector in Nigeria (Okoh, 2015). Given this relative ineffectiveness of fiscal policy on sectoral growth, recent studies have advocated the adoption of strong monetary policy action to influence sectoral output and economic growth (Oseni & Oyelade, 2023).

Monetary policy affects the agricultural and manufacturing sectors through its interest rate and lending channels, thereby impacting cost of input, production, output and export of agricultural and manufactured goods. Ogbanje & Ihemezie (2021) found that monetary policy affects the agricultural sector in diverse manners. Monetary policy instruments such as lending rate, monetary policy rate, loan and advances to the sectors remain vital for achieving improved agricultural productivity and manufacturing sector performance in Nigeria. High lending rate increases

cost of borrowing, hinders domestic investments in agriculture and manufacturing, diminishes aggregate demand, increases unemployment, and weakens economic growth. Various regimes of monetary policy have been implemented in Nigeria; sometimes, monetary policy is contractionary to stabilize prices and at other times, expansionary to enhance the real sector performance such as the manufacturing sector (Nwosa et al., 2011). Nguyen (2019) shows that monetary policy tightening has negative impact on output in emerging and developing economies. Onaga et al. (2023) find that monetary policy affects performance of the real sector in Sub-Saharan Africa. Sengupta (2014) concludes that monetary policy affects sectoral output in India through the interest rate and credit channels.

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This paper examines the effects of monetary policy on agricultural and manufacturing sectors in Nigeria. Previous studies on the impact of monetary policies have largely focused on its impact on aggregate economic growth (Oseni & Oyelade, 2023). Few studies that investigated monetary policy's impacts on sectors have either focused on the agricultural sector (Udeaja & Udoh, 2014; Ogbanje &Okpe, 2022) or manufacturing sector (Okonkwo et al., 2015; Akpunonu & Orajak, 2021). None of these studies has examined and compared the effects of monetary policy on the agricultural and manufacturing sectors in Nigeria. This is the gap that this study seeks to fill by examining the effects of monetary policy on these two essential sectors.

The study contributes to the existing literature in two ways. First, we examine the effects of monetary policy on two essential sectors of Nigerian economy. Second, we compare the effects of monetary policy on agricultural and manufacturing sectors.

2. Monetary policy design in Nigeria

2.1 Monetary policy and agricultural sector in Nigeria

Financial intermediation is the practice of channeling funds from areas of surplus to areas of deficit. The intermediation processes, however, have been ineffective due to several factors including: asymmetric information between the lender and borrower, collateral constraints by borrowers, commercial banks' apathy to lend to certain sectors due to perceived risks,

among others. These have necessitated the need for Central Bank of Nigeria (CBN) interventions so as to enhance banks' confidence and mitigate the risks around lending to key sectors of the economy. Thus, the CBN has designed and implemented various monetary policies to enhance agricultural productivity, achieve food self-sufficiency, promote food security, and strengthen the agricultural value chain. The CBN's interventions in agricultural sector include:

i. Agricultural Credit Guarantee Scheme Fund (ACGSF): the fund was introduced in 1978 and administered by the Central Bank of Nigeria with the aim of assisting banks to support agricultural activities.
ii. Commercial Agriculture Credit Scheme (CACS): this was established by the CBN in partnership with the Federal Ministry of Agriculture and Rural Development (FMARD) in March 2009. The objective is to fast track the development of commercial agriculture in the country.
iii. National Food Security Programme (NFSP): It was established in 2009 to mop up strategic grains reserve and benefit registered members of Apex Farmers' Associations (AFA),
iv. Paddy Aggregation Scheme (PAS): this was introduced as working capital to support rice millers and targeted at paddy aggregation during harvest periods.
v. Accelerated Agricultural Development Scheme (AADS) and Private Sector-led Accelerated Agricultural Development Scheme (P-AADS): this targets long term financing for land clearing, irrigation facilities mechanization services, rural access roads and other agricultural infrastructure.
vi. Maize Aggregation Scheme (MAS): provision of working capital support for major feed mills and big poultry farms to aggregate maize during harvest periods
vii. Anchor Borrowers' Programme (ABP): this targets the development of an ecosystem that enhances value chain financing through lending in-kind to smallholder farmers and market assurance.

viii. Presidential Fertilizer Initiative: this targets bulk financing through Nigeria Sovereign Investment Authority (NSIA) in order to facilitate raw materials supply to local blending plants through the MOU with Morocco.

2.2 Monetary policy and manufacturing sector in Nigeria

The Central Bank of Nigeria (CBN) has introduced and implemented pivotal interventions to enhance manufacturing productivity and strengthen the resilience of the manufacturing sector. These CBN's interventions in manufacturing sector include:

i. Real Sector Support Facility through the Differentiated Cash Reserve Requirement (RSSF-DCRR): this was established in August 2018 with a bid to unlock the potential of the real sector. The objectives are to increase the flow of credit to the real sector of the economy, consolidate and sustain economic recovery, increase output, generate employment, increase foreign exchange earnings, diversify the revenue base, and provide inputs for the industrial sector on a sustainable basis.
ii. Non-oil export stimulation facility: the CBN introduced the Non-Oil Export Stimulation Facility in 2017. The facility aims to improve access of exporters to concessionary finance, expand and diversify the non-oil export baskets, shore up non-oil export sector productivity and create more jobs, and support export-oriented companies to upscale and expand their export operations.
iii. Export development fund (EDF): this was introduced in 2018 by the CBN with the aims of facilitating the Bank's quest to drive non-oil exports, improving access of exporters to concessionary finance, expanding and diversifying the non-oil export baskets, attracting new investments and encourage re-investments in value added non-oil exports, and revamping/resuscitating export-oriented industries,
iv. CBN-Bank of Industry Facility (CBIF); and 100 for 100 Policy on Production and Productivity (100 for 100 PPP): this

is an intervention of the CBN designed to stimulate investments in Nigeria's top priority sectors and boost production.

3. Review of literature

This section discusses the theoretical and empirical literature relevant to this study. This considers the monetary transmission channels, particularly the credit and interest rate channels.

3.1 Theoretical literature

Two theories are relevant to this work: the credit channel transmission of monetary policy and the Keynesian interest rate transmission mechanism.

3.1.1 The credit transmission channel

Monetary transmission through the credit channel occurs when changes in the monetary policy stance affect the quantity of credit that is available. The credit channel can be decomposed into two: the banking lending channel and the balance sheet channel (Bernanke & Gertler, 1995). The bank lending channel represents the impact of monetary policy on the capacity of banks to lend to the real sector. According to bank lending channel, monetary policy works by affecting bank assets as well as banks' liabilities. Monetary policy shifts the supply of deposits and the supply of bank loans (Bemanke and Blinder,1988). An expansionary monetary policy which increases bank reserves and bank deposits causes a rise in the quantity of bank loans available. Where firms are dependent on bank loans to finance their investment, this increase in bank loans will cause a rise in investment, leading ultimately to an increase in aggregate output. Bernanke and Blinder's (1988) model of the bank lending channel indicated that open market sales by the monetary authority, that drain reserves and deposits from the banking system, would limit the supply of bank loans by reducing banks' access to loanable funds.

The balance sheet channel considers the impact of monetary policy on the capacity of firms to borrow from markets in response to changes in their

net worth arising from monetary policy decisions. The balance sheet channel of monetary policy arises because shifts in monetary policy affect not only market interest rates but also the financial positions of borrowers, both directly and indirectly. The balance sheet channel is based on the theoretical premise that the external finance premium facing a borrower depends on borrower's financial position. Since borrowers' financial positions affect the external finance premium, and the terms of credit that they face, fluctuations in the quality of borrowers' balance sheets would affect their investment decisions (Bernanke & Gertler, 1995). A contractionary monetary policy *directly* weakens borrowers' balance sheets in at least two ways. The rising interest rates directly increase interest expenses, reduce net cash flows and weaken the borrower's financial position. Further, the rising interest rates are also associated with declining asset prices, which shrink the value of the borrower's collateral. The erosion of the firm's net worth and creditworthiness over time explain the impact of the credit channel on spending, particularly on inventory and investment spending.

3.1.2 Interest rate channel

This is typically called "the Keynesian transmission mechanism" whereby a monetary tightening (increase in the short-term interest rate) leads to longer-term rates through the expectations-hypothesis of the term structure. With sticky prices, the rise in nominal interest rates translates into an increase in the real interest rate. Firms respond to this increased cost of capital by cutting back on investment which depresses output. . Similarly, households facing higher real borrowing costs reduce their purchases of durable goods. Thus, aggregate output and employment fall. This interest rate channel forms the basis of the traditional Keynesian IS-LM model

3.2 Empirical literature

Empirical studies have examined the effects of monetary policy on bank lending to the real sector of the economy. For instance, Abd Karin et al. (2006) examined monetary policy and bank lending to sectors in Malaysia. The results showed that monetary policy tightening has

negative effects on all the sectors in Malaysia. The results, however, showed that the agricultural, manufacturing and mining sectors were mostly affected by monetary policy contraction. Onaolapo & Shomade (2017) investigated monetary policy and bank lending behavior in Nigeria. The findings indicated that monetary policy had long run relationship with commercial bank lending in Nigeria.

A number of studies have assessed the effects of monetary policy on the agricultural sector. For example, Udeaja & Udoh (2014) examined the effect of monetary policy on the agricultural sector in Nigeria. Applying ARDL technique, the findings showed that monetary policy through the exchange rate channel impact agricultural sector in Nigeria. Ogbanje &Okpe (2022) investigated the impact of monetary policy on agricultural sector performance in Nigeria. The results showed that monetary policy influence the agricultural sector in the short run. Magaji et al. (2023) examined the impact of loan to agricultural sector to agricultural output in Nigeria. The results showed that agricultural loan has positive effect on agricultural output.

Studies have also investigated the impact of monetary policy on the manufacturing sector. Okonkwo et al. (2015), employing ARDL, analyzed the impact of monetary policy on the manufacturing sector in Nigeria. The results revealed that monetary policy exerts strong influence on the manufacturing sector. Okafor et al. (2020) assessed the impact of monetary policy on industrial output in selected African countries. Using ARDL, the findings showed that monetary policies have significant impact on industrial output in Nigeria, South Africa and Kenya. Henry et al. (2020), using VECM, found that monetary policy significantly affects manufacturing sector performance in Nigeria. Akpunonu & Orajak (2021), using OLS, investigated the effect of monetary policy on industrial growth in Nigeria, The estimates showed that monetary policy impact the industrial sector. Agbonrofo & Ajibola (2023), using panel ARDL, assessed the effects of monetary policy on the manufacturing sector in CFA zones of Sub-Sahara Africa (SSA). The findings indicate that monetary policies have significant effect on the manufacturing sector in the long run but no effect in the short run in the CFA zone.

The above review shows that existing studies have largely focused on the effects of monetary policy either on the agricultural sector or manufacturing sector. None of these studies has examined and compared the effects of monetary policy on the 2 sectors.

4. Data and Methodology

This study employed time-series annual data over the period 1990 to 2022. The data were sourced from the Central Bank of Nigeria (CBN) database. The variables include agricultural output, manufacturing output, loan to the agricultural sector, loan to the manufacturing sector, liquidity ratio, loan to deposit ratio, monetary policy rate (MPR), and treasury bill (TB) rate.

The functional forms of the model are specified as:

$$Agricoutput = f(liquid\ ratio, loan\ to\ agric, MPR, loan\ deposit\ ratio, TBrate) \ldots (1)$$

$$Manufoutp = f(liquid\ ratio, loan\ to\ manuf, MPR, loan\ deposit\ ratio, TBrate) \ldots\ldots (2)$$

The autoregressive Distributed Lag (ARDL) technique by Pesaran and Shin (1999) and Pesaran et al. (2001) is applied to investigate the short and long run dynamics among the variables. As noted by Rahman and Kashem (2017), ARDL is flexible, unbiased, and adequately address autocorrelation and endogeneity problem. The econometric forms of the model are stated as:

$$lAgrc_t = \gamma_1 + \gamma_2 liqrat_t + \gamma_3 lonagric_t + \gamma_4 londeprat_t + \gamma_5 MPR_t + \gamma_6 TBrate_t + \mu_t (3)$$

$$lmanf_t = \rho_1 + \rho_2 liqrat_t + \rho_3 loanmanf_t + \rho_4 loandeprat_t + \rho_5 MPR_t + \rho_6 TBrate_t + \varepsilon_t (4)$$

Where $lAgrc_t$ represents agricultural output, $lmanuf_t$ is manufacturing output, $liqratio_t$ is liquidity ratio, $lonagric_t$ is loan to the agricultural sector, $lonmanuf_t$ is loan to the manufacturing sector, $londeprat_t$ is loan to deposit ratio, MPR_t is monetary policy rate and $TBrate_t$is treasury bill rate. γ_1 and ρ_1 are the intercepts; $\gamma_2, \gamma_3, \gamma_4, \gamma_5,$

γ_6, ρ_2, ρ_3, ρ_4, ρ_5 and ρ_6 are the coefficient of explanatory variables and μ_t and ε_t are the stochastic terms..

3.1 *ARDL and Bound Test*

Our ARDL model are specified as:

$$\Delta Agric_t = \beta + \sum_{i=1}^{n} \theta_1 \Delta Agric_{t-1} + \sum_{i=1}^{n} \theta_2 \Delta liqrat_{t-1} + \sum_{i=1}^{n} \theta_3 \Delta lonagric_{t-1} + \sum_{i=1}^{n} \theta_4 \Delta londeprat_{t-1} + \sum_{i=1}^{n} \theta_5 \Delta MPR_{t-1} + \sum_{i=1}^{n} \theta_6 \Delta TBRate_{t-1} + \delta_1 Agric_{t-1} + \delta_2 liqrat_{t-1} + \delta_3 loanagric_{t-1} + \delta_4 londeprat_{t-1} + \delta_5 MPR_{t-1} + \delta_6 TBRate_{t-1} + \varepsilon_t \quad \ldots(5)$$

$$\Delta Manuf_t = \beta + \sum_{i=1}^{n} \vartheta_1 \Delta Manuf_{t-1} + \sum_{i=1}^{n} \vartheta_2 \Delta liqrat_{t-1} + \sum_{i=1}^{n} \vartheta_3 \Delta lonmanuf_{t-1} + \sum_{i=1}^{n} \vartheta_4 \Delta londeprat_{t-1} + \sum_{i=1}^{n} \vartheta_5 \Delta MPR_{t-1} + \sum_{i=1}^{n} \vartheta_6 \Delta TBRate_{t-1} + \omega_1 Manuf_{t-1} + \omega_2 liqrat_{t-1} + \omega_3 lonman_{t-1} + \omega_4 londeprat_{t-1} + \omega_5 MPR_{t-1} + \omega_6 TBRate_{t-1} + \varepsilon_t \quad \ldots(6$$

Where in eq. (5), the short run impacts are captured by the estimates assigned to the first-differenced variables and long run effects are represented by the estimates of $\delta_2 - \delta_6$ normalized on δ_1 in eq. (5) and $\omega_2 - \omega_6$ normalized on ω_1 in eq.(6) The $F - test$ is applied for the existence of long run relationship and joint significance of lagged variable (Pesaran et al., 2001). The null hypotheses for eq, (5) and (6) are specified as: $H_0: \delta_0 = \delta_1 = \delta_2 = \delta_3 = \delta_4 = \delta_5 = \delta_6 = 0$

$$H_0: \omega_0 = \omega_1 = \omega_2 = \omega_3 = \omega_4 = \omega_5 = \omega_6 = 0$$

The null hypothesis of no cointegration is rejected if F-statistics is greater than the upper bound critical value and is not rejected if the F-statistics is below the lower bound value. If the computed F-statistics fall between the upper and lower critical bound value, the test in inconclusive.

5. Analysis of results

4.1 Unit root tests

Table 2 presents the results for the Augmented Dickey Fuller (ADF) stationarity tests. The estimates show that the variables are of different order of integrations.This provides justification for the application of ARDL (see Pesaran et al., 2001; Pesaran & Shin, 1999).

Table 2: Stationarity tests

Variables	At level		First difference		Remarks
	Intercept	Trend	Intercept	Trend	
Lagric.	-0.844	-1.065	-5.067***	-5.058***	I(1)
Lmanuf.	-0.057	-2.555	-3.802***	-4.067***	I(1)
Loanagric	-0.761	-3.137	-6.393***	-6.302***	I(1)
Loanmanuf	-2.813*	-2.75	-4.496***	-4.018**	I(0)
Liqratio	-4.795***	-4.861***	-5.087***	-5.00***	I(0)
MPR	-3.239**	-3.355*	-7.87***	-7.785***	I(0)
Loan-dep	-2.759*	-3.002	-6.322***	-6.205	I(0)
Tbrate	-2.017	-3.119	-6.742***	-6.635***	I(1)

4.3 Discussion of results

The results of the ARDL bound test are presented in Table 3. The computed

$F - Statistics$ is greater than the upper critical bound value at 5% significant level once agriculture and manufacturing are used as the independent variables. This indicates the presence of cointegration among the variables over the sample period. This suggests that long run relationship exists among agriculture, manufacture, liquidity ratio, loan to agricultural sector, MPR, TB rate and loan to deposit ratio.

Table 3. Bound test result

	Agriculture		Manufacturing	
	Pesaran		Pesaran	
Critical values	Lower $I(0)$	Upper $I(1)$	Lower $I(0)$	Upper $I(1)$
1%	3.06	4.15	3.06	4.15
5%	2.39	3.38	2.9	3.38
10%	2.08	3.00	2.08	3.00
$F-Stat$	4.016		12.369	

The estimates for short and long run effects of monetary policy on the agricultural sector are provided in Table 4. The estimates show that monetary policy instruments- liquidity ratio, loan ratio, and monetary policy rate (MPR) have negative insignificant effects on agricultural output in the short run. This indicates that monetary policy does not impact the agricultural sector in the short run. This may be due to the long time lag it takes for the policy effects to manifest on agricultural output to be produced. This is in contrast to the findings by Udeaja & Elijah (2014). The results for the long run show that loan-to-agriculture has significant positive effect on agricultural output. This implies that an increase in loan facility directed to agricultural sector will increase agricultural output in the long run. One percent increase in loan-to-agriculture will increase agricultural output by 0.002% in the long run. This is similar to the findings by Magaji et al. (2023) for Nigeria. In contrast, the results show that MPR has a significant negative impact on agricultural output. This indicates that a rise (fall) in MPR reduces (increases) agricultural output. One percent increase in MPR will decrease agricultural output by 0.356% in the long run A rise in MPR increases the cost of borrowing and cost of farming, thereby reducing agricultural output. This is in line with the results by Ogbanje & Okpe (2022). Lastly, liquidity ratio and loan-to-deposit ratio have insignificant positive and negative effects on agricultural output respectively

Regarding diagnostic tests, the adjusted-R^2 show that 98.7 per cent of the variations in agricultural output is explained by the independent variables. The diagnostic results show that the model did not suffer serial correlation

as the probability value is higher than a 5 per cent significance level. Further, the results show that the model is free of heteroscedasticity as the null hypothesis not dismissed. Moreover, the model is well stated as the significant level is higher than the 5 per cent considerable level.

Table 4. Short run and long run estimates: Dependent variable: $\Delta lagric$

Panel A: Short run			
Independent variables	Coefficient	Std.	t-stat
$\Delta liq\ ratio$	-0.0002	0.001	-0.204
$\Delta loan\ agric$	-0.0002	0.001	1.412
ΔMPR	-0.004	0.01	-0.417
$\Delta TBRATE$	0.011	0.01	1.364
$\Delta loan\ dep\ ratio$	-0.002	0.001	-1.679
Panel B: Long run			
$liq\ ratio$	0.0032	0.015	0.206
$loan\ agric$	0.002*	0.011	1.88
MPR	-0.356*	0.191	-1.87
$TBRate$	0.19	0.167	1.134
$loan\ dep\ ratio$	-0.0045	0.016	-0.279
$Constant$	10.295	1.411	7.295

$R^2 = 0.991;\ \bar{R}^2 = 0.987; (\chi^2_{sc}) = 0.53\ ; (\chi^2_R)\ = 0.43; (\chi^2_N) = 0.53; (\chi^2_H) = 1.98$

The estimates for short and long run effects of monetary policy on the manufacturing sector are provided in Table 5. The results show that liquidity ratio, MPR, and loan-deposit--ratio have insignificant negative effects on manufacturing output in the short run while loan-to-manufacturing and TB rate have insignificant positive effects on manufacturing output This implies that the impact of monetary policy on manufacturing output is in the long run. This is similar to the findings by Agbonrofo & Ajibola (2023). However, the estimates for the long run show that liquidity ratio and MPR have significant negative effect on manufacturing output. This implies that an increase in liquidity ratio and MPR will cause a decline in manufacturing output. One percent rise

liquidity ratio will decrease manufacturing output by 0.014% while one percent increase in MPR will lead to a decline in manufacturing output by 0.11% in the long run. This is similar to the findings by Agbonrofo & Ajibola (2023). Further, the results indicate that loan-to-manufacturing sector and TB rate have significant positive impact on manufacturing output. This implies that a provision of more loans directed at the manufacturing sector will lead to an increase in manufacturing output in the long run. One percent increase in loan-to-manufacturing sector will lead to a rise in manufacturing output by 0.005% while one percent increase in TB rate will lead to a rise in manufacturing output by 0.049% in the long run This is similar to results by Okonkwo et al. (2015). Loan-to-deposit ratio has insignificant positive effect on manufacturing output. The adjusted-R^2 show that 97.4% of the variations in manufacturing output is explained by the independent variables. The diagnostic results indicate that the model did not suffer serial correlation as the probability value is greater than a 5% significance level. The null hypothesis that the model is free of heteroscedasticity is not dismissed. Further, the model is well stated as the significant level is higher than the 5 per cent considerable level.

Generally, the results show that MPR and directed loans to agricultural and manufacturing sectors are the most efficient monetary policy tools to boost output in the 2 sectors.

Table 5. Short run and long run estimates: Dependent variable: $\Delta lmanuf$

Panel A: Short run			
Independent variables	Coefficient	Std.	t-stat
$\Delta liq\ ratio$	-0.00013	0.001	0.116
$\Delta liq\ ratio(-1)$	0.006**	0.0012	4.944
$\Delta liq\ ratio(-2)$	0.0033**	0.0012	2.639
$\Delta loan\ manuf$	0.0008	0.00008	-0.97
$\Delta loan\ manuf(-1)$	0.0004**	0.0001	-3.441
$\Delta loan\ manuf(-2)$	0.0002*	0.0001	-2.261
ΔMPR	-0.003	0.0063	-0.51

$\Delta MPR(-1)$	0.04***	0.009	4.277
$\Delta MPR(-2)$	0.011**	0.004	2.406
$\Delta TBRATE$	0.006	0.006	1.029
$\Delta loan\ dep\ ratio$	-0.001	0-001	1.007
$\Delta loan\ dep\ ratio(-1)$	-0.0032*	0.0017	-2.023
$\Delta loan\ dep\ ratio(-2)$	-0.0026*	0.0013	-1.967
Panel B: Long run			
$liq\ ratio$	-0.014**	0.0054	-2.544
$loan\ manuf$	0.005***	0.0006	7.54
MPR	-0.11**	0.039	-2.861
$TBRate$	0.049*	0.025	1.951
$loan\ dep\ ratio$	0.006	0.0057	1.123
$Constant$	9.61	0.502	19.14

$R^2 = 0.989;\ \bar{R}^2 = 0.974; (\chi^2_{sc}) = 0.16\ ; (\chi^2_R)\ = 0.17; (\chi^2_N) = 0.57; (\chi^2_H) = 0.33$

6. Conclusion and Recommendations

Given the importance of agricultural and manufacturing sectors to the growth and development of Nigerian economy, this study investigated the effects of monetary policy on the agricultural and manufacturing sectors in Nigeria. The study employs ARDL estimation technique. The findings reveal that monetary policy has no impact on the agricultural and manufacturing sectors in Nigeria in the short run. In the long run, however, monetary policy has long run impact on the agricultural and manufacturing sectors. The estimates show that MPR and directed loans to agricultural and manufacturing sectors are the most potent monetary policy tools to enhance productivity and output in the 2 sectors. Further, the results show that monetary policy has stronger effect on the manufacturing sector than the agricultural sector. Based on the findings, the study recommends that the CBN should lower MPR to boost productivity in the agricultural and manufacturing sectors and should provide direct loans to the agricultural and manufacturing sectors in Nigeria so as enhance output in the two sectors. Further, the CBN should lower MPR to promote output in the 2 sectors.

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CORPORATE TRANSPARENCY AND FINANCIAL MARKETS PERFORMANCE IN NIGERIA

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Abstract

This study examined the relationship between transparency and financial Market performance Nigeria. This study is based the fact that companies listed on Nigeria stock exchange (NGX) are expected to be transparent in their disclosures to the exchange. The study therefore examined how their level of transparency affects their performance on the NGX Information related to research variables is for 1981-2022 (41-year period). To investigate the association between variables of this research, the transparency (Board Composition) is used as the dependent variable while financial information like Credit to private sector (CPS), Money market Values to GDP, Transaction Total in capital Market and all share Index as independent variables are considered. The Ordinary Least Square (OLS) regression test was employed in this study to assess the

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models' estimation and research data in order to ascertain their degree of transparency and explore potential relationships between the study's variables. Based on the research findings, there is a considerable positive correlation between the financial market performance criteria of CPS and MS and transparency, as measured by the transparency indices provided in Standard & Poor's model. However, transparency and TT with ASI have negative connections, which mean that transparency has a detrimental effect on dependent variables. This study will provide literature evidences as record about transparency indexes and financial market performance in Nigeria. The result leads to a lot of recommendations on the need to ensure transparency which is the pillar for getting good performance in the Nigeria Financial market.

Keywords: Transparency, Financial Performance, Credit to private sector, Money market Values, all shares Index
JEL Classification: G34

1.0 Introduction

Transparency and disclosure quality of companies is today's one of the major concerns for corporate governance and the management of companies listed on the stock across the globe. According to Jahanshad, Heidarpoor, and Valizadeh (2013), financial transparency is the capacity to have easy access to reliable and pertinent information on the state and performance of the economy's finances, governance, investment opportunities, and risk-taking. Transparency in financial information, on the one hand, reassures macro stakeholders that they will consistently receive reliable information about the value of the company and concerns managers and macro stakeholders about not violating their rights; on the other hand, it encourages managers to strive for increasing the value of the company rather than pursuing short-term personal interests (Bano, Tahir, Abbas, & Ansari, 2018). If the manager's judgment is called into doubt because financial statements lack sufficient transparency, the quality of the company's performance may suffer.

It can be a paramount concerning factor for the decision making of stakeholders. It also can lead to inappropriate resource distribution as well

as capitals which are directed to an unknown direction. Thus, the economy may suffer from the crisis. However, the world's capital market opined that transparency always plays a vital role to prevent the corruption and provision of distorted information and it should often do with the aim of carrying out illegal acts. However, there is a clear discrepancy between expectations and experimental evidence of openness because, in practice, there is no data supporting the operationalization of transparency with regard to reforms. Furthermore, even in industrialized nations and liberal communities, there is a lack of transparency when it comes to financial matters and governance. As a result, this study will support the defining circumstances that lead to the advancement of transparency in the Nigeria Stock Exchange-listed companies. Furthermore, this study examines its relationship to the financial success of the company using the following assessment of transparency in Nigerian corporations: (Outa, & Waweru, 2016; Zain, & Shafii, 2018). Nonetheless, the purpose of this study is to look into the connection between financial market success and company openness.

The subject of corporate governance has received a lot of attention in the fields of economics, management, company law, business ethics, and others in recent years. Over the course of the last 20 years, growing public concern over company collapse and fraud, CEO excess, misuse of management power, and corporate social irresponsibility has led to the submission of numerous formal studies and suggestions in both developed and developing nations. For instance, in the last eight years, four significant and influential reports have been released in the UK (Cadbury 1992; Greenbury 1995; Hampel 1998; and Turnbull 1999). The only solution to corporate governance issue is the enthronement of corporate transparency which in all form would have reduced or eliminate the challenges.

Because of this, there are transparency difficulties with corporations in Nigeria. In 2011, the Security and Exchange Commission incorporated disclosure and transparency into its framework of best practices. Numerous organizations have collapsed as a result of companies engaging in unethical tactics.

It is however worrisome that despite these disclosure requirements, many companies in Nigeria still violates the rules on transparency and this has led to a barrage of issues that have make the performance of companies to nosedive and lead to collapse of many companies on the stock exchange.

This study's goal is to investigate the connection between Nigeria's financial market performance and corporate transparency levels. The board, financial, and management process transparency are the study's dimensions of transparency, which are based on research by Aksu & Kosedag (2006), Chiang (2005), and Meek et al. (1995).

Objectives of the Study

This study broad objective is to investigate the effect of corporate transparency on financial market performance in Nigeria. The specific objectives are to:

1 Examine the effect of board composition on credit to private sector
2 Assess the effect of board composition on money market development
3 Evaluate the relationship between board composition and capital market development
4 Examine the relationship between the board composition and total transactions on the stock exchange

The study will therefore statically test the objectives using the following hypothesis:

1 The board composition doesn't have any effect on credit to private sector
2 The board composition doesn't have effect on money market development
3 No relationship exist between board composition and capital market development
4 No relationship exist between the board composition and total transactions on the stock exchange
5

2.0 literature Review

An increase in the timely and accurate flow of information on economic, social, and political matters—such as investors' usage of loans, borrowers' creditworthiness, monetary and fiscal policies, and international institutions' operations—is referred to as transparency. On the other hand, there might not be enough openness if people are unable to obtain information, if the information they do receive is unrelated to the problem at hand, or if the information is delayed, erroneous, or misrepresented. Accordingly, characteristics like accessibility, comprehensiveness, relevance, quality, and dependability should all be included in a workable definition of transparency (Vishwanath & Kaufmann, 2001). Acting transparently and providing information are two definitions of disclosure. In the fields of finance and economics, disclosure is widely described as "a process that makes information about decisions, actions, and current conditions visible and accessible."

Disclosure and transparency are essential components of business governance. Improved disclosure and increased transparency lessen the knowledge asymmetry that exists between bond holders and equity holders of a company and its management, which helps to mitigate the agency problem in corporate governance. Transparency, in the words of Fernandez-Feijoo, Romero, and Ruiz (2014), is the firm's specific information being made available to the public at large. In addition, a company's transparency can be evaluated using its corporate reporting, acquisition, and sharing of personal data together with information sharing as the three main components. However, financial transparency and governance transparency are the two main components that make up corporate transparency. Financial transparency is defined as the intensity of financial disclosure, whereas governance transparency is the degree of governance disclosure.

Furthermore, there is a strong correlation between financial transparency and analyst forecast accuracy when there is a limited amount of transparency. According to the explanation above, the researcher thinks that the company will require more transparent and accountable corporate procedures if they hope to see a robust and long-lasting economic

rebound. Transparency plays a crucial role in ensuring that information is disclosed in a clear, timely manner that takes into account the interests of all parties involved with the firm. Furthermore, establishing faith in the financial information provided demonstrates the impact that transparency has had in the recovery of the markets. Transparency strengthens the capacity of financial markets to evaluate risks by supplying information and data that lowers uncertainty. (Henriques, 2013).

A number of financial crises struck Latin American and East Asian nations in 1997. The economic downfall of those countries was caused by these crises, which impacted numerous joint ventures. In addition, there was the financial crisis in the final quarter of 2008, which led to numerous businesses and foreign institutions going bankrupt. But given that the company's managers and auditors withheld the financial statements, one of the main reasons for these collapses in numerous economic units is that this lack of disclosure results in a lack of trust in the financial reports and a failure to implement the principles of corporate governance, which are predicated on transparency (Gan, Shek & Mueller, 2015).

As a result, the financial statements' most crucial components of transparency and disclosure were removed. As a result, the idea of institutional control over businesses has grown in significance and is now one of the key tenets around which economic units ought to be built. Numerous groups have demanded that the benefits of institutional governance be applied to various economic units, as this is a prerequisite for all those who stand to gain. To inspire confidence, the financial department makes sure that the financial reporting procedure is carried out in a professional manner. The beneficiaries want to be included in the decision-making process and to guarantee the fairness and accuracy of the financial data included in the financial statements that are prepared.
By issuing criteria and guaranteeing the security of their application, professionals work to enhance the fairness and dependability of these reports in order to protect the interests of all parties (Allawi, Khudair. Majid, 2015).

Furthermore, because the company is transparent, the information revealed can be positively interpreted by the stakeholders. As a result, businesses with high levels of transparency will be shielded from government meddling and will be able to take advantage of several institutional supports. Additionally, the enterprises' acquisition of both tangible and intangible resources makes it possible for CSR conductivity to support their operations more successfully and effectively. In other cases, it was necessary to demonstrate to customers that their participation in the connection between CSR and financial performance

(Kajola, 2008; Wu, Liu, Chin, & Zhu, 2018). Therefore, openness and accountability are essential components of the study of sustainability. Generally speaking, accountability focuses more on the company's obligation to participate in specific activities and take into account the acts performed. The business is entitling the public and its stakeholders in the meantime. Regarding transparency, it pertains to the degree of openness exhibited by the organization in providing pertinent information that enables stakeholders to make informed decisions and guarantees that a threat to the sustainability assurance process in the management control is detected and addressed after the assurance process (Monte, 2009; Dingwerth & Eichinger, 2010). Transparency, however, needs a mechanism to measure it. As is true in most cases, Ali & Shaker (2017) state that there are four models to quantify the openness of disclosure of accounting information. Which are CIFAR index, Dipiazz and Eccles's transparency model, Bushman, Piotroski and Smith's transparency model, and Standard and Poor's model.

Actualy, the word "performance," which comes from the verb "performed," can mean "to render," "to do," or "to carry out." It is the act of accomplishing, fulfilling, or carrying out a task. Furthermore, performance can also be more broadly described as the achievement of a certain assessment in comparison to the requirements for completeness, accuracy, cost, and speed. Simplified, it's an accomplishment level that an entity has completed in order to be fulfilled. Generally speaking, throughout a specific time period, in relation to previous or anticipated

cost efficiency, the management's liability and accountability; this is applied to all aspects of an organization's operations

Performance, in the opinion of Maqbool and Zameer (2018), is a sign of the health, compliance, and success of the company. Performance is a generic phrase used to describe past or future liability or accountability for cost-efficient management. It is similar to how it is frequently applied to all or a portion of a company's sets of activities over a given amount of time. Performance, thus, encompasses both the presentation and the caliber of the outcomes that are attained. Compliance and success performance are typically employed to reflect a firm's conditions (Maqbool & Zameer, 2018; Gan, Shek, & Mueller, 2015; Chang & Taylor, 2016). Regarding the notion of performance, it is employed to expound upon the business's performance that possesses the legal standing of a firm.

In addition, a company's success can be explained as the result of its strategy or assessment, and it has been demonstrated that both the plan and the evaluation demonstrated the firm's potential to meet its goals. Furthermore, it serves as a broad indicator of the company's overall financial standing during a certain time period when comparing companies within the same industry or between industries or sectors as a whole (Khudhair, Norwani, Ahmed, & Aljajawy, 2019). The performance of a corporation has been measured using a variety of factors. Corporate performance, in the opinion of Venkatraman and Raman Jam (1986), revealed the firm's capacity to meet its objectives and perform well. This covers both non-financial metrics like market efficacy and market dynamics as well as financial metrics like economic considerations.

On what constitutes an appropriate financial performance measurement, however, there has been no consensus. According to earlier research, profitability and stock market returns can be effective performance indicators because ROA, ROE, and ROI have been used by the researchers (Maqbool & Zameer, 2018). Previous scholarly research has examined the relationship between business performance and governance. Creating this kind of connection is not easy. There are some discrepancies

in the results, which may be related to the use of various regulations, national legal environments, market circumstances, governmental policies, and measures of corporate governance and performance that vary amongst studies (Zahra & Pearce, 1989). There are more economic justifications for the value-boosting impact of financial transparency.

According to Clarkson et al. (1996), for instance, greater disclosure lowers the estimation risk associated with return distributions. According to Vander and Willekens' (2008) research, corporations in European Union member states with higher ownership concentrations disclose at a lower level than those in common law nations. Board of director (BOD) disclosure was one of the transparency metrics utilized in earlier research to gauge performance (Ben Othman, 2012). The conclusion showed that most companies' financial sectors are impacted by BSPD. But it's also a useful instrument for observing the traits and actions of the board of directors. A number of earlier studies have observed that reducing the size of the board can boost and improve the performance of the company.

However, according to agency theory, the independent board will encourage management to reveal information by promoting greater transparency than the executive members, while the non-executive board directors should disclose more about various aspects of the company (Outa, & Waweru, 2016; Zaman, Arslan & Sidiqui, 2014).

2.1 Theoretical Review

A lot of theories have fundamentally explained the relationship between the corporate transparency and performance of financial markets in Nigeria which are all explored to explain the relationship

2.1.1 Stakeholder theory

This suggests that engaging in corporate social responsibility can strengthen linkages between the company and its many stakeholder groups, which will enhance business performance. Similarly, Jo and Harioto (2011) contend that strategic managers maximize shareholder wealth and minimize shareholder complaints by using CSR engagement

to settle stakeholder conflicts. Disclosure of corporate information as part of corporate social responsibility (CSR) can greatly reduce the degree of information asymmetry among stakeholders, lowering their level of doubt and preventing conflicts and needless risks. A company with a high degree of CPT might convey to the market that its managers are confident in meeting social responsibility standards and that the company does well financially.

2.1.2 Agency Theory

According to agency theory, the fundamental challenge of corporate governance is the same as the issue of agents acting in their own best interests in any principal-agent interaction. When a director or management, acting on behalf of the principal, receives work delegation from a shareholder, acting as the principal (Eisenhardt, 1989). The idea posits that managers, acting as agents, may not always act in the best interests of the shareholders and may instead seek their own interests at the expense of the owners. This is based on the assumption that individuals maximize their own utility. Two issues that arise in the principal-agent relationship are the focus of agency theory. The first is how costly or difficult it is for the principal to keep an eye on the agent's conduct and daily activities.

Second, the differing inclinations between the principal and the agent with regard to interactions stemming from their disparate risk aversions (Eisenhardt, 1989). These issues give rise to a specific kind of management cost known as "agency cost," which is incurred when principals/owners try to make sure that agents/managers act in the principals' best interests (Jensen and Meckling, 1976).

2.1.3 Stewardship Theory

Unlike the agency theory and others, the stewardship theory holds a distinct perspective on the nature of humans (Marris, 1964; Nichols, 1969; Etizioni, 1975). The stewardship theory challenges the agency theory as a flawed premise and contends that managers are good stewards of the company. The agency theory is based on the assumption of self-interested human conduct to declare that managers as agents cannot be trusted and

should be fully watched. The stewardship theory contends that managers are acting just like stewards to serve the interests of the shareholders and diligently work to attain a high level of corporate profit and shareholder value. This theory is based on a traditional legal view of the corporation as a legal entity in which directors have a fiduciary duty to the shareholders.

2.1.4 Resource Dependence Theory

According to Pfeffer's (1972) resource dependence theory, organizations try to control their surroundings by appropriating the resources they require to thrive. The idea of co-optation has significant effects on the function and composition of the board. Boards are useful tools for bridging boundaries. They can serve as a means of establishing connections with the outside world. Environmental contingencies can be managed through interorganizational links such as board interlocks and the recruitment of outside directors. Executives can get useful knowledge from directors who are well-known in their fields and areas. By engaging their other constituents on behalf of the local group, they get active in supporting the organization (Keasy and Wright, 1993).

2.1.5 Signaling Theory

According to Karasek and Bryant, (2012:19) “Signaling is all around us in our everyday lives. People signal by the way they carry themselves, speak and interact. Organizations signal as well in their advertisements, recruiting and annual reports, just to name a few” We examine the impact of Spence's landmark 1973 paper on signaling theory in this study. Signaling reduces the spread of false information among related parties in business (Connelly, Certo, Ireland, & Reutzel, 2010). According to Spence (1973), the theory clarifies how businesses or business organizations use their board to inform shareholders about their accomplishments, disclosures, and compliance with applicable CG mechanisms and financial reporting. We examine how management, psychology, and anthropology have been impacted by signaling theory. We put up a model explaining how information and company performance are related. Lastly, we recommend directions for future study based on signaling theory.

2.2 Empirical Review

A lot of work has been undertaken to show the importance of transparency and it effect on the financial markets performance and they are analysed below:

Transparency plays a crucial role in ensuring that information is disclosed in a clear, timely manner that takes into account the interests of all parties involved with the firm. Furthermore, establishing faith in the financial information provided demonstrates the impact that transparency has had in the recovery of the markets. Transparency strengthens the capacity of financial markets to evaluate risks by supplying information and data that lowers uncertainty.

(Henriques, 2013

Board of director (BOD) disclosure was one of the transparency metrics utilized in earlier research to gauge performance (Ben Othman, 2012). The conclusion showed that most companies' financial sectors are impacted by BSPD. But it's also a useful instrument for observing the traits and actions of the board of directors. A number of earlier studies have observed that reducing the size of the board can boost and improve the performance of the company. Conversely, agency theory advised that non-executive board directors communicate more about a number of organizational characteristics, and the independent board will encourage management to provide information by being more transparent than the executive members.

(Outa, & Waweru, 2016; Zaman, Arslan & Sidiqui, 2014).

In the past, businesses that had good news would typically tell their stakeholders more than those that had bad news. In their study of Singaporean and Hong Kong businesses, Chau and Gray (2002) discovered a favorable correlation between performance and disclosure. Corporate success and openness are strongly correlated, and companies with stronger corporate governance have much higher standards for the firm's transparency and disclosure of material facts. Better performing organizations are expected to have a positive association with corporate disclosure. On the other hand, there is data from Ball, Robin, and Wu

(2003), Clatworthy and John (2006), and Watson and Marston (2002) that suggests a negative association between performance and disclosure. On the other hand, Wallace and Naser (1995) suggest that there are adverse correlations between transparency and performance in empirical research. Research by Akhtaruddin (2005) and Ahmed (1999) do not establish a meaningful correlation. Companies are expected to submit information beyond what is required by the SEC and CAMA, according to the SEC 2011. The explanations given above lead to the development of the following theories. Suchada (2007) conducted research on the effects of disclosure, transparency, and the board of directors on performance. He employed a sample population consisting of one hundred companies that were listed between 2004 and 2007 on the Thailand stock exchange. He separated transparency into three levels in his study: absolute transparency, three categories of disclosure and transparency, and ultimately the twelve categories of disclosure and transparency.

Since there was a 10% significant threshold, he concluded that in the first level, total transparency and disclosure is unrelated to any of the performance measures using ROA and Tobin Q as performance indicators. Since there was a 5% significant level, transparency and disclosure have an impact on a firm's worth in terms of investment opportunity at the second level. This is due to the fact that greater financial information openness and disclosure results in less information asymmetry between management and shareholders and, thus, cheaper capital costs.

S&P's third phase of the Turkish transparency and disclosure study was carried out in 2007 by Balic (2007) of S&P, who examined the disclosure policies of 52 Turkish companies that were listed on the Istanbul Stock Exchange. In order to give a comparative understanding of Turkish companies' disclosure practices, Standard & Poor's Governance Services and the Corporate Governance Forum of Turkey (CGFT) conducted a survey over three years that tracked and evaluated corporate responses to market and regulatory conditions.

From 2007 to 2011, Wanyonyi & Olweny (2011) investigated how corporate governance affected the financial performance of Kenyan listed insurance companies. The study's goal was to determine how listed insurance companies' financial performance was impacted by the size and makeup of their boards. They decided on a sample of six companies out of the 45 listed by the Insurance Regulatory Authority. The investigation revealed a robust correlation between the firm's financial success and the Corporate Governance procedures examined. It has been discovered that the financial performance of insurance businesses listed on the NSE is adversely affected by board size. Board composition and company financial success were positively correlated.

But more important than a director's title was their experience, knowledge, and ability on the board than their status as an executive or non-executive director. Leverage has also been shown to have a positive impact on the financial performance of insurance companies that are listed on the NSE. Regarding CEO duality, the study discovered that the financial performance of listed insurance companies was favorably impacted by the separation of the CEO and Chair roles. Transparency and financial performance are significantly correlated with the firm's performance, according to Zaman, Arslan, and Sidiqui (2014). Results indicate that organizations can improve organizational value and establish a positive relationship between corporate governance and performance by implementing excellent corporate governance practices. Moreover, significant profit and leverage were frequently the outcome of documented information that the disclosure in the annual reports provided. As a result, transparency may be defined as an essential tool for a business since it makes correct information available to all employees and makes it easier to evaluate the success of the business. Furthermore, it furnishes the public with details about the company (Balachandran & Faff, 2015).

3.0 Data and Methodology

The annual reports of the firms listed on the Nigeria Stock Exchange (NGX) from 1981 to 2022 provided the data used in this study. The random sampling technique was used to choose a sample of the

companies. Multiple regression analysis was used for analysis, and ordinary least squares (OLS) was used for estimation. The All Share Index is calculated in points, the Board Composition is measured in numbers, and the Credit Private Sector, Money Market Value, and Total Transaction in the Capital Market are measured in Naira.

3.1 Financial performance as independent variables .

Gurr (2018), Yang & Baasandorj (2017) state that performance ratios have been divided into two categories in previous research on financial performance measurement: Users of financial statements can assess the profitability and efficiency of an organization's asset and liability management strategies by using accounting-based ratios. When assessing a company, customers frequently look at profitability ratios such as ROI, ROE, and ROA. As per Gentry & Sheen (2010), there has been scholarly discourse over the use of accounting-based metrics as a gauge of financial performance since the 1980s.

3.2 Transparency as dependent variables

The transparency metric that has been utilized in previous studies (Zaman, Arslan & Sidiqui, 2014; Ali & Shaker 2017; Aljjawi & Al-Khafaji, 2018) is subjective in nature. Nevertheless, ownership structure and board size are used in the transparency index construction for this study as a proxied with board composition...

3.3 Model Specification

The model to capture the impact of corporate transparency on the financial market performance variables are stated below with the independent variables as credit to private sector to GDP, money markets transactions to GDP, capital markets total transactions to GDP and all share index the dependent Variable is board structure using size and composition .

This is expressed functionally as

$BDC_t = F(CPS_t, MS_t, TT_t, ASI_t)$ ……..…… (1)

The operational and log form of the model is stated thus:

$BDC_t = b_o + b_1 CPS_t + b_2 MS_t + b_3 TT_t + b_4 ASI_t + \mu_t$ ……... (2)

$LnBDC_t = b_o + b_1 LnCPS_t + b_2 LnMS_t + b_3 LnTT_t + b_4 ASI_t + \mu$**… ….**(3)

LnBDCt = Board Composition
LnCPSt = Credit Private Sector
LnMSt = Money Market Value
Ln t = Total Transaction in Capital Market
LnASIt = All Share Index
b0 = intercept
b1-b4= Coefficient of the independent variables
μ = white noise or error term
Note: All variables are in their natural logarithm form

The apriori expectation:

b1, b2, b4>0; b3 <0

4. Results and Discussions

4.1 Descriptive statistics

The fundamental properties of the variables under consideration, such as the number of observations, mean, standard deviation, minimum and maximum values, are frequently described by descriptive statistics. To ascertain the distribution and dispersion of every characteristic for Nigeria firms, descriptive statistics are offered. A descriptive statistical summary of all the variables used in this study from 1981 to 2022 is shown in Table 1.

This table exhibits the descriptive statistics of the independent variables including CPS, MS, TT and ASI. The averages in this order are 11.21,15.18,5584 and 14898 for the Nigerian economy while the depended variable is 653.84.

Table 1 Descriptive statistics result for the study

	BDC	C	CPS	MS	TT	ASI
Mean	653.8462	1.000000	11.21244	15.18527	5584.306	14898.27
Median	420.0000	1.000000	8.211023	12.73591	472.3000	8111.000
Maximum	1350.000	1.000000	20.77330	25.15527	25890.22	57990.20
Minimum	260.0000	1.000000	5.917270	9.151674	5.000000	11.39480
Std. Dev.	361.3816	0.000000	5.399504	5.227400	7881.274	15181.72
Skewness	0.717766	NA	0.792837	0.692518	1.135669	0.757341
Kurtosis	2.038986	NA	1.826749	1.837442	2.868621	2.756876

Jarque-Bera	4.849486	NA	6.322685	5.313534	8.411384	3.824223
Probability	0.088501	NA	0.042369	0.070175	0.014910	0.147768
Sum	25500.00	39.00000	437.2854	592.2255	217788.0	581032.6
Sum Sq. Dev.	4962673.	0.000000	1107.876	1038.377	2.36E+09	8.76E+09
Observations	41	41	41	41	41	41

Authors Computation,2024

4.2 Correlation analysis

This section presents the correlation matrix as an addition to the summary of the descriptive statistics. The statistical measure of how well one variable predicts the value of another as its value changes is called a correlation coefficient. The value rises or falls in positively connected variables. When two variables have a negative correlation, one's value rises while the other's value falls. The strength and direction of a relationship between two variables are measured by correlation. Correlation is just the computation of a correlation coefficient that indicates how much one variable tends to change when another does; it does not fit a line through the data points. There is no association when r = 0.0.

There is a tendency for one variable to rise in tandem with the other when r is positive. There is a tendency for one variable to rise as the other falls when r is negative. A statistical measure that shows how much two variables vary together is called correlation. When two variables rise or decrease simultaneously, there is a positive correlation; when there is a negative correlation, one variable increases as the other falls. The correlations between every pair of variables are displayed in Table 2. This study examines and illustrates the Pearson correlation coefficient, a well-known method for determining how strongly two variables are correlated In Table 2, the correlation's probability is indicated by the value below the direction and coefficient of correlation, which are displayed in front of the variables. It is implied that these associations have significance by the bolded probabilities. As can be shown, only a small percentage of the

correlation analyses are statistically significant, while the remainder are not. It should come as no surprise that there is a strong and significant association between the firm performance indicators of CPS, MS, TT, and ASI. For the purposes of this study's analysis, these business performance indicators are therefore regarded as dependent variables in their own equations.

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Table 2 Correlation statistics result for the study

	BDC	CPS	MS	TT	ASI
BDC	1.000000	-0.519538	-0.448018	-0.519419	0.138919
CPS	-0.519538	1.000000	0.967755	0.876559	0.349128
MS	-0.448018	0.967755	1.000000	0.917222	0.338021
TT	-0.519419	0.876559	0.917222	1.000000	0.163347
ASI	0.138919	0.349128	0.338021	0.163347	1.000000

Authors Computation,2024

5.3 Regression Analysis

This section presents the regression result for the study especially as it relates to each of the variables under consideration

Table 3 Regression statistics result for the BDC

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(BDC(-1))	-0.977936	0.168947	-5.788427	0.0000
C	1.964413	33.84838	0.058036	0.9541

R-squared	0.489095	Mean dependent var	-0.810811
Adjusted R-squared	0.474498	S.D. dependent var	283.9931
S.E. of regression	205.8710	Akaike info criterion	13.54491
Sum squared resid	1483400.	Schwarz criterion	13.63199
Log likelihood	-248.5809	Hannan-Quinn criter.	13.57561
F-statistic	33.50589	Durbin-Watson stat	2.002195

Authors Computation,2024

Table 4 Regression statistics result for the ASI

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(ASI(-1))	-1.021231	0.168993	-6.043047	0.0000
C	-4.173938	1492.545	-0.002797	0.9978
R-squared	0.510616	Mean dependent var		-0.985916
Adjusted R-squared	0.496633	S.D. dependent var		12796.35
S.E. of regression	9078.797	Akaike info criterion		21.11781
Sum squared resid	2.88E+09	Schwarz criterion		21.20489
Log likelihood	-388.6795	Hannan-Quinn criter.		21.14851
F-statistic	36.51842	Durbin-Watson stat		2.008336
Prob(F-statistic)	0.000001			

Authors Computation,2024

Table 5 Regression statistics result for the CPS

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(CPS(-1))	-0.837336	0.169192	-4.949040	0.0000
C	0.118937	0.636995	0.186715	0.8530
@TREND("1981")	0.005530	0.028084	0.196922	0.8451
R-squared	0.418734	Mean dependent var		-0.035559
Adjusted R-squared	0.384542	S.D. dependent var		2.323137
S.E. of regression	1.822528	Akaike info criterion		4.115931
Sum squared resid	112.9346	Schwarz criterion		4.246545
Log likelihood	-73.14471	Hannan-Quinn criter.		4.161978
F-statistic	12.24650	Durbin-Watson stat		1.898586
Prob(F-statistic)	0.000099			

Authors Computation,2024

Table 6 Regression statistics result for the MS

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(MS(-1))	-1.005225	0.171517	-5.860781	0.0000
C	0.070173	0.636383	0.110269	0.9128
@TREND("1981")	0.014916	0.028188	0.529170	0.6001
R-squared	0.502553	Mean dependent var		0.006684
Adjusted R-squared	0.473291	S.D. dependent var		2.511636
S.E. of regression	1.822813	Akaike info criterion		4.116243
Sum squared resid	112.9700	Schwarz criterion		4.246858
Log likelihood	-73.15050	Hannan-Quinn criter.		4.162291
F-statistic	17.17447	Durbin-Watson stat		1.999393
Prob(F-statistic)	0.000007			

Authors Computation,2024

Table 7 Regression statistics result for the TT

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(TT(-1))	-2.690422	0.478307	-5.624882	0.0000
D(TT(-1),2)	1.323519	0.385009	3.437628	0.0019
D(TT(-2),2)	0.837519	0.280559	2.985183	0.0058
D(TT(-3),2)	0.487428	0.184285	2.644965	0.0132
C	-1774.378	833.0080	-2.130085	0.0421
@TREND("1981")	162.0564	41.79683	3.877240	0.0006
R-squared	0.698535	Mean dependent var		117.2082
Adjusted R-squared	0.644702	S.D. dependent var		3190.830
S.E. of regression	1901.953	Akaike info criterion		18.09794
Sum squared resid	1.01E+08	Schwarz criterion		18.36729
Log likelihood	-301.6649	Hannan-Quinn criter.		18.18979
F-statistic	12.97598	Durbin-Watson stat		2.151085
Prob(F-statistic)	0.000001			

Authors Computation,2024

Since the goal of this work is to analyze time series data, three mandatory tests were carried out to determine the best approach for panel data analysis between Pooled OLS, Fixed effect, and Random effect: the F-test, the Breusch-Pagan test, and the Hausman test. The relationships between Pooled OLS and Fixed effect, Pooled OLS and Random effect, and finally between Random effect and Fixed effect are examined using the F-test, BP-LM test, and Hausman test, respectively. The result of the F-test indicates that, when using the Pooled OLS null hypothesis in relation to the equation including BDC as the dependent variable, the fixed effect alternative hypothesis is accepted and the null hypothesis is rejected. Then, using Pooled OLS as the null hypothesis, the Breusch-Pagan test result demonstrates that the null hypothesis is rejected and the Random effect is accepted.

Ultimately, the Hausman test (using the null hypothesis of random effect) demonstrates that the null hypothesis, which is the random effect, is accepted and cannot be refuted. Consequently, it is evident that Random effect (RE) is the approach most suited for solving the equation.The paper examines the result of equation, which indicates that BDC serves as a dependent variable and CPS, MS, TT, and ASI are independent variables. This is done after determining that the most appropriate way of time data analysis is Random effect for the first equation and verifying the assumption of regression models. The final results of the equation's random effect analysis are displayed in Table 3. Table 3's time series data regression result indicates that CPS and MS have significant probabilities of 5% and 1%, respectively.

that implies the meaningful impact of CPS and MS on (BDC). Thus, it indicates that for every unit increase in CPS, BDC will grow by 11 units, and for every unit increase in MS, BDC will increase by 0.07. However, the likelihood of both TT and ASI is more than 0.1, indicating that TT and ASI has little effect on BDC. As a result, both independent variables in the equation has no discernible effect on BDC.

5.0 Conclusion and Recommendations

5.1 Conclusion

In conclusion, it can be said that CPS and MS have a positive, significant impact on BDC in the equation where BDC is the dependent variable, whereas TT and ASI do not. Future research, however, must to be done using a sizable sample size and should involve multiple other nations. Future research should also use institutional ownership and CEO tenure as primary indicators, among other important variables. This study also suggests that in the future, researchers should carry out additional research using a questionnaire and interview approach to gather responses from those who create yearly reports.

The study has significant investing implications for various forms of financial integration. Investors that seek to boost their financial performance typically put their money into transparent companies in order to minimize information asymmetry and uncertainty, which can result in investment loss. However, as this study demonstrates, transparency might not be as straightforward as it first appears. When making investment judgments, one should take the transparency's financial integration into account

5.2 Recommendations

The study made the following recommendations based on the findings

1. Disclosure in the annual reports by itself is insufficient. The importance of practicing sound corporate governance cannot be an adoption of all firms. Practice combined with transparency that improves business performance, prevent insiders from abusing their influence over company resources, and keep managers' on their toes without any deviation should be strictly observed by all companies.
2. To determine how much emphasis the organizations are placing on this transparency, the scope of the current type of analysis should be expanded by examining the corporate governance disclosure practices of Nigerian public limited firms over a number of years.

3. A different set of company groups and various company performance metrics could be used to conduct other studies. For instance, other industries might also conduct similar studies that shows the level of transparency.

4 Regulations alone should not be the reason to exercise corporate governance. It's important to take into account the chances it offers for expansion and market survival which should be domesticated for all companes. Furthermore, the results of this study demonstrate that CG techniques have real-world effects on business performance. Investors will now have the opportunity to fund businesses with superior corporate governance procedures. According to McKinsey Quarterly polls, institutional investors are willing to pay up to 28% extra for shares in emerging market companies with sound governance practices. The listed Companies should take advantage of this.

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REGULATORY POLICY GUIDELINES AND DEPOSIT MONEY BANKS' PERFORMANCE

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ABSTRACT

The study investigated the effect of regulations on commercial banks by the apex bank on the performance of commercial banks in Nigeria for the period of 1981 to 2022. Regulations are meant to bring sanity to the banks and protect customers' deposits. Yet the banks are profit –making organizations. It appears that guidelines that protect the interest of the depositors may have far-reaching effects on banks' performances. The effect of this scenario may be adverse or beneficial to the banks. However, such effect is still a subject of debate in literature. This calls for investigation. The major objective of the paper is to investigate the effect of regulatory policy guidelines on deposit money banks' performance. The source of data is secondary obtained from the Statistical Bulletin of the Central Bank of Nigeria. The econometric tools used are the unit root tests, Auto regressive distributed lag (ARDL). Results indicate that regulatory policy guidelines in Nigeria have both negative and positive significant and insignificant effect on commercial banks performance. This implies that the performance of the commercial banks in the country has been attributable to regulatory guidelines policy. Recommendations include that policy makers should ensure strict compliance of these

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guidelines by the banks and bring erring banks to order as a deterrent to others; policy guideline rates should be selected with caution bearing in mind the implications of the rates on the performance of banks in particular and the economy at large among others.

Keywords: Policy guidelines, monetary policy rate, bank performance, deposit money banks

JEL Classification: K2, G2, G21, E5,E52, E58.

1. INTRODUCTION

Linkage between the guidelines and performance of banks raised research concerns after the last banking failures in Nigeria in the 1990s. Monetary Theory shows that this link may be through the channels of monetary policy, the interest rate channel, and the asset and liability mismatches. These three channels are transmitted through the regulated policy guidelines by the Central Bank of Nigeria (CBN). The CBN (2019) affirms that under the interest rate channel, the CBN sets a short term rate such as the rediscount rate, which influences long term rates such as Treasury bill rates, interbank rate and lending rate.

Overall good performance of banks becomes pertinent in view of the role of banks as purveyors of the economy. The dual statutory functions of banks of credit creation and deposit mobilization put banks survival as a *sine qua non* for any economy. It becomes crucial not to underestimate factors that directly trigger the performance of banks. This has raised a lot of research discourse. Regulatory policy guidelines can affect the performance in the form of rising / falling due to increase/decrease of the policy rates put in place at a particular time.

Borio, Gambacorta and Hofmann (2018) opine that monetary policy affects profitability and performance of banks. Samuelson (1945) asserts that the relationship that occurs when the policy makers increase or decrease the policy rates is increase or decrease in the performance of banks as the case may be.

The performance of the deposit money banks no doubt engenders stability and growth of the financial system in particular and the economy at large. Equally regulatory guidelines are synonymous with shaping the operations and environment of these banks. While the regulations are designed to ensure stability, protect customers, and promote transparency, their effect on banks' performance may vary. On one hand, stringent regulations may constrain bank performance and operations, whereas on the other hand, they can facilitate stability and trust triggering better performance. Conversely, expansionary guidelines may liberalize banks operations and profitability but jeopardize trust and customers interest. The problem is to address is the lack of comprehensive understanding of how these guidelines have affected performance of these banks within the reviewed period in Nigeria.

In view of the foregoing, the question yet to answer is, to what extent has these policy guidelines affected the performance of the banks? Put succinctly, despite the various policy guideline reforms put in place for a robust commercial bank performance, indicators depict that such expected performance is yet to be attained. This calls for investigation.

Regulations are meant to bring sanity to the banks and protect customers' deposits. Unarguably, banks are profit –making organizations that need to balance their profitability with liquidity. It appears that guidelines that protect the interest of the depositors may have negative or positive effects on banks' performances. Notably, such effects pose an inconclusive debate in literature. This calls for investigation.

The major objective of the paper is to investigate the effect of regulatory policy guidelines on deposit money banks' performance.
This study aims at bridging the gap by empirically analyzing the relationship between the regulatory policy guidelines and performance of deposit money banks in Nigeria in view of the positive and negative impacts.

The relevance of the study stems on the premise that policy makers no doubt will engage the result and recommendations from the study as a

basis for the implementation of appropriate policy guidelines that will enhance the performance of deposit money banks in Nigeria and other economies.

The paper is structured as follows. Following the introduction in section 1 is the review of related literature in section 2; sections 3 and 4 deal on the methodology, results and discussions respectively while the paper is concluded in chapter 5 with conclusion, summary and recommendations.

2. REVIEW OF RELATED LITERATURE

2.1 Conceptual review

Regulatory Policy Guidelines

The regulatory policy tools include the cash reserve ratio, lending rate, liquidity ratio, loan deposit ratio, monetary policy rate among others. These rates are expected to drive the performance of banks.

Fazio, Silva and Tabak (2018) state that indirectly effect is that the real economy is affected since tight policy guidelines leads to increase in the rate of lending; reduces borrowing from the banks; reduces growth in the economy; triggers rate of default, resulting to huge loan losses and depletes profitability and performance. Thirdly is through the endogenous responses of the banks to the policy rate changes whereby the short term rates which influence long term rates will impact on banks performance. High demand for loans will positively affect the banks performance, when the interest rate is reduced borrowers will take more loans while this entails low profits and vice versa.

Deposit Money Banks' Performance

Bank performance includes the acronym CAMEL depicting capital adequacy, assets, management, earnings and liquidity. This is the index of measuring the operation, stability and efficiency of the banks. Deposit money banks performance is proxy as loans (credit) to the private sector from the commercial banks expressed as a percentage of gross domestic product (GDP) .

2.2 Theoretical Purview

The study reviews the following theories - the Modern Monetary Theory, Normative theories, and positive theories. However, the development and techniques has posed a topic of academic research. Two basic Schools of Thought have dominated the regulatory policy- positive and normative theories. The Central Bank of Nigeria has the mandate to issue legal tender, currency in Nigeria, maintain external reserve to safeguard the international value of the domestic currency, promote sound financial system, and act as Banker and provide economic and financial advice to the federal government. To provide sound financial system, the CBN embarks on certain regulations on the banks through periodic guidelines to act as a check and balance in the operations of the banks.

Mishkin (2013) states that John Maynard Keynes (1936) regarded as the purveyor of the Modern Monetary Theory posit that monetary policy guidelines are transmitted through interest rate and investments. It implies that expansionary policy guidelines will decrease interest /lending rate and vice versa. The direct effect of this is that a mismatch in the maturity of the assets and liabilities can affect banks' margins and thereby affect performance.

The normative theories of regulation was first propounded by Fred Siebert, Theodore Peterson and Wilbur Schramin in their book "Four theories of the Press". Initially, the word Normative theory originated from the United States of America at the wake of the cold war. The theory posits that regulators should competition where it becomes tenable, lower the information and promotional costs asymmetries by way of getting information and furnishing operators with incentives towards triggering overall performance, making provision for price structures tending to the improvement of price efficiency.

The positive theories questions the reasons why regulations should occur or not. The theory include theories of market power; interest group theories that underpins the interest of the stakeholders regulation; and also the theories of government opportunism that portrays the why government involvement and restrictions in the form of regulations and discretion is

vital to instill efficient service delivery to the customers, protect the interest of all facets of the economy and preventing exploitation.

2.3 Empirical Review

Empirically, some works has been conducted on effect of policy guidelines on bank performance Rao (2006) found that lending rate has a positive relationship with banks performance suggesting that rise in lending rate increases banks profitability. Enyioko (2012) found that interest rate policies have not improved the overall performances of banks significantly in Nigeria. Studies on the influence of policy guidelines on banks' profitability by Meshak and Nyamute (2016), Waweru (2013) found that there is a positive effect while similar study by Ngugi and Kabubo (1998) found a negative effect.

3. METHODOLOGY

3.1 Research Design

We employed data for Nigeria from 1981 to 2022 in order to ascertain the effect of regulatory policy guidelines on banks' performance. This period is justified in that it collapses with the timeline of prior , during and after banking failures of the 1990s in Nigeria. Secondary sourced data is gotten from the statistical bulletin of the CBN of various issues. The response variable is the bank performance depicted as commercial banks loans to the private sector expressed as a percentage of Gross Domestic Product while the explanatory variable is the policy guideline instruments. They include the cash reserve requirement CRR, loan deposit ratio LDR, liquidity ratio LQR, lending rate LR, minimum rediscount ratio / monetary policy ratio MRR/MPR. CRR is the cash reserves or balances held by banks with Central Bank of Nigeria CBN which the Bank has the authority to vary according to the exigencies of the credit control. Such deposits with the CBN must not be less than a prescribed proportion of banks' deposit liabilities. A high rate implies inability of banks to grant loans. LDR is the ratio of loans to the deposits. The lending rate is the rate at which the banks lend to their customers. LQR is designed to enhance the ability of banks to meet cash withdrawals on them by their customers. It stands for the proportion of specified liquid assets such as cash, bills and government securities. MRR or MPR is the rate of interest the

monetary authorities charge the deposit money banks on loans extended to them. It is the official minimum rate at which the CBN would rediscount what is regarded as eligible bills (bank bills or first class bills) granted to the banks. When CBN wants to increase liquidity and investment, it reduces the rate. This will reduce the interest rate charged by commercial banks to lend to customers. This was called minimum rediscount ratio until 2005 when it was changed to monetary policy rate in 2006.

The technique adopted is the Ordinary Least Squares (OLS), the unit root test URT, the correlation test, the autoregressive distributed lag test ARDL.

The model for this study is of the form:

$$L\Delta\ LPSCR = \beta_0 + \beta_1 LCRR + \beta_2\ LDR + \beta_3 LLQR + \beta_4\ LLR + LMRR\text{-}MPR + t \quad \ldots (1)$$

where,

PSCR represents PSCr/GDP depicting commercial banks credit to the private sector as a percentage to GDP, CRR is the cash reserve requirement, LDR is loan deposit ratio, LR is the lending rate, MRR/MPR is the minimum rediscount ratio or the monetary policy rate L = log , β_0 = constant, β_1, β_2 = explanatory power of the variables, t = stochastic error term.

To achieve the objective of the study, both descriptive and econometric tools were adopted for analysis.

3.1 Descriptive Statistics

The study employed the descriptive tests. This include means(averages), standard deviation, probability among others to examine relationships among the variables.

Econometric tests

Unit root test

We first test for the integration order of the dependent and dependent variables.. three of the mostly employed URT include Dickey –Fuller (1979, 1981), Phillips-Peron test (1988), and the Kwiatkowski et al test (1982). Dickey- Fuller.

Correlation test

Correlation analysis also called bivariate basically concerns with ascertaining if there is an existing relationship between variables and then determine the magnitude and size of such relationship. It measures the strength of the linear relationship existing between these variables.

ARDL co integration

Cromwell (1994) asserts that ARDL is a "model for time series data where a regression equation is employed to predict present values of an observed variable based on both the current values of the independent variable and the lagged (past periods) values of the explanatory variable. opine that in statistics and econometrics, a distributive lag model is a model for time series data in which the regression equation is used to predict the current values of the dependent variables".

The starting point of for a distributive lag model is an assumed structure of the form

$Y_t = \alpha + W_0 \chi_t + W_1 \chi_{t-1} + W_2 \chi_{t-2} + \ldots + W_n \chi_{t-n} + \in$ … (2)

Alternatively , the distributive lag model is $Y_t = \alpha + W_0 \chi_1 + W_1 \chi_{t-1} + W_2 \chi_{t-2} + \ldots + \in$ … (3)

where, Y_t is the value at the time period t of the dependent variable y, α = the intercept term to be estimated, W_0 is the explanatory powers of the variables, χ_t = explanatory variable, W_1,W_2 are the lag weight, $\in$ = the error term

In the first equation, the dependent variable is affected by values of the independent variables arbitrarily in the past, so the number of lag model weights is infinite and therefore the model is called the infinite distribution model. On the other hand, in the second and alternative equation there are only a finite number of lag weights, indicating an assumption that there is a maximum lag beyond which values of the independent variables do not affect the dependent variable. A model based on this assumption is described as a finite distribution lag model.

4. RESULTS AND DISCUSSION

4.1 Results

Table 1 Descriptive test Results

	PSCR	CRR	LDR	LQR	LR	MRR_MPR
Mean	6797.052	5.888095	67.38857	49.40119	23.22405	12.97619
Median	847.7250	0.000000	66.90000	46.36500	22.46500	13.00000
Maximum	26547.00	27.50000	96.82000	104.2000	43.21000	26.00000
Minimum	8.570000	0.000000	37.56000	26.39000	10.00000	6.000000
Std. Dev.	9355.612	9.746874	13.35339	14.64676	7.202506	3.913629
Skewness	1.022798	1.257887	-0.189788	1.386428	0.336099	0.759534
Kurtosis	2.416222	2.874247	2.654199	6.166886	3.206054	4.657704
Jarque-Bera	7.919204	11.10363	0.461399	31.00632	0.865040	8.847213
Probability	0.019071	0.003880	0.793978	0.000000	0.648872	0.011991
Sum	285476.2	247.3000	2830.320	2074.850	975.4100	545.0000
Sum Sq. Dev.	3.59E+09	3895.064	7310.830	8795.628	2126.920	627.9762
Observations	42	42	42	42	42	42

Source: Researchers' computation

We employed the mean value to enable the pattern of dispersal estimation. The figures are 6797 for private sector credit and 5.88, 67.3, 49.4, 23.22 and 12.9 for the explanatory variables depicted as cash reserve requirement, loan deposit ratio, liquidity ratio, lending rate and minimum rediscount ratio or the monetary policy rate respectively. The standard deviation depicts the variability from the mean or average value. The values shown in the Table 1 above depicts that for PSCR, it stood at 9355; while for the explanatory variables it is 9.74, 13.3, 14.6, 7.2 and 3.91 respectively. It depicts that while the dependent variable exhibit high variability, the explanatory variables have low and steady variability. In summary, all values are widely dispersed around the mean. This indicates that they are grossly affected by the extreme mean.

The values are also positively skewed with such values as 1.023 for the PSCR; 1.25, -0.18, 1.38, 0.33 and 0.75 respectively for the independent variables.

The kurtosis can be flat or peak with regards to the normal curve. As it is well known, kurtosis measures the "tailedness" of the probability distribution of a real valued random variable. The decision rule is as follows- if kurtosis is equal to 3, it is concluded that it is normal distribution or mesokurtic; if kurtosis is less than 3 it is platykurtic; if kurtosis is greater than 3, it is leptokurtic. Therefore, PSCR, CRR, LDR depict platykurtic while LQR, LR MRR are leptokurtic.

Also the variables depict reasonable level of association with probability significant at 5 percent level of significance for except LDR and LR.

Jarque-Bera is used to measure the normality of the series, that is to say whether the series are normally distributed or not. Decision rule is that at 5% level of insignificance, the residuals are normally distributed.

Although the variables exhibit reasonable sign of association in the descriptive analysis, we also subject these claims to more econometric test to confirm these claims.

Econometric Results

Table 2 Unit Root test result

Variable	Intercept Only	Decision	Trend and Intersect	Decision
LPSCR	-2.9237 (6.9759)*	I(0)	-3.5173 (-6.9773)*	I(0)
LCRR	-2.9251 (-0.2758)	I(1)	-3.5445 (-1.7483)*	I(1)
LLDR	-2.9251 (1.92207)	I(1)	-3.2185 (-0.3104)*	I(1)
LLQR	-2.9500 (-1.5639)	I(1)	-3.5676 (-2.1451)	I(1)
LLR	-2.9389 (7.3517)	I(1)	-3. 2163 (2.0556)*	I(1)
LMRR-MPR	-2.9273 (-5.8167)	I(0)	-3.5063 (-6.1647)*	I(0)

* (**) *** Significant at 1% (5%) 10% level of significance

Source – Researcher's Computation

The Augmented Dickey Fuller unit root test depicts that the variables are integrated of order I(0) and order 1, that is, I(1) at 1%, 5% and 10% level of significance respectively as the case may be. Since variables are mixed where some are stationery at level and some are stationery at first difference, we adopt the Auto regressive Distributive Lag ARDL. In the time series domain, ARDL co- integration bounds can be used to find the long run relationship among variables which are mixed such as some are stationery at level and some are stationery at first difference.

Table 3 Correlation Results

	PSCR	**CRR**	**LDR**	**LQR**	**LR**	**MRR_MPR**
PSCR	1					
CRR	0.9729	1				
LDR	-0.2556	-0.2409	1			
LQR	0.3525	0.3915	-0.0554	1		
LR	0.6412	0.6516	-0.4747	0.2276	1	
MRR_MPR	-0.16716	-0.0802	-0.4013	0.0588	0.4942	1

Source: Researchers' Computation

The variables exhibited varying levels of relationship. The CRR level of 97% implies a strong positive relationship with the performance of banks. The LDR and the MRR/MPR show a negative relationship with the dependent variables. The LQR and the lending rate have a positive correlation with the performance of banks. Also the correlation matrix enables the explanation of existence of multicollinearity in a model. If the matrix shows a variable that have value that is above 0.8, it implies that there is multi-collinearity in the model. The CRR exhibits the value of 0.97 far above 0.8 implying that the model in multi-collinear.

Table 4 ARDL results

Dependent Variable: PSCR

Method: ARDL
Date: 11/02/23 Time: 12:02
Sample (adjusted): 1985 2022
Included observations: 38 after adjustments
Maximum dependent lags: 4 (Automatic selection)
Model selection method: Akaike info criterion (AIC)
Dynamic regressors (4 lags, automatic): CRR LDR LQR LR MRR_MPR
Fixed regressors: C
Number of models evalulated: 12500
Selected Model: ARDL(4, 3, 3, 0, 0, 4)

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
PSCR(-1)	0.888114	0.155161	5.723812	0.0000
PSCR(-2)	0.204907	0.235694	0.869377	0.3961
PSCR(-3)	0.355577	0.237464	1.497393	0.1516
PSCR(-4)	-0.263161	0.198818	-1.323629	0.2022
CRR	369.3688	131.0263	2.819042	0.0114
CRR(-1)	31.09960	99.32633	0.313105	0.7578
CRR(-2)	57.02440	114.4217	0.498370	0.6243
CRR(-3)	-647.5720	121.2417	-5.341167	0.0000
LDR	26.43145	13.73029	1.925047	0.0702
LDR(-1)	39.54078	17.06968	2.316433	0.0325
LDR(-2)	20.76731	15.06009	1.378963	0.1848
LDR(-3)	48.73469	17.85284	2.729800	0.0138
LQR	6.057311	11.05055	0.548146	0.5903
LR	-29.71914	43.74630	-0.679352	0.5056
MRR_MPR	41.79712	59.50132	0.702457	0.4914
MRR_MPR(-1)	109.1239	51.97590	2.099509	0.0501
MRR_MPR(-2)	53.61018	47.82863	1.120880	0.2771
MRR_MPR(-3)	91.94926	48.81509	1.883624	0.0759
MRR_MPR(-4)	53.89717	43.44127	1.240691	0.2306
C	-13844.59	3004.815	-4.607467	0.0002

R-squared	0.997935	Mean dependent var	7511.390
Adjusted R-squared	0.995756	S.D. dependent var	9564.892
S.E. of regression	623.1483	Akaike info criterion	16.01286
Sum squared resid	6989649.	Schwarz criterion	16.87475
Log likelihood	-284.2444	Hannan-Quinn criter.	16.31952
F-statistic	457.8547	Durbin-Watson stat	2.131422
Prob(F-statistic)	0.000000		

*Note: p-values and any subsequent tests do not account for model selection.

Source:Researchers Computation

Diagnostic test

This is conducted by employing the coefficients of multiple determination and analysis of variance (ANOVA) and the Durbin –Watson (DW) statistic. The R-squared is the coefficient of determination used to test the explanatory power of the model and the goodness of fit. The adjusted R-squared is 99.5 per cent implying that 99.5% of the systematic variations in the dependent variable is explained by changes in the independent variables while only 1 per cent of the variations of bank performance, cannot not be explained by the explanatory variables. This also depicts significance.

We go further to test overall significance of the model. The analysis of variance (ANOVA) is employed. It is depicted here in Table 4 by F-statistic and the probability. The F-statistic is 457 with probability of 0.000. We test the null hypothesis that the coefficients are equal to zero at 5% level of significance. We reject the null hypothesis since the probability of F-statistic is less than 0.05 and we conclude that the regulatory guidelines have significant impact on banks' performance.

Further we test for autocorrelation in the model. The Durbin-Watson (DW) was used to test the first order auto-regressive scheme. The value is 2.13 therefore we reject the null that residuals are not auto-correlated with first order scheme hence absence of autocorrelation.

The next to be tested is the heteroscedasciticity test. It is one of the assumptions of the error term. It is used to test if the error term is constant. If the probability of the F-statistic is greater than 0.05 we conclude that there is presence of heteroscedasticity and on the contrary there is homoscedasticity.

The next is the stability diagnostic test. This test is used to provide evidence for the stability of long run relationships among the variables. It enables us to separately test for the stability of long run relationships and also the stability of the speed of adjustment towards equilibrium
From the above table it was found that the critical value of the t-statistics is -4.6 and a probability of 0.0002 which is less at 5 percent level of significance. This depicts stability of the short run speed of adjustment towards equilibrium.

We go further to perform the long run test. The Wald Test is adopted to establish if there exists a long run equilibrium relationship between the dependent and explanatory variables. The hypothesis that $\Theta_1 + \Theta_2 + \Theta_3 + \Theta_4 = 0$ is to be tested. The test that all the coefficients of the explanatory variables are equal to 0 is to be performed. A comparison is made between the estimated F-statistic and bounds F-critical value to determine if there exists a long run relationship between the regulatory policy guidelines and banks performance in Nigeria within the reviewed period. The calculated F-statistic value of 457 is greater than 3.52 (the critical value) of Pesaran et al (1996, 2001). We conclude that there is an existence of long run relationship between the variables

We test the long run equilibrium relationship the calculated F-statistic is 457. This is greater than the bounds F- critical test. This indicates the existence of a long-run relationship between policy guidelines and banks performance.

The coefficient of the explanatory variable- CRR having a positive value of 369 has significant effect on productivity having a probability of 0.01. This implies that the CRR have a positive significance on banks performance. With regards to loan deposit ratio which have a coefficient

value of 26 is insignificant having a probability of 0.07 greater than 5% level of significance. This depicts that loan deposit ratio has a positive but insignificant effect on banks performance. Also with regards to liquidity ratio which has a coefficient value of 6 is insignificant having a probability of 0.5 greater than 5% level of significance. This depicts that LQR has a positive insignificant effect on bank performance. For lending rate, the coefficient of -29 and probability of 0.5 shows negative impact on performance although insignificantly. This implies that lending rate synonymous with low banks performance. For MPR or MRR, the coefficient of 41 and probability of 0.49 shows positive impact on performance although insignificantly. This implies that MRR has a positive insignificant effect on banks performance.

Taking together, the CRR have a positive significance on banks performance; loan deposit ratio has a positive but insignificant effect on banks performance; LQR has a positive insignificant effect on bank performance; lending rate has a negatively insignificant effect on banks performance; MRR has a positive insignificant effect on banks performance.

This implies that the policy guidelines have insignificant positive impact on bank performance, cash reserve ratio has a positive significant effect while lending rate has an insignificant negative effect on commercial banks performance.

Therefore regulatory policy guidelines in Nigeria have both negative and positive insignificant effect on commercial banks performance. This is explained since there is a large disparity between the interest rate paid to the depositors by banks and that paid by the borrowers to the banks. Cash reserve with the CBN is more monitored and has exhibited positive impact on the performance of banks than any other policy guidelines.

The findings does not support the findings of Enyioko, (2012) for Nigeria. The findings negate the a priori expectation that policy guidelines will trigger performance of banks.. However the study corroborates with that of Ngugi and Kabubo (1998).

4.2 Discussion of Findings

There is an existence of long run relationship between the variables. This results suggests that both the regulatory guidelines and bank performance co-move over a long time period.

The CRR have a positive significance on banks performance; this finding is very clear. Cash reserve ratio will positively affect performance of banks since the cash held as reserve is also part of the bank liquidity in the economy; while still providing a buffer to cushion the event of cash run both in the short and long run..

The loan deposit ratio has a positive but insignificant effect on banks performance; this is not far-fetched. Banks have taken advantage of the ratio since they charge higher interest rates on loans and overdrafts while granting lesser interest rates on the deposits to savings account holders.

The LQR has a positive insignificant effect on bank performance; lending rate has a negatively insignificant effect on banks performance; this is because it is aimed at enhancing the ability of banks to meet cash withdrawals on them by their customers. It has positive effect on significant effect on performance implying that the efficacy of the rate has not been fully utilized.

MRR has a positive insignificant effect on banks performance. The minimum rediscount rate and the monetary policy rate when reduced will stimulate liquidity and trigger investment and consequently the rate the banks charge to customers for obtaining loans and overdrafts will be reduced. When it is increased the reverse is the case. We find out that this rate has a positive effect on performance of banks but insignificantly. The impact of this rate to banks performance is dependent on how it is fine-tuned by the authorities. However it is observed in Nigeria that this rate has been on the increase over the years which had triggered increase in the lending rate of the banks over the years.

5. CONCLUSION

5.1 Conclusion

This study was poised to investigate the effect of the regulatory policy guidelines on commercial banks performance in Nigeria from 1981 to 2022. Both descriptive and econometric statistics were adopted for data analysis. Results depict a long run relationship between the dependent and explanatory variables. In summary regulatory policy guidelines in Nigeria has both negatively and positively insignificant effect on banks performance in Nigeria within the reviewed period.

5.2 Policy Implication of Findings

The implication of the findings is that less performance of the commercial banks in the country has been attributable to regulatory guidelines policy. The objectives of these policy guidelines have not been attained when measured in terms of banks performance. The policy measures ought to be consistent with high banks performance. Limitations inherent in the implementation and monitoring of the policy guidelines must have deterred the attainment of higher performance of banks.

5.3 Recommendations

1. The policy guideline rates should be selected with caution bearing in mind the implications of the rates on the performance of banks in particular and the economy at large.
2. Distortions that impede customers' patronage to banks such as poverty, low income, unemployment, difficulty in accessing banks, ineffective and inefficient supply -side of banking services, among others should be addressed to trigger bank patronage and stimulate their performance.
3. Policy makers should ensure that policy guideline transmission to the rate of interest is efficient.
4. Limitations and lag in the policy guideline initiation, implementation and monitoring of the policy should be reduced to desirable limits.

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RESPONSIVENESS OF GLOBAL FOOD PRICES TO CARBON EMISSIONS FUTURES, GEOPOLITICAL RISK AND OIL PRICE SHOCKS: A GLOBAL EVIDENCE FROM SOFT AND GRAIN COMMODITY MARKETS

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Abstract
The agricultural commodity market is influenced by various factors, but the specific impacts of carbon emission futures, geopolitical risk, and oil prices have not been fully understood, especially in the context of recent global events. This study provides a comprehensive analysis of these factors' impact on the agricultural commodity market. Employing the Structural Vector Autoregression (SVAR) model and utilizing a real-time daily dataset between November 1, 2021, and April 10, 2023, during the period of the Russia-Ukraine conflict, the research examines the responses of softs and grains agricultural commodity market returns to shocks in carbon emissions futures, geopolitical risk, and oil prices. The results indicate that softs and grains agricultural commodity market returns respond positively to shocks in carbon emissions futures and oil prices but negatively and significantly to geopolitical risk. Individual commodity responses vary in both direction and magnitude. The forecast error variance decomposition estimation reveals that the majority of the variation in softs and grain commodity market returns is explained by shocks in carbon emissions futures, followed by geopolitical risk and oil price shocks. These findings highlight the complex link between environmental, geopolitical, and economic factors in shaping agricultural commodity markets. Future research and policy decisions should consider

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these relationships to better manage risks and opportunities in the agricultural sector.

Keywords: Responsiveness, Global food prices, Carbon emissions futures, geopolitical risk, Commodity market

1. Introduction

The global food system faces challenges including rising demand, declining agricultural productivity, and climate change impacts. Carbon emissions are a major driver of climate change, with far-reaching environmental and economic consequences. Urgent action is needed from governments and organizations worldwide. Policies like carbon emissions futures offer a solution (World Bank, 2021). These allow trading of carbon credits, representing emissions amounts. Purchasing these credits enables organizations to offset their emissions. This strategy incentivizes emission reduction and provides an economic benefit.

The concept of turning carbon into a valuable commodity is gaining traction in the food supply chain (Wang, Zhao & Herty, 2018). This is especially notable as efforts to combat climate change and shift to a decarbonized economy intensify. Consumer goods companies and other enterprises in the supply chain seek carbon credits to counterbalance emissions and neutralize their carbon footprint (Chen & Lin, 2021). On the other side, farmers explore sustainable land management techniques for revenue through carbon credits. This not only reduces emissions but also offers a financial gain. Global food price volatility is a significant issue impacting food security and agricultural productivity. Influencing factors include weather, geopolitical risks, and trade policies. Natural disasters disrupt production, leading to supply shortages and higher prices. Trade policies like tariffs also play a role. Understanding the link between carbon emissions futures and food price volatility is crucial for effective policies. Recent studies suggest that carbon emissions futures can impact agricultural commodity prices (Hengzhen, Qiujin & Matthew, 2022). Organizations may reduce emissions by reducing production, affecting food supply and increasing prices.

This study addresses the pivotal role of agricultural commodities in global food security amid geopolitical tensions and a volatile commodity market. While some studies have examined carbon futures in specific contexts (Dutta, 2019), a comprehensive assessment of their impact on agriculture is lacking. Previous research has focused on specific

aspects or industries, neglecting resource-intensive sectors like agriculture (see Ahmadi & Niaz, 2016; Chang, Mcaleer & Zuo, 2017). This study aims to bridge this gap by analyzing the relationship between carbon emissions futures, geopolitical risk, oil price shocks, and key international agricultural commodities. Both composite and disaggregated analyses will be conducted, offering insights into a wide range of agricultural commodities (Alberola, Chevallier & Chèze, 2008).

1.1 Research Objectives and Corresponding Hypotheses

1. Objective: To analyze the impact of carbon emission futures on agricultural commodity markets, specifically softs and grains.
Hypothesis (H1): Carbon emission futures have a significant positive impact on softs and grains agricultural commodity market returns.

2. Objective: To examine the influence of geopolitical risk on agricultural commodity market returns.
Hypothesis (H2): Geopolitical risk has a significant negative impact on softs and grains agricultural commodity market returns.

3. Objective: To assess the effect of oil prices on agricultural commodity markets.
Hypothesis (H3): Oil prices have a significant positive impact on softs and grains agricultural commodity market returns.

4. Objective: To investigate the individual responses of different agricultural commodities to shocks in carbon futures and oil prices.
Hypothesis (H4): Individual agricultural commodities (such as cocoa, coffee, sugar, corn, cotton, lumber, orange juice, oats, soybeans, rough rice, and wheat) show varied responses to shocks in carbon futures and oil prices, both in direction and magnitude of impact.

2. Literature Review

The current empirical literature on the connection between carbon emissions futures and global commodity prices, particularly in the context of leading global food prices, is in its early stages. Recent studies suggest that carbon trading is crucial in resource-intensive sectors. Wang, Zhao, and Herty (2018) propose a transfer payment mechanism to incentivize supply chain participation in carbon trading, resulting in reduced

emissions. Dutta (2019) employs ARDL and bound testing techniques to analyze carbon emission trading's impact on EU butter prices, finding a long-term effect.In Canada, Wu and Thomassin (2018) examine carbon taxes in agriculture using a multi-regional price model, revealing negative impacts on food prices and consumption patterns. This underscores the need for careful consideration of carbon policies' consequences in the agricultural sector.

Despite growing interest in carbon emissions futures markets, research on how food prices respond to shocks in carbon emissions futures during geopolitical uncertainty is limited. Some scholars explore linkages between carbon emissions futures and other commodities, such as oil, and the impact of economic uncertainties on carbon prices. For instance, Chang, McAleer, and Zuo (2017) investigate volatility spillovers between carbon emissions and oil prices, while Meng et al. (2022) examine global carbon emissions trading scheme returns.

Geopolitical risk significantly impacts food prices, with causal relationships established in various studies. Saâdaoui et al. (2022) confirm geopolitical risk's significant impact on essential food commodity prices. Sohag et al. (2022) reveal short-term reduction and long-term increase of food prices due to geopolitical risk in Eastern Europe during the Russia-Ukraine war. Mitsas, Golitsis & Khudoykulov (2022) find real-time global geopolitical risks have a significant impact on food price volatility.

This study contributes significantly to understanding the influence of carbon emissions futures on global food prices, addressing gaps in existing literature that often focus on specific regions or combine agricultural and energy commodities. This approach provides a more comprehensive understanding of factors affecting individual commodity prices, informing targeted policy interventions.

2.1 Research Gap

This study addresses several important research gaps in the understanding of agricultural commodity markets. Previous research may have focused on individual factors or used older data, lacking a comprehensive analysis of multiple contemporary influences (see Ahmadi & Niaz, 2016; Chang, Mcaleer & Zuo, 2017). By simultaneously examining the impacts of carbon emission futures, geopolitical risk, and oil prices on agricultural commodity markets during the recent Russia-Ukraine conflict, this study provides a more holistic and up-to-date perspective. It fills gaps in understanding the specific effects of carbon futures on these markets and differentiates between individual

commodities' responses, rather than treating them as a homogeneous group. The use of real-time daily data during a period of significant geopolitical tension offers insights into how recent events affect these markets. Additionally, by quantifying the relative importance of these factors, the study addresses the lack of research on their comparative influences. Finally, it highlights the growing importance of environmental factors in commodity markets, an area that may have been underexplored in previous economic-focused studies. These contributions collectively enhance our understanding of the complex dynamics shaping agricultural commodity markets in the current global context.

3. Data and Methodology

3.1 Data

Real-time daily closing prices of softs (coffee, cocoa, cotton, lumber, orange juice, and sugar) and grains (corn, oats, rough rice, soybeans, and wheat) futures were collected from https://www.investing.com/markets/ between November 1, 2021, and April 10, 2023, to analyze the impact of carbon emissions futures and geopolitical tensions on agricultural commodity markets. The base date selection was informed by the period of high tensions leading to the Russian invasion of Ukraine on February 24, 2022, with U.SReal-time prices of carbon emissions futures and the West Texas Intermediate (WTI) crude oil price were also obtained in the same context. The use of real commodity prices enabled the researchers to control for the simultaneous inflationary influence of monetary policies on commodity prices, as noted in Ahmadi, Niaz and Matteo (2016).

3.1.1 Geopolitical risk

To assess the impact of geopolitical tensions on agricultural commodities, a dataset of daily indices for the Geopolitical Risk Index (GPR) was obtained for the duration of the study. The GPR was proposed by Caldara and Iacoviello (2018) as a comprehensive measure of geopolitical risk based on a content analysis of international newspaper articles covering geopolitical events and associated risks. Specifically, the index is constructed by tracking the frequency of specific words such as "geopolitics," "war," "military," and "terrorism" in 11 international newspapers Caldara and Iacoviello (2022).

3.2 Methodology

A Structural Vector Autoregressive (SVAR) model is used in this study to explore the sensitivity of agricultural commodity market returns to carbon futures, geopolitical risk, and oil shocks. SVAR models have grown in popularity in finance and economics because they give a framework for capturing complicated interactions between economic variables and can aid in the identification of causal links. Furthermore, the SVAR model allows for the identification of forecast error variance decomposition parameters, which can be used to evaluate the explanatory power of exogenous shocks on the variations in the endogenous variables.

The general SVAR specification that takes into account the individuality of our model variables and properties can be represented as follows:

$$\Delta Yt = A1\Delta Yt-1 + A2\Delta Yt-2 + B1\Delta Xt-1 + B2\Delta Xt-2 + C\Delta Zt + \varepsilon t \qquad 1$$

Where:

ΔYt = vector of endogenous variables $[\Delta SOFTS, \Delta COCO, \Delta COFE, \Delta COTN, \Delta LMBR, \Delta ORGJ, \Delta SUGA, \Delta GRAIN, \Delta WHET, \Delta SOYB, \Delta CORN, \Delta RRICE, \Delta OATS]$. ΔXt = vector of exogenous variables $[\Delta CO2EF, InGPR]$. ΔZt = vector of structural shocks. $A1, A2$ = matrices of coefficients for the endogenous variables. $B1, B2$ = matrices of coefficients for the exogenous variables. C = matrix of coefficients for the control variable $[\Delta OIL]$. εt = vector of error terms.

$\Delta SOFTS$ = soft futures returns, $\Delta COCO$ = cocoa price returns, $\Delta COFE$ = coffee price returns, $\Delta COTN$ = cotton price returns, $\Delta LMBR$ = lumber price returns, $\Delta ORGJ$ = orange juice price returns, $\Delta SUGA$ = sugar price returns, $\Delta GRAIN$ = grain price returns, $\Delta WHET$ = wheat price returns, $\Delta SOYB$ = soybeans price returns, $\Delta CORN$ = corn price returns, $\Delta RICE$ = rough rice price returns, and $\Delta OATS$ = oats price returns. $\Delta CO2EF$ = carbon emissions futures returns. $InGPR$ = natural logarithm of the geopolitical risk index, and ΔOIL = WTI oil price returns.

Following the approach of Vu et al. (2019), Equation (1) is reformulated in matrix notation as:

$$[\Delta Y_t;\ \Delta Y_{\{t-1\}};\ \ldots;\ \Delta Y_{\{t-p+1\}}] = \begin{bmatrix} [A_1;\ A_2;\ \ldots;\ A_p] & [\Delta Y_{\{t-1\}};\ \Delta Y_{\{t-2\}};\ \ldots;\ \Delta Y_{\{t-p\}}] \\ [B_1;\ B_2;\ \ldots;\ B_q] & [\Delta X_{\{t-1\}};\ \Delta X_{\{t-2\}};\ \ldots;\ \Delta X_{\{t-q\}}] \end{bmatrix} + C\,\Delta Z_t + \varepsilon_t \quad 2$$

where:

ΔY_t = $p\ x\ 1$ vector of endogenous variables at time t (p is the number of endogenous variables).

ΔX_t = $q\ x\ 1$ vector of exogenous variables at time t (q is the number of exogenous variables)

ΔZ_t = k x 1 vector of structural shocks at time t (k is the number of structural shocks)

A_i = $p\ x\ p$ matrix of coefficients for the $i-th$ lag of the endogenous variables ($i\ =\ 1,\ldots,p$)

B_j = $p\ x\ q$ matrix of coefficients for the $j-th$ lag of the exogenous variables ($j\ =\ 1,\ldots,q$)

C = $p\ x\ k$ matrix of coefficients for the structural shocks

ε_t = $p\ x\ 1$ vector of error terms at time t

The matrix form of the SVAR model allows for the easy computation of impulse response functions and forecast error variance decomposition, which are useful tools for analyzing the dynamic responses of the system to shocks and for assessing the relative importance of the different sources of variation.

4 Results and Discussions

4.1 Preliminary Tests

Table 1 presents a statistical description of the variables used in the model employed in this study. The table offers important insights into the distribution and characteristics of the variables, which are useful in interpreting the results.

Table 1. Statistical Description of Model Variables

Variable	Mean	Max.	Min.	S.D	Obs.
Geopolitical tension as measured by geopolitical risk index	153.00	539.58	28.22	83.41	372
Carbon emissions futures ($/t)	81.54	98.01	57.29	8.46	372
WTI Oil ($/bbl)	89.16	123.70	65.57	13.65	372
Cocoa ($/t)	1852.99	2280.00	1511.00	176.72	372

Coffee ($/t)	2115.42	2468.00	1808.00	143.17	372
Cotton ($/t)	104.84	154.74	72.00	21.74	372
Lumber ($/m³)	697.13	1464.40	344.00	308.66	372
Orange Juice ($/lb)	184.51	286.30	115.00	41.73	372
Sugar ($/t)	545.90	705.10	480.00	40.24	372
Corn ($/bu)	673.87	818.25	551.50	65.63	372
Oats Corn ($/bu)	522.21	807.00	321.25	156.63	372
Rough rice ($/cwt)	16.39	18.31	13.02	1.27	372
Soybeans ($/bu)	1488.43	1769.00	1178.00	134.86	372
Wheat ($/bu)	253.37	361.00	191.00	38.43	372

Source: https://www.investing.com/markets/

Table 1 provides descriptive statistics for various variables used in the study. The mean value of the geopolitical risk index was 153, with a maximum of 539.58 and a minimum of 28.22. The standard deviation of the geopolitical risk index was 83.41, indicating that the values were quite spread out. The mean value of carbon emissions futures was 81.54, with a maximum of 98.01 and a minimum of 57.29. The mean value of WTI oil was 89.16, with a maximum of 123.70 and a minimum of 65.57. The mean prices of cocoa, coffee, cotton, lumber, orange juice, sugar, corn, oats, rough rice, soybeans, and wheat were also reported. The standard deviations of the prices were generally quite high, indicating that the prices had a wide range of variability. The descriptive statistics was used to inform the analysis of the relationships between these variables.

4.2 Discussion of Results

4.2.1 Summary of main findings

Table 2 provides a summary of the main findings of the study. The table presents the estimated coefficients of the SVAR model for the different agricultural commodities and the identified exogenous shocks. The unique risks associated with carbon emissions futures and oil prices shocks imply that the direction and intensity of shocks transmitted to response variables would vary. However, the direction of the influence of geopolitical risk across all the estimations is consistent with expectation.

Table 2. Summary of main findings

Impact of $\Delta GUI, \Delta CO2EF$ and ΔOIL on agricultural commodity prices. Optimal Lags = 1

Response Variable	$\Delta CBEF$	$\Delta InGUI$	ΔOIL
$\Delta SOFTS$	$+^*$	$-^*$	$+^*$
$\Delta COCO$	$-^*$	$-$	$+^*$
$\Delta COFE$	$+^*$	$-^*$	$+^*$
$\Delta COTN$	$+^*$	$-$	$+^*$
$\Delta LMBR$	$+^*$	$-^*$	$+^*$
$\Delta ORGJ$	$+^*$	$-^*$	$+^*$
$\Delta SUGA$	$+^*$	$-^*$	$+^*$
$\Delta GRAIN$	$+^*$	$-^*$	$+$
$\Delta CORN$	$-^*$	$-^*$	$+$
$\Delta OATS$	$+^*$	$-^*$	$-^*$
$\Delta RICE$	$+^*$	$-^*$	$+^*$
$\Delta SOYB$	$+$	$-$	$+$
$\Delta WHET$	$+^*$	$-^*$	$+^*$

Note: The asterisk (*) indicates statistical significance at the 5% level.

The study reveals that carbon emission futures returns have a positive impact on the softs commodity market, due to increased investment in renewable energy, demand for carbon offsetting, and regulation of carbon emissions. However, geopolitical risk has a significant negative impact on the softs commodity market, disrupting the supply chain, leading to price fluctuations and lower demand. This result aligns with the findings in Saâdaoui et al., (2022) suggesting that geopolitical risk can also affect currency exchange rates, affecting softs commodity prices. The study also reveals mixed impacts on commodity prices, with short-term declines in cocoa, coffee, and orange juice prices due to environmental factors, while cotton prices increase due to increased returns. The impact varies across commodities due to production processes, supply chain dynamics, and demand patterns. The grain commodity market's response to carbon emissions futures returns is positive in the first period, increasing significantly over the next two periods. However, the response declines after the third period and remains stable through the tenth period. Geopolitical risk can significantly impact grain prices, with an increase in risk leading to a decline in prices.

5. Concluding Practical Policy Implication

Global food price volatility is influenced by carbon emissions futures and geopolitical risk in softs and grains commodity markets. To mitigate the impact of climate change on food prices, policymakers should incentivize industries to reduce their carbon footprint and support

sustainable farming practices. Financial incentives and research on renewable energy technologies can also help. Policymakers should also reduce geopolitical risk by improving diplomatic relations and international cooperation. Diversifying the agricultural sector, supporting research and development of climate-resilient crops, and investing in sustainable sourcing practices can help stabilize production and prices. This will enhance food security and economic stability.

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APPENDIX

Raw Data set

Date	CO2 EF	OILP	COCO	COFFE	COTTN	SUGA	LUMBR	ORJC	WHET	SOYB	CORN	RICE	OATS	InGPR
1/11/2021	3.03%	0.57%	0.47%	2.48%	4.17%	0.41%	3.14%	0.21%	3.17%	0.08%	1.89%	0.56%	2.88%	1.98
2/11/2021	4.36%	0.17%	1.72%	1.54%	1.96%	0.39%	1.13%	2.32%	0.72%	0.59%	1.04%	1.44%	1.27%	1.92
3/11/2021	0.60%	3.63%	0.06%	0.09%	1.04%	0.57%	5.14%	0.76%	1.33%	1.00%	1.57%	0.00%	1.81%	1.89
4/11/2021	0.05%	2.54%	0.48%	1.25%	1.79%	0.10%	0.54%	1.63%	0.93%	1.81%	0.84%	1.31%	0.74%	1.91
5/11/2021	0.75%	3.12%	0.66%	1.04%	0.41%	0.18%	1.49%	1.74%	0.94%	1.41%	1.12%	0.80%	1.08%	1.93
8/11/2021	2.06%	0.81%	0.91%	0.69%	0.30%	1.24%	3.89%	2.86%	0.20%	1.20%	0.27%	0.34%	3.40%	1.91
9/11/2021	0.34%	2.71%	0.18%	2.77%	1.98%	0.10%	0.61%	1.58%	1.37%	1.83%	0.59%	1.57%	1.00%	1.89
10/11/2021	4.49%	3.34%	2.13%	0.49%	0.21%	1.42%	0.17%	0.25%	3.15%	0.33%	2.61%	0.74%	3.32%	1.82
11/11/2021	0.85%	0.31%	0.72%	3.48%	0.13%	3.08%	6.22%	4.00%	1.18%	0.73%	0.04%	1.39%	2.03%	1.85
12/11/2021	0.69%	0.98%	0.95%	0.65%	0.84%	0.84%	1.80%	1.88%	0.55%	1.79%	1.36%	0.51%	1.24%	1.90
15/11/2021	4.15%	0.11%	0.36%	0.57%	0.06%	0.57%	0.76%	0.39%	1.13%	1.88%	0.13%	1.76%	1.46%	1.86
16/11/2021	2.43%	0.15%	0.65%	1.19%	0.08%	2.00%	24.4%	2.32%	1.94%	0.48%	0.95%	0.25%	1.00%	1.89
17/11/2021	0.56%	2.97%	0.24%	0.85%	2.04%	2.14%	6.75%	0.30%	1.48%	2.06%	0.74%	1.30%	1.23%	1.91
18/11/2021	2.86%	0.83%	0.90%	1.95%	2.02%	1.54%	6.32%	3.98%	0.09%	0.90%	0.39%	1.53%	2.30%	1.92
19/11/2021	0.39%	3.68%	0.18%	1.49%	1.24%	0.77%	5.93%	0.47%	0.00%	0.18%	0.39%	0.17%	1.06%	1.99
22/11/2021	0.82%	0.85%	1.01%	0.27%	3.06%	0.90%	3.65%	2.40%	2.76%	0.87%	1.05%	0.14%	1.77%	2.01
23/11/2021	1.04%	2.28%	0.65%	2.04%	0.08%	2.05%	0.88%	0.15%	1.21%	0.10%	0.65%	0.89%	0.50%	2.00
24/11/2021	5.38%	0.14%	1.87%	0.70%	0.23%	1.39%	1.55%	1.31%	2.25%	0.51%	0.13%	0.31%	0.43%	2.05
25/11/2021	2.13%	1.25%	0.00%	2.32%	3.78%	0.00%	3.20%	3.78%	1.34%	1.09%	1.21%	1.18%	0.60%	2.06
26/11/2021	2.23%	11.96%	3.27%	0.40%	0.13%	1.92%	3.69%	1.33%	2.18%	0.90%	0.98%	0.03%	1.09%	2.04
29/11/2021	1.94%	2.64%	0.55%	1.79%	4.46%	0.74%	3.78%	1.88%	4.18%	1.95%	2.41%	1.82%	3.18%	2.03
30/11/2021	1.60%	5.39%	1.18%	0.14%	2.27%	2.43%	5.46%	1.38%	0.61%	0.90%	0.88%	0.61%	1.80%	2.03
1/12/2021	1.94%	0.92%	1.13%	2.41%	0.18%	0.29%	5.18%	0.58%	3.60%	1.30%	0.87%	0.50%	4.33%	2.00
2/12/2021	3.95%	1.42%	1.58%	0.53%	0.29%	0.10%	0.85%	0.45%	1.49%	1.85%	1.56%	0.32%	4.96%	1.98
3/12/2021	2.01%	0.36%	0.25%	1.46%	2.80%	0.45%	0.29%	3.05%	0.31%	0.45%	0.43%	0.28%	1.42%	1.94
6/12/2021	3.83%	4.87%	2.44%	0.74%	0.57%	1.99%	3.61%	1.04%	0.28%	0.89%	0.47%	0.78%	0.32%	1.91

7/12/2021	4.52%	3.68%	3.14%	-1.81%	0.30%	1.81%	1.35%	1.62%	-1.00%	0.86%	-0.26%	-0.68%	-1.08%	1.92
8/12/2021	4.77%	0.43%	-2.79%	-0.97%	0.07%	-1.60%	3.16%	0.43%	-2.24%	0.28%	-0.64%	-0.14%	-1.73%	1.92
9/12/2021	-9.54%	-1.96%	-1.21%	-0.48%	-0.38%	-0.58%	-4.60%	-1.20%	-1.10%	-0.26%	-0.00%	-0.18%	-3.12%	1.88
10/12/2021	4.32%	1.03%	-2.33%	-0.65%	-0.44%	-0.14%	4.39%	2.04%	-0.45%	-1.87%	-0.72%	-0.36%	-0.94%	1.89
13/12/2021	-1.96%	-0.53%	3.97%	-0.17%	-0.66%	-0.25%	4.21%	4.45%	-0.10%	-1.25%	-0.77%	-0.40%	-0.00%	1.89
14/12/2021	-3.14%	-0.79%	-2.48%	-0.44%	-0.20%	-0.16%	-0.80%	3.22%	-3.85%	-0.24%	-0.51%	-0.80%	-0.04%	1.87
15/12/2021	-1.34%	-0.20%	-6.83%	-0.26%	-3.70%	-1.51%	-0.37%	-2.12%	-1.92%	-1.17%	-0.94%	-0.99%	-0.11%	1.91
16/12/2021	-5.57%	-2.13%	-0.17%	-0.17%	-2.04%	-0.24%	-0.87%	-1.46%	-0.58%	-0.63%	-0.34%	-0.11%	-1.33%	1.92
17/12/2021	-13.64%	-2.10%	-0.76%	-1.48%	-1.95%	-1.27%	-2.68%	-2.15%	-0.35%	-0.54%	-0.38%	-0.51%	-5.70%	1.96
20/12/2021	-8.20%	-3.71%	-2.05%	-1.07%	-1.88%	-2.05%	-4.13%	-1.54%	-2.73%	-1.22%	-1.23%	-0.04%	-0.68%	1.98
21/12/2021	-1.06%	-4.24%	-1.26%	-0.39%	-1.29%	-0.88%	-3.76%	-5.03%	-1.88%	-1.59%	-0.71%	-1.90%	-4.01%	2.05
22/12/2021	-5.08%	-2.31%	-0.47%	-0.95%	-0.36%	-2.19%	-1.75%	-1.46%	-0.09%	-0.24%	-0.54%	-0.97%	-9.52%	2.08
23/12/2021	-3.08%	-1.42%	-0.12%	-0.60%	-3.01%	-0.08%	-2.93%	-3.93%	-0.13%	-0.79%	-0.01%	-0.57%	-10.68%	2.09
24/12/2021	-2.48%	-2.41%	-0.06%	-0.42%	-1.95%	-1.01%	-4.28%	-0.65%	-1.45%	-1.49%	-1.48%	-1.49%	-4.25%	2.12
27/12/2021	-0.80%	-0.54%	-1.07%	-0.90%	-2.52%	-0.58%	-4.10%	-2.57%	-2.55%	-0.24%	-1.63%	-0.87%	-2.97%	2.13
28/12/2021	-3.08%	-0.76%	-0.65%	-0.38%	-1.20%	-1.28%	-2.36%	-2.27%	-0.54%	-0.20%	-0.12%	-0.59%	-1.03%	2.13
29/12/2021	-1.35%	-0.56%	-0.53%	-0.13%	-0.63%	-0.49%	-1.00%	-4.65%	-1.02%	-2.12%	-1.57%	-0.17%	-1.26%	2.12
30/12/2021	-0.25%	-2.31%	-1.94%	-0.89%	-0.00%	-0.36%	-0.85%	-0.21%	-1.15%	-0.08%	-0.46%	-0.38%	-0.51%	2.08
31/12/2021	-0.61%	-1.16%	-0.48%	-1.19%	-0.36%	-1.43%	-3.13%	-0.17%	-1.65%	-1.15%	-0.67%	-1.33%	-0.33%	2.04
3/1/2022	4.17%	1.20%	-1.37%	-0.60%	2.69%	-0.43%	1.89%	-0.89%	-1.58%	2.59%	3.44%	-0.17%	1.65%	2.06
4/1/2022	-1.07%	-1.12%	-3.15%	-0.39%	-0.07%	-0.06%	-2.34%	-1.14%	-1.20%	-0.40%	-1.19%	-0.10%	-1.01%	2.02
5/1/2022	-3.14%	-2.07%	-0.41%	-2.42%	-1.19%	-0.93%	-2.75%	-0.03%	-1.94%	-0.51%	-0.25%	-0.28%	-2.12%	2.01
6/1/2022	-0.96%	-0.70%	-1.18%	-0.35%	-0.37%	-1.77%	-0.29%	-0.03%	-1.68%	-1.76%	-0.50%	-0.45%	-0.34%	2.00
7/1/2022	-1.52%	-0.85%	-0.64%	-0.62%	-0.10%	-2.76%	-2.36%	-1.60%	-0.46%	-1.91%	-1.15%	-1.24%	-0.64%	1.96
10/1/2022	-6.24%	-3.82%	-1.52%	-1.97%	-0.58%	-1.19%	-3.87%	-0.55%	-1.08%	-0.15%	-0.21%	-2.23%	-1.20%	1.94
11/1/2022	-1.51%	-1.75%	-2.31%	-0.40%	-1.36%	-1.07%	-0.59%	-5.14%	-1.62%	-1.05%	-0.33%	-0.11%	-1.52%	1.99
12/1/2022	-1.59%	-0.63%	-0.34%	-0.45%	-0.58%	-1.13%	-1.41%	-1.71%	-1.45%	-1.87%	-1.92%	-0.00%	-3.56%	1.99
13/01/2022	-0.69%	-2.07%	-0.56%	-1.04%	-2.50%	-0.16%	-0.65%	-0.30%	-0.70%	-0.62%	-1.49%	-0.89%	-2.25%	2.02
14/01/2022	-1.89%	-0.01%	-0.28%	-1.37%	-1.22%	-0.20%	-5.66%	-3.46%	-3.71%	-0.33%	-0.55%	-2.33%	-6.20%	1.99

17/01/2022	-1.83%	0.17%	-0.34%	0.09%	2.32%	-0.55%	2.17%	1.03%	3.58%	2.20%	1.83%	0.93%	1.35%	1.98
18/01/2022	-2.59%	2.08%	-1.19%	0.63%	1.03%	-0.37%	3.52%	0.03%	0.78%	2.48%	0.08%	0.78%	-2.21%	2.00
19/01/2022	-0.70%	1.79%	-2.25%	0.72%	1.42%	-0.18%	3.65%	1.08%	1.30%	0.81%	0.86%	0.54%	2.81%	1.97
20/01/2022	-4.26%	0.07%	-0.41%	1.82%	0.56%	-0.10%	3.79%	0.32%	2.63%	0.80%	0.77%	0.88%	1.32%	1.89
21/01/2022	-1.31%	2.03%	-0.71%	2.06%	0.56%	-0.83%	3.93%	2.41%	2.19%	0.30%	0.16%	0.07%	3.37%	1.92
24/01/2022	-0.53%	2.15%	-1.35%	0.78%	0.97%	-0.02%	4.10%	1.22%	2.81%	2.33%	1.13%	0.67%	0.73%	1.89
25/01/2022	-4.08%	2.75%	-0.95%	0.46%	0.58%	-0.90%	4.27%	6.19%	2.26%	0.57%	0.28%	0.73%	0.34%	1.90
26/01/2022	-1.38%	2.04%	-0.41%	0.55%	1.74%	-0.55%	1.37%	2.57%	1.19%	1.50%	1.72%	0.10%	3.13%	1.90
27/01/2022	-1.24%	0.85%	-2.47%	0.18%	3.13%	-1.42%	3.02%	1.32%	3.18%	1.39%	1.57%	0.57%	2.96%	1.88
28/01/2022	-0.60%	0.24%	-0.23%	1.01%	0.06%	-2.06%	4.39%	0.07%	1.02%	2.55%	1.40%	0.70%	2.80%	1.90
31/01/2022	-0.02%	1.53%	-0.29%	1.00%	1.15%	-0.67%	4.59%	0.48%	1.82%	1.10%	1.93%	1.78%	1.40%	1.94
1/2/2022	-0.31%	0.06%	-0.80%	0.32%	1.25%	-1.22%	4.81%	4.27%	0.43%	0.06%	0.92%	0.39%	0.45%	1.86
2/2/2022	-5.24%	0.07%	-1.24%	0.23%	0.82%	-1.12%	4.59%	1.01%	1.53%	0.60%	0.61%	0.65%	0.38%	1.89
3/2/2022	-0.64%	2.28%	-0.74%	0.72%	0.63%	-1.36%	4.39%	3.35%	0.72%	-1.82%	-2.38%	-1.15%	-0.68%	1.87
4/2/2022	-1.73%	2.26%	-2.05%	1.12%	1.13%	-0.72%	4.21%	-0.11%	1.30%	-0.81%	-0.47%	-1.23%	1.32%	1.89
7/2/2022	-0.26%	-1.07%	-0.67%	0.18%	-0.46%	-1.43%	4.04%	-1.79%	0.80%	-1.64%	-2.29%	-1.15%	-3.55%	1.95
8/2/2022	-0.24%	-2.15%	-0.50%	0.31%	-0.71%	-1.76%	3.88%	-2.25%	-1.72%	-1.29%	-0.77%	-1.92%	-2.07%	2.01
9/2/2022	-6.33%	0.34%	-2.28%	1.19%	-0.44%	-3.83%	3.73%	-2.09%	3.40%	-0.56%	-1.44%	-2.81%	-0.86%	2.00
10/2/2022	-0.01%	0.25%	-0.00%	0.98%	-3.54%	-0.46%	2.71%	-0.07%	0.19%	-0.82%	-0.73%	-1.05%	-0.57%	2.06
11/2/2022	-2.30%	-3.58%	-2.22%	0.40%	-0.06%	-0.56%	2.47%	-0.79%	-2.44%	-1.19%	-2.71%	-1.59%	-3.52%	2.07
14/02/2022	-1.20%	-2.53%	-1.28%	0.00%	-0.72%	-0.85%	3.61%	-0.26%	-0.10%	-2.34%	-1.41%	-0.47%	-0.00%	2.09
15/02/2022	-0.68%	-3.55%	-0.35%	-0.84%	-0.13%	-0.39%	-2.28%	-1.43%	-2.24%	-0.28%	-0.46%	-0.20%	-0.59%	2.08
16/02/2022	-1.40%	-1.73%	-1.48%	-0.93%	-1.27%	-0.25%	-2.27%	-0.82%	-0.13%	-0.60%	-0.65%	-0.07%	-3.57%	2.07
17/02/2022	-3.81%	-2.03%	-1.08%	-1.16%	-0.57%	-1.69%	-1.58%	-0.40%	-5.93%	-0.22%	-3.13%	-1.48%	-1.34%	2.04
18/02/2022	-3.51%	-0.75%	-1.54%	-1.15%	-0.70%	-0.28%	-0.39%	-0.00%	-3.76%	-0.03%	-1.33%	-0.40%	-0.22%	2.08
21/02/2022	-0.23%	-0.60%	-1.46%	-2.46%	-1.56%	-0.77%	-1.43%	-0.26%	-5.71%	-2.35%	-1.65%	-0.40%	-3.35%	2.06
22/02/2022	-0.10%	-1.12%	-0.59%	-0.05%	-0.59%	-1.38%	-2.41%	-7.24%	-8.96%	-2.45%	-5.11%	-0.07%	-1.79%	2.09
23/02/2022	-5.90%	-0.32%	-1.91%	-4.04%	-0.12%	-0.69%	-2.74%	-2.91%	-10.08%	-0.81%	-5.76%	-1.69%	-11.60%	2.13
24/02/2022	-8.46%	-0.27%	-0.37%	-0.29%	-3.22%	-2.68%	-0.03%	-0.70%	-7.95%	-4.29%	-6.06%	-3.22%	-5.97%	2.16

25/02/2022	1.28%	0.77%	0.12%	-2.59%	-3.56%	1.16%	1.85%	-1.45%	5.67%	3.40%	-0.10%	0.19%	-3.36%	2.18
28/02/2022	-6.73%	1.31%	0.18%	-0.84%	-1.05%	1.36%	2.72%	-0.77%	21.78%	3.73%	-1.66%	0.88%	-1.41%	2.24
1/3/2022	-16.25%	4.51%	2.48%	-1.24%	-2.74%	1.93%	3.33%	-6.76%	4.58%	1.64%	-0.70%	0.56%	-0.38%	2.28
2/3/2022	-0.52%	8.03%	0.94%	-0.15%	-0.67%	0.19%	-3.22%	-2.36%	5.73%	0.16%	-0.96%	-1.24%	-1.43%	2.32
3/3/2022	-1.66%	6.95%	1.58%	-2.90%	-0.79%	0.56%	-1.60%	-2.27%	10.68%	0.24%	-0.70%	-1.57%	-0.77%	2.32
4/3/2022	-3.34%	2.65%	0.17%	-1.10%	-0.27%	1.90%	-1.05%	-0.25%	5.77%	0.12%	-2.58%	-0.93%	-0.51%	2.34
7/3/2022	-10.45%	7.44%	2.18%	-1.13%	-0.44%	0.27%	-4.79%	-0.29%	10.48%	-1.81%	-3.10%	-0.29%	-3.79%	2.33
8/3/2022	-17.51%	3.22%	0.22%	-0.10%	-3.55%	0.51%	-2.59%	-2.02%	1.51%	-1.06%	-0.89%	-0.39%	-1.35%	2.32
9/3/2022	-6.82%	3.60%	0.00%	-0.95%	-1.90%	0.08%	-0.15%	-0.81%	3.36%	-0.80%	-4.74%	-0.45%	-16.97%	2.29
10/3/2022	-4.41%	-12.13%	-3.82%	-1.61%	-0.29%	-1.34%	-4.56%	-0.84%	-2.39%	-0.54%	-4.09%	-3.85%	-8.38%	2.28
11/3/2022	-0.46%	-2.47%	-0.29%	-3.22%	-1.06%	-0.02%	-0.00%	-0.52%	-4.96%	-0.21%	-3.69%	-1.95%	-0.49%	2.25
14/03/2022	-1.98%	-3.12%	-1.51%	-0.42%	-1.86%	-0.65%	-0.71%	-2.11%	-7.36%	-1.69%	-3.36%	-0.98%	-2.33%	2.22
15/03/2022	-1.09%	-5.78%	-1.18%	-1.31%	-3.93%	-1.92%	-19.01%	-0.10%	-2.69%	-0.57%	-1.69%	-0.54%	-2.17%	2.15
16/03/2022	-0.94%	-6.38%	-1.52%	-0.37%	-2.78%	-2.48%	-4.96%	-2.10%	-3.12%	-1.17%	-1.95%	-1.95%	-4.60%	2.15
17/03/2022	-2.21%	-1.45%	-2.07%	-0.23%	-0.15%	-0.47%	-1.80%	-1.14%	-5.22%	-0.03%	-0.43%	-0.60%	-0.41%	2.18
18/03/2022	-1.25%	-8.35%	-1.97%	-1.43%	-0.17%	-0.29%	-4.81%	-1.95%	-0.09%	-1.38%	-0.63%	-0.22%	-0.28%	2.17
21/03/2022	-0.63%	-1.67%	-0.97%	-0.14%	-0.88%	-0.40%	-1.51%	-1.14%	-1.12%	-0.33%	-1.25%	-0.13%	-2.60%	2.10
22/03/2022	-2.91%	-7.09%	-0.92%	-0.56%	-3.60%	-2.20%	-5.13%	-2.39%	-1.81%	-1.31%	-0.77%	-1.53%	-4.94%	2.07
23/03/2022	-5.05%	-0.32%	-1.51%	-1.12%	-3.18%	-1.40%	-3.25%	-1.02%	-1.52%	-1.05%	-0.73%	-1.81%	-2.44%	2.12
24/03/2022	-2.14%	-2.84%	-1.26%	-0.42%	-2.17%	-2.52%	-1.18%	-1.61%	-4.11%	-0.56%	-2.97%	-1.44%	-4.89%	2.15
25/03/2022	-0.46%	-2.25%	-0.06%	-1.18%	-1.93%	-0.67%	-0.84%	-2.56%	-4.04%	-2.69%	-1.62%	-1.18%	-1.53%	2.17
28/03/2022	-2.81%	-1.39%	-0.17%	-0.56%	-3.05%	-0.80%	-5.45%	-3.69%	-1.28%	-1.28%	-1.46%	-0.60%	-0.34%	2.17
29/03/2022	-1.10%	-6.97%	-1.13%	-1.02%	-0.51%	-0.55%	-4.96%	-1.05%	-2.07%	-1.28%	-1.84%	-0.03%	-1.72%	2.20
30/03/2022	-4.15%	-1.62%	-0.74%	-0.38%	-2.18%	-0.41%	-3.63%	-0.66%	-2.14%	-2.75%	-2.11%	-0.25%	-1.28%	2.24
31/03/2022	-2.34%	-3.43%	-0.98%	-0.57%	-0.03%	-0.72%	-0.04%	-0.44%	-2.62%	-2.19%	-1.23%	-0.44%	-2.02%	2.28
1/4/2022	-2.63%	-6.99%	-1.11%	-0.95%	-1.44%	-0.18%	-1.87%	-2.19%	-3.46%	-1.23%	-0.43%	-0.81%	-0.97%	2.30
4/4/2022	-0.01%	-1.01%	-1.78%	-1.15%	-1.76%	-0.57%	-1.67%	-2.76%	-0.40%	-1.79%	-0.17%	-0.57%	-1.96%	2.30
5/4/2022	-0.57%	-4.04%	-1.98%	-1.45%	-0.69%	-2.13%	-2.91%	-3.82%	-2.03%	-0.75%	-1.45%	-0.22%	-3.55%	2.29
6/4/2022	-1.11%	-1.28%	-0.44%	-1.00%	-2.23%	-0.20%	-6.07%	-1.06%	-3.09%	-1.65%	-0.55%	-0.98%	-1.07%	2.27

7/4/2022	3.58%	-5.62%	-1.28%	-0.28%	2.42%	0.73%	1.30%	5.81%	2.83%	2.64%	1.54%	0.54%	0.50%	2.29
8/4/2022	0.19%	0.21%	-0.62%	-0.28%	3.10%	2.27%	6.38%	-0.58%	2.08%	2.00%	0.93%	0.32%	-1.27%	2.35
11/4/2022	-2.67%	-2.32%	-0.45%	-0.29%	-0.55%	-1.28%	-6.70%	-5.50%	-0.88%	-0.91%	-0.86%	-2.76%	-4.99%	2.39
12/4/2022	-1.36%	-4.04%	-1.81%	-0.52%	-0.77%	-5.41%	-1.37%	-10.00%	-1.53%	-0.34%	-0.09%	-2.19%	-0.56%	2.45
13/04/2022	-1.99%	-6.69%	-1.04%	-0.19%	-3.35%	-0.19%	-1.09%	-1.48%	-0.07%	-0.37%	-2.81%	-2.93%	-1.94%	2.51
14/04/2022	-3.27%	-3.63%	-0.06%	-1.05%	-0.15%	-0.76%	-0.60%	-2.16%	-2.26%	-0.07%	-1.14%	-0.06%	-3.08%	2.53
19/04/2022	-0.29%	-2.59%	-1.08%	-0.09%	-0.61%	-1.96%	-3.93%	-3.84%	-1.92%	-2.01%	-1.46%	-1.09%	-1.66%	2.58
20/04/2022	-9.50%	-1.18%	-1.27%	-2.36%	-1.09%	-1.77%	-1.59%	-3.31%	-1.00%	-0.10%	-2.02%	-0.15%	-1.37%	2.62
21/04/2022	-1.57%	-5.22%	-1.22%	-0.58%	-0.62%	-0.12%	-6.07%	-1.18%	-1.84%	-1.76%	-0.78%	-0.77%	-0.83%	2.63
22/04/2022	-2.95%	-0.19%	-0.06%	-1.07%	-0.49%	-0.58%	-2.95%	-0.32%	-0.23%	-0.09%	-0.91%	-2.57%	-2.97%	2.64
25/04/2022	-6.21%	-1.01%	-1.27%	-2.81%	-3.34%	-0.76%	-2.19%	-0.41%	-1.60%	-1.84%	-0.37%	-0.54%	-3.28%	2.62
26/04/2022	-0.90%	-1.66%	-0.51%	-0.86%	-4.98%	-0.36%	-1.24%	-4.34%	-0.04%	-2.37%	-1.53%	-0.69%	-3.24%	2.61
27/04/2022	-2.06%	-3.46%	-1.31%	-0.38%	-0.93%	-1.96%	-1.95%	-0.42%	-1.19%	-0.17%	-0.06%	-4.20%	-2.53%	2.61
28/04/2022	-2.06%	-3.21%	-1.97%	-1.04%	-2.99%	-0.40%	-1.70%	-3.09%	-0.34%	-1.22%	-0.28%	-4.03%	-1.26%	2.59
29/04/2022	-2.14%	-0.31%	-1.61%	-0.05%	-0.45%	-1.04%	-0.72%	-1.28%	-0.50%	-0.47%	-0.64%	-1.55%	-2.70%	2.56
2/5/2022	-1.67%	-3.27%	-0.18%	-2.48%	-3.16%	-1.72%	-0.49%	-1.64%	-2.76%	-0.04%	-1.51%	-0.38%	-15.27%	2.53
3/5/2022	-6.20%	-0.64%	-1.05%	-3.02%	-3.86%	-1.86%	-0.48%	-2.50%	-0.13%	-2.38%	-0.28%	-0.12%	-1.55%	2.51
4/5/2022	-0.14%	-0.46%	-1.30%	-0.54%	-3.56%	-0.59%	-0.46%	-0.49%	-0.70%	-0.90%	-0.66%	-0.50%	-2.60%	2.52
5/5/2022	-0.68%	-2.62%	-1.38%	-3.43%	-0.49%	-0.64%	-2.84%	-2.38%	-2.82%	-0.96%	-1.43%	-2.94%	-2.06%	2.52
6/5/2022	-2.96%	-5.27%	-3.37%	-0.96%	-0.39%	-1.15%	-0.99%	-2.40%	-2.79%	-0.05%	-0.98%	-0.55%	-1.48%	2.51
9/5/2022	-4.94%	-0.42%	-2.75%	-0.87%	-0.19%	-2.84%	-1.95%	-1.58%	-0.18%	-1.52%	-0.25%	-0.60%	-2.00%	2.52
10/5/2022	-0.37%	-1.39%	-0.71%	-2.30%	-1.19%	-2.52%	-0.11%	-5.09%	-1.42%	-2.27%	-2.00%	-1.50%	-5.03%	2.51
11/5/2022	-1.71%	-6.09%	-5.03%	-0.81%	-0.14%	-1.02%	-1.00%	-0.14%	-0.87%	-0.44%	-1.40%	-1.27%	-0.68%	2.54
12/5/2022	-0.64%	-3.23%	-0.39%	-1.95%	-3.59%	-0.14%	-1.29%	-3.71%	-2.35%	-0.91%	-2.34%	-3.94%	-9.13%	2.53
13/05/2022	-0.25%	-5.96%	-1.47%	-0.82%	-1.34%	-0.40%	-1.42%	-0.53%	-5.93%	-0.44%	-1.89%	-3.70%	-2.23%	2.51
16/05/2022	-1.22%	-0.40%	-1.38%	-1.15%	-2.64%	-1.14%	-0.35%	-2.71%	-0.62%	-2.03%	-1.08%	-2.07%	-1.84%	2.49
17/05/2022	-2.41%	-4.11%	-0.52%	-0.73%	-1.75%	-1.09%	-8.37%	-2.41%	-6.88%	-0.61%	-2.40%	-1.04%	-2.18%	2.48
18/05/2022	-7.72%	-3.36%	-0.23%	-0.10%	-3.06%	-0.82%	-16.48%	-0.99%	-2.40%	-1.30%	-0.22%	-1.06%	-2.39%	2.45
19/05/2022	-1.72%	-1.58%	-1.56%	-2.20%	-0.13%	-1.33%	-2.42%	-2.21%	-3.66%	-0.91%	-0.57%	-0.61%	-2.77%	2.43

20/05/2022	-3.35%	-2.50%	0.82%	-1.01%	-0.69%	0.27%	0.13%	5.16%	-2.46%	-1.67%	0.96%	-0.61%	7.07%	2.38
23/05/2022	-2.79%	-2.39%	0.17%	-0.62%	-2.21%	0.42%	-6.15%	0.19%	-2.64%	-0.87%	-1.84%	-0.52%	0.96%	2.39
24/05/2022	-4.06%	-0.91%	-2.33%	-0.48%	-2.94%	-1.22%	-6.63%	-3.11%	-1.82%	-1.07%	-0.06%	-1.17%	-0.66%	2.40
25/05/2022	-0.10%	-2.60%	-0.68%	-0.19%	-0.94%	-0.42%	-3.36%	-1.69%	-2.96%	-0.36%	-0.94%	-1.13%	-7.59%	2.42
26/05/2022	-4.13%	-0.47%	-1.72%	-1.37%	-0.17%	-1.01%	-2.31%	-0.06%	-0.56%	-0.71%	-1.60%	-0.20%	-6.04%	2.44
27/05/2022	-0.66%	-0.51%	-1.07%	-0.05%	-2.02%	-2.75%	-1.24%	-0.25%	-0.44%	-2.71%	-0.21%	-0.63%	-0.26%	2.45
30/05/2022	-0.27%	-3.41%	-0.40%	-0.89%	-2.17%	-5.15%	-1.24%	-0.30%	-1.25%	-0.33%	-2.85%	-2.34%	-3.47%	2.45
31/05/2022	-0.06%	-0.86%	-0.17%	-0.19%	-0.17%	-0.02%	-4.79%	-1.32%	-0.18%	-0.30%	-2.95%	-0.93%	-1.08%	2.44
1/6/2022	-2.45%	-0.47%	-0.46%	-0.43%	-0.78%	-2.70%	-1.77%	-4.19%	-5.88%	-3.12%	-0.14%	-1.06%	-5.66%	2.43
2/6/2022	-0.30%	-1.73%	-0.23%	-0.62%	-0.44%	-2.49%	-0.81%	-3.63%	-4.25%	-0.42%	-0.45%	-2.59%	-1.48%	2.39
3/6/2022	-0.61%	-2.50%	-2.40%	-1.91%	-2.28%	-0.23%	-6.74%	-0.35%	-1.63%	-2.31%	-2.13%	-1.68%	-1.80%	2.37
6/6/2022	-6.26%	-0.51%	-0.53%	-0.10%	-4.49%	-0.62%	-6.87%	-2.84%	-1.72%	-1.82%	-1.95%	-0.12%	-0.97%	2.38
7/6/2022	-0.15%	-1.40%	-0.00%	-0.10%	-0.70%	-1.46%	-1.66%	-0.92%	-5.10%	-0.09%	-0.99%	-1.68%	-0.91%	2.35
8/6/2022	-1.84%	-1.71%	-1.52%	-2.38%	-0.28%	-0.36%	-4.14%	-0.25%	-1.94%	-1.71%	-1.11%	-2.31%	-2.43%	2.34
9/6/2022	-1.50%	-0.31%	-2.01%	-1.19%	-1.69%	-0.47%	-3.69%	-1.24%	-0.28%	-0.68%	-0.03%	-0.80%	-1.31%	2.32
10/6/2022	-1.05%	-0.77%	-0.58%	-0.10%	-0.45%	-0.71%	-0.58%	-1.57%	-0.33%	-1.67%	-0.52%	-1.07%	-1.06%	2.32
13/06/2022	-0.39%	-2.26%	-1.10%	-1.16%	-0.57%	-1.03%	-3.99%	-1.13%	-0.05%	-1.33%	-0.13%	-0.60%	-0.82%	2.33
14/06/2022	-3.20%	-0.49%	-0.17%	-0.57%	-17.68%	-1.18%	-0.82%	-0.82%	-0.02%	-2.18%	-0.75%	-0.61%	-0.45%	2.32
15/06/2022	-2.44%	-0.69%	-0.11%	-1.28%	-3.75%	-0.36%	-2.18%	-1.89%	-1.94%	-0.53%	-1.84%	-0.83%	-5.73%	2.30
16/06/2022	-3.71%	-0.22%	-0.34%	-2.01%	-5.08%	-1.34%	-5.02%	-1.23%	-0.02%	-0.28%	-0.48%	-0.59%	-2.58%	2.31
17/06/2022	-0.76%	-1.65%	-1.25%	-0.20%	-5.61%	-0.37%	-1.89%	-2.44%	-2.69%	-0.93%	-3.03%	-1.18%	-2.32%	2.31
20/06/2022	-1.98%	-3.04%	-0.29%	-1.13%	-3.88%	-2.01%	-4.74%	-5.74%	-4.08%	-0.44%	-0.95%	-1.23%	-3.78%	2.33
21/06/2022	-0.87%	-1.98%	-1.10%	-1.59%	-4.08%	-0.24%	-0.98%	-3.54%	-5.70%	-0.30%	-2.77%	-0.37%	-0.21%	2.34
22/06/2022	-3.36%	-6.83%	-0.70%	-0.78%	-0.61%	-0.51%	-2.13%	-0.90%	-0.13%	-0.03%	-0.47%	-0.16%	-3.69%	2.32
23/06/2022	-2.75%	-0.57%	-0.12%	-1.33%	-4.28%	-1.29%	-0.79%	-2.34%	-4.02%	-0.91%	-0.80%	-0.81%	-18.66%	2.32
24/06/2022	-0.83%	-0.09%	-0.29%	-0.35%	-1.40%	-0.75%	-4.17%	-7.99%	-1.44%	-1.68%	-2.05%	-1.48%	-0.89%	2.32
27/06/2022	-1.94%	-1.66%	-0.65%	-1.90%	-1.38%	-0.99%	-0.25%	-0.15%	-0.68%	-3.60%	-1.42%	-0.15%	-1.18%	2.32
28/06/2022	-2.76%	-4.03%	-2.05%	-0.31%	-4.10%	-1.33%	-0.88%	-0.25%	-2.02%	-1.10%	-3.44%	-1.86%	-29.53%	2.32
29/06/2022	-1.09%	-1.81%	-0.86%	-0.56%	-5.21%	-0.05%	-1.36%	-7.76%	-0.64%	-5.04%	-1.45%	-1.80%	-0.58%	2.30

30/06/2022	2.05%	3.21%	-1.33%	1.90%	3.69%	2.50%	0.39%	0.17%	-4.95%	1.77%	-2.45%	0.60%	1.91%	2.26
1/7/2022	-5.08%	1.81%	1.88%	0.76%	0.08%	0.42%	1.08%	10.73%	4.30%	0.96%	1.12%	1.32%	0.90%	2.28
4/7/2022	1.20%	2.00%	0.06%	-0.61%	3.30%	1.33%	2.59%	2.62%	4.61%	0.70%	0.37%	0.40%	29.07%	2.27
5/7/2022	-1.61%	-1.77%	-2.19%	-1.38%	-4.22%	-1.61%	-4.69%	-0.33%	-0.31%	-3.25%	-4.18%	-0.65%	-0.11%	2.24
6/7/2022	0.04%	3.66%	-0.47%	2.57%	-3.45%	1.26%	0.95%	0.76%	3.98%	4.67%	-0.39%	0.61%	6.89%	2.25
7/7/2022	2.04%	2.52%	1.90%	-0.36%	4.56%	0.50%	0.00%	0.83%	6.58%	0.50%	6.21%	0.06%	0.06%	2.23
8/7/2022	-2.51%	0.22%	0.35%	3.59%	5.97%	-7.43%	-2.59%	-3.59%	-5.36%	-2.68%	-0.99%	-0.46%	-1.61%	2.22
11/7/2022	1.90%	-2.04%	1.17%	0.30%	4.84%	-2.62%	0.78%	-1.68%	-5.01%	-1.89%	-6.08%	-2.39%	-2.26%	2.24
12/7/2022	1.53%	9.87%	0.75%	0.00%	0.67%	0.69%	5.20%	0.84%	0.41%	5.93%	13.06%	3.30%	4.97%	2.21
13/07/2022	2.09%	0.97%	1.89%	0.55%	0.47%	0.62%	1.35%	0.36%	0.50%	4.29%	1.32%	0.53%	0.55%	2.22
14/07/2022	0.13%	4.26%	0.88%	1.26%	1.30%	1.73%	0.32%	0.72%	2.20%	0.57%	2.53%	1.25%	1.55%	2.23
15/07/2022	1.68%	2.01%	2.53%	0.56%	0.78%	2.16%	2.44%	3.79%	4.63%	0.77%	0.75%	0.24%	1.07%	2.16
18/07/2022	0.52%	0.67%	1.49%	0.05%	0.19%	0.41%	1.09%	5.84%	0.06%	1.29%	2.79%	0.71%	5.00%	2.16
19/07/2022	1.52%	7.93%	1.47%	1.67%	3.76%	0.04%	1.84%	1.53%	0.89%	2.83%	2.00%	0.39%	3.04%	2.15
20/07/2022	5.75%	0.48%	2.18%	0.35%	0.62%	4.19%	6.56%	1.62%	1.62%	1.59%	2.79%	0.97%	2.41%	2.13
21/07/2022	0.93%	0.54%	0.00%	0.70%	1.20%	0.83%	6.04%	1.10%	5.86%	1.91%	2.93%	0.06%	0.12%	2.14
22/07/2022	2.32%	1.89%	0.41%	0.00%	0.55%	0.63%	0.86%	1.06%	1.45%	2.31%	0.54%	0.38%	5.47%	2.11
25/07/2022	0.09%	5.13%	1.34%	0.39%	2.77%	0.34%	2.27%	2.76%	4.38%	1.09%	2.46%	0.79%	0.00%	2.12
26/07/2022	0.41%	1.58%	-1.67%	0.15%	0.80%	1.07%	1.33%	1.59%	1.68%	2.30%	0.20%	1.33%	1.67%	2.15
27/07/2022	0.70%	1.88%	1.94%	0.89%	0.40%	0.06%	6.08%	1.89%	3.39%	2.80%	1.50%	0.69%	4.43%	2.15
28/07/2022	3.70%	5.78%	0.69%	0.05%	0.20%	4.34%	2.24%	3.50%	1.13%	1.90%	2.59%	1.70%	2.49%	2.16
29/07/2022	-0.52%	1.71%	0.58%	1.57%	1.60%	1.05%	2.73%	0.37%	0.93%	2.16%	0.04%	1.55%	1.34%	2.17
1/8/2022	2.58%	2.11%	1.04%	1.25%	0.56%	0.46%	0.25%	2.23%	3.19%	1.94%	1.82%	0.09%	1.56%	2.16
2/8/2022	1.70%	-1.78%	0.17%	2.33%	3.64%	1.31%	3.33%	0.61%	1.42%	4.26%	1.33%	0.84%	9.11%	2.16
3/8/2022	2.49%	2.40%	0.23%	3.44%	1.89%	0.98%	1.79%	0.60%	2.45%	1.39%	0.29%	1.13%	4.56%	2.15
4/8/2022	0.24%	0.86%	0.80%	1.71%	3.62%	0.90%	1.35%	2.71%	0.86%	1.21%	1.15%	0.32%	2.67%	2.15
5/8/2022	0.68%	2.28%	0.29%	0.18%	3.82%	0.16%	2.43%	0.54%	0.52%	3.50%	0.93%	0.80%	6.19%	2.16
8/8/2022	1.12%	4.80%	1.37%	1.63%	4.60%	1.27%	5.37%	2.88%	0.22%	0.63%	1.29%	0.44%	0.77%	2.16
9/8/2022	2.53%	0.56%	1.91%	0.18%	2.87%	0.34%	1.38%	1.35%	2.34%	0.62%	1.67%	0.47%	0.44%	2.16

10/8/2022	-0.01%	3.98%	0.23%	0.27%	2.83%	2.37%	4.16%	1.13%	1.38%	2.05%	2.03%	1.02%	4.02%	2.15
11/8/2022	1.90%	2.34%	-0.34%	0.36%	0.74%	2.08%	8.37%	0.53%	0.59%	0.07%	2.51%	1.39%	2.26%	2.17
12/8/2022	1.51%	0.53%	-0.34%	0.76%	2.94%	-0.11%	6.45%	0.65%	0.65%	1.45%	0.65%	0.66%	4.40%	2.17
15/08/2022	2.15%	1.97%	-1.65%	0.67%	1.61%	-0.05%	8.86%	0.79%	-1.84%	0.40%	0.77%	3.20%	-1.45%	2.17
16/08/2022	1.43%	0.29%	-2.44%	3.99%	1.67%	-0.05%	1.03%	0.50%	-2.89%	-2.89%	1.01%	0.23%	-1.43%	2.19
17/08/2022	4.04%	1.58%	-0.34%	-1.53%	1.64%	-0.29%	1.16%	3.04%	-4.16%	-2.19%	1.20%	0.96%	0.00%	2.18
18/08/2022	0.25%	2.62%	-0.40%	-1.43%	0.04%	-2.19%	0.03%	2.84%	-2.97%	-0.62%	4.18%	-0.26%	-2.73%	2.17
19/08/2022	-2.05%	-2.38%	-0.90%	-0.79%	-3.13%	-2.04%	-1.22%	-5.07%	-2.29%	-1.10%	-0.87%	-0.49%	-2.12%	2.18
22/08/2022	-5.96%	-2.91%	-0.28%	-0.49%	-0.44%	-0.42%	-0.39%	-5.25%	-1.59%	-0.09%	-1.24%	-0.90%	-0.66%	2.17
23/08/2022	-3.12%	-3.22%	-0.72%	-0.98%	-4.13%	-1.51%	-5.50%	-2.80%	-1.56%	-2.23%	-1.71%	-0.20%	-0.36%	2.17
24/08/2022	-0.06%	-1.83%	-0.95%	-0.22%	-0.79%	-2.63%	-8.05%	-3.96%	-3.18%	-1.73%	-2.24%	-0.87%	-3.42%	2.16
25/08/2022	-0.08%	-2.71%	-0.06%	-0.27%	-4.42%	-1.34%	-3.85%	-3.70%	-1.95%	-0.21%	-0.59%	-0.43%	-0.68%	2.14
26/08/2022	-1.12%	-0.30%	-0.28%	-2.03%	-4.62%	-1.43%	-3.20%	-1.46%	-7.39%	-1.77%	-0.88%	-0.69%	-4.63%	2.15
29/08/2022	-4.04%	-0.59%	-0.22%	-1.06%	-0.33%	-0.35%	-3.99%	-4.66%	-2.67%	-2.10%	-2.30%	-0.03%	-2.14%	2.15
30/08/2022	-6.75%	-3.89%	-1.00%	-1.70%	-1.86%	-1.58%	-4.97%	-7.45%	-1.37%	-1.61%	-1.63%	-3.05%	-1.46%	2.14
31/08/2022	-0.97%	-1.23%	-1.07%	-0.53%	-2.25%	-1.34%	-0.69%	-0.47%	-4.06%	-0.37%	-0.24%	-0.42%	-1.93%	2.14
1/9/2022	0.95%	2.50%	-1.02%	0.04%	0.89%	4.25%	1.45%	7.01%	1.66%	0.70%	2.00%	2.74%	0.26%	2.13
2/9/2022	-3.59%	0.58%	-2.00%	-1.06%	-0.83%	-1.09%	-2.17%	-0.59%	-0.37%	-2.11%	-0.59%	-0.46%	-7.30%	2.17
5/9/2022	-4.42%	-4.24%	-1.23%	-0.40%	-3.21%	-0.25%	-0.83%	-1.31%	-0.53%	-2.01%	-1.22%	-0.64%	-1.16%	2.15
6/9/2022	-6.14%	-5.54%	-1.08%	-0.90%	-0.38%	-2.98%	-1.83%	-2.24%	-0.58%	-0.23%	-4.49%	-0.52%	-0.97%	2.14
7/9/2022	-1.22%	-2.28%	-5.62%	-1.09%	-0.56%	-15.25%	-1.18%	-1.82%	-3.34%	-1.31%	-1.97%	-0.17%	-0.06%	2.13
8/9/2022	-2.59%	-3.28%	-0.11%	-1.46%	-3.87%	-0.02%	-0.16%	-2.15%	-1.81%	-1.09%	-0.46%	-1.54%	-5.29%	2.10
9/9/2022	-1.73%	-0.30%	-0.21%	-0.09%	-3.27%	-1.16%	-0.93%	-0.61%	-4.89%	-0.18%	-0.00%	-0.03%	-0.44%	2.11
12/9/2022	-8.69%	-1.59%	-1.06%	-1.08%	-2.82%	-2.93%	-3.16%	-1.09%	-1.24%	-1.89%	-4.44%	-1.07%	-1.58%	2.11
13/09/2022	-2.88%	-0.80%	-0.21%	-0.04%	-3.85%	-0.78%	-1.56%	-1.57%	-1.86%	-5.38%	-0.04%	-0.51%	-2.73%	2.09
14/09/2022	-4.00%	-2.34%	-2.15%	-0.00%	-0.39%	-0.28%	-0.86%	-2.99%	-1.31%	-0.64%	-0.15%	-0.56%	-1.09%	2.09
15/09/2022	-0.95%	-5.69%	-1.42%	-2.64%	-4.14%	-1.10%	-9.02%	-2.10%	-1.02%	-1.61%	-2.03%	-1.36%	-0.18%	2.07
16/09/2022	-1.98%	-1.95%	-0.42%	-1.28%	-4.51%	-0.15%	-0.92%	-3.32%	-1.75%	-0.24%	-0.94%	-0.03%	-5.28%	2.08
19/09/2022	-2.96%	-3.89%	-0.47%	-1.18%	-0.32%	-0.44%	-8.75%	-1.14%	-3.40%	-0.21%	-0.40%	-0.17%	-4.18%	2.09

20/09/2022	0.06%	1.14%	-0.05%	-1.33%	0.45%	0.21%	5.38%	0.50%	7.62%	0.88%	-1.67%	-0.20%	-2.25%	2.08
21/09/2022	-1.90%	-0.54%	-1.29%	-0.93%	-3.76%	-0.85%	-0.48%	-3.58%	-1.12%	-1.20%	-1.55%	-0.26%	-2.16%	2.07
22/09/2022	0.93%	1.34%	0.37%	-0.05%	0.21%	1.70%	0.21%	0.35%	0.77%	1.18%	0.19%	-0.06%	1.26%	2.05
23/09/2022	-6.63%	-3.82%	-2.13%	-0.05%	-1.34%	-0.28%	-6.95%	-4.02%	-3.32%	-0.56%	-0.45%	-1.04%	-1.89%	2.04
26/09/2022	6.93%	0.01%	0.10%	1.52%	14.18%	3.12%	3.82%	1.54%	2.56%	1.88%	-0.15%	1.37%	2.69%	2.05
27/09/2022	-3.37%	-0.73%	-2.19%	-0.70%	-5.11%	-0.27%	-7.22%	-2.58%	-1.57%	-0.05%	-1.19%	-0.18%	-0.75%	2.05
28/09/2022	-4.13%	-1.49%	-0.80%	-0.14%	-0.36%	-0.47%	-5.48%	-3.24%	-3.64%	-1.00%	-0.48%	-0.03%	-0.25%	2.07
29/09/2022	0.89%	1.79%	-1.05%	-0.37%	-1.46%	-0.47%	-5.56%	-2.04%	-0.77%	-0.19%	-0.33%	-0.47%	-1.37%	2.09
30/09/2022	-1.52%	-0.66%	-1.07%	-1.11%	-4.34%	-0.61%	-4.50%	-3.89%	-2.82%	-0.05%	-0.15%	-0.38%	-4.53%	2.10
3/10/2022	-1.18%	-5.69%	-0.82%	-2.01%	-0.71%	-0.47%	-0.82%	-2.00%	-1.03%	-0.14%	-1.24%	-0.65%	-1.52%	2.11
4/10/2022	-1.49%	-2.58%	-0.76%	-1.81%	-4.43%	-0.38%	-5.06%	-0.95%	-0.99%	-3.26%	-1.15%	-0.03%	-1.95%	2.15
5/10/2022	-0.22%	-2.33%	-2.52%	-0.15%	-0.15%	-0.41%	-2.82%	-1.76%	-0.11%	-0.61%	-2.20%	-0.54%	-2.61%	2.17
6/10/2022	-2.82%	-4.65%	-0.52%	-0.34%	-1.93%	-1.74%	-0.83%	-4.80%	-2.55%	-0.76%	-0.75%	-0.30%	-1.24%	2.19
7/10/2022	-1.29%	-1.12%	-0.62%	-2.19%	-0.07%	-1.55%	-1.88%	-1.01%	-0.14%	-0.99%	-0.00%	-0.15%	-2.39%	2.17
10/10/2022	-4.41%	-2.14%	-0.83%	-1.64%	-0.96%	-2.02%	-0.60%	-0.19%	-6.56%	-0.86%	-0.69%	-0.39%	-2.20%	2.15
11/10/2022	-0.64%	-5.21%	-0.26%	-2.15%	-4.86%	-0.97%	-4.15%	-0.66%	-3.94%	-0.66%	-1.15%	-0.78%	-0.45%	2.13
12/10/2022	-0.56%	-3.46%	-1.18%	-2.20%	-1.14%	-1.28%	-2.00%	-3.88%	-2.08%	-0.51%	-0.91%	-0.33%	-3.23%	2.10
13/10/2022	-3.19%	-1.43%	-2.48%	-0.31%	-2.24%	-0.36%	-1.59%	-1.15%	-1.13%	-0.16%	-0.37%	-0.21%	-0.20%	2.05
14/10/2022	-1.19%	-0.79%	-1.61%	-2.82%	-3.79%	-0.95%	-5.74%	-0.32%	-3.64%	-1.40%	-0.40%	-0.55%	-0.20%	2.02
17/10/2022	-0.75%	-4.74%	-0.63%	-0.63%	-3.07%	-0.40%	-2.13%	-4.26%	-0.15%	-0.02%	-0.85%	-0.76%	-3.72%	1.96
18/10/2022	-0.39%	-1.63%	-0.79%	-1.94%	-0.83%	-0.31%	-1.92%	-0.12%	-1.34%	-0.86%	-0.04%	-0.31%	-1.31%	1.95
19/10/2022	-0.71%	-1.95%	-1.32%	-0.32%	-3.48%	-2.25%	-0.86%	-0.41%	-0.97%	-0.11%	-0.40%	-0.96%	-0.28%	1.95
20/10/2022	-0.62%	-2.33%	-0.52%	-1.39%	-3.99%	-1.04%	-3.16%	-0.65%	-0.95%	-0.96%	-0.70%	-0.12%	-0.56%	1.96
21/10/2022	-2.77%	-2.11%	-1.40%	-3.51%	-0.15%	-0.77%	-1.47%	-0.82%	-0.18%	-0.04%	-0.18%	-0.72%	-2.23%	1.99
24/10/2022	-5.24%	-3.93%	-1.79%	-2.04%	-4.17%	-0.17%	-2.71%	-5.61%	-1.41%	-1.24%	-0.40%	-2.70%	-6.14%	2.00
25/10/2022	-6.62%	-0.18%	-2.46%	-1.12%	-5.33%	-0.58%	-0.49%	-3.01%	-0.48%	-0.43%	-0.22%	-4.02%	-2.70%	2.03
26/10/2022	-1.71%	-3.09%	-0.44%	-1.48%	-5.06%	-1.52%	-0.99%	-1.32%	-0.69%	-1.68%	-1.58%	-0.23%	-2.13%	2.07
27/10/2022	-5.83%	-3.30%	-0.05%	-1.07%	-4.73%	-1.22%	-6.03%	-2.17%	-0.24%	-0.73%	-0.90%	-0.00%	-1.66%	2.11
28/10/2022	-1.25%	-0.50%	-2.34%	-0.11%	-0.64%	-1.15%	-3.57%	-1.35%	-1.10%	-0.02%	-1.47%	-0.73%	-1.63%	2.12

31/10/2022	-1.53%	-1.08%	-1.38%	0.16%	0.22%	2.13%	1.74%	-9.02%	6.39%	0.04%	-1.20%	0.64%	-1.41%	2.15
1/11/2022	-4.06%	0.55%	-2.71%	0.05%	-1.35%	2.05%	2.39%	-2.35%	2.30%	0.40%	-0.26%	0.89%	-1.17%	2.16
2/11/2022	-0.03%	0.87%	-0.50%	-0.65%	-0.14%	0.35%	-3.71%	-4.11%	6.26%	2.29%	-0.77%	0.43%	-0.07%	2.17
3/11/2022	-0.55%	3.04%	-0.25%	-1.20%	-2.11%	-1.88%	-1.16%	-1.56%	0.65%	1.99%	-1.22%	0.14%	-0.59%	2.16
4/11/2022	-0.10%	1.33%	-0.50%	-0.55%	-3.31%	-5.97%	-0.87%	-2.35%	0.86%	0.43%	-0.45%	0.31%	-2.31%	2.14
7/11/2022	-1.48%	-1.32%	-0.30%	-1.44%	-1.98%	-2.06%	-1.66%	-0.81%	0.24%	-1.17%	-1.69%	0.06%	-1.87%	2.11
8/11/2022	-1.85%	-1.56%	-0.70%	-0.38%	-0.24%	-1.86%	-3.33%	-0.07%	-2.13%	-1.76%	-0.73%	-0.85%	-0.95%	2.12
9/11/2022	-4.34%	-2.13%	-1.69%	-0.60%	-1.71%	-1.36%	-0.00%	-2.29%	-2.57%	-0.82%	-0.11%	-0.22%	-0.63%	2.11
10/11/2022	-0.40%	-1.84%	-1.12%	-1.20%	-1.76%	-0.26%	-4.60%	-0.78%	-0.37%	-0.22%	-1.45%	-0.06%	-0.25%	2.10
11/11/2022	-3.82%	-2.03%	-0.44%	-2.37%	-4.77%	-0.43%	-0.86%	-0.46%	-1.28%	-0.31%	-0.22%	-0.37%	-0.44%	2.10
14/11/2022	-0.80%	-5.04%	-0.64%	-0.00%	-3.31%	-0.77%	-1.97%	-2.13%	-0.58%	-2.02%	-0.34%	-0.08%	-0.63%	2.10
15/11/2022	-1.89%	-0.89%	-2.81%	-2.26%	-0.58%	-1.74%	-0.00%	-1.97%	-1.19%	-2.09%	-0.04%	-0.76%	-0.25%	2.09
16/11/2022	-4.23%	-3.14%	-1.34%	-0.11%	-3.28%	-0.21%	-3.35%	-0.77%	-1.30%	-0.78%	-1.24%	-0.36%	-1.25%	2.06
17/11/2022	-1.38%	-3.46%	-0.76%	-0.22%	-1.53%	-0.96%	-0.58%	-2.12%	-1.31%	-1.16%	-0.42%	-0.61%	-1.14%	2.07
18/11/2022	-0.10%	-0.75%	-0.33%	-1.51%	-2.10%	-1.03%	-1.70%	-1.44%	-0.43%	-1.92%	-0.99%	-1.05%	-0.70%	2.09
21/11/2022	-2.50%	-2.88%	-0.47%	-0.26%	-4.96%	-0.15%	-5.45%	-2.91%	-0.50%	-0.86%	-0.72%	-0.20%	-1.16%	2.09
22/11/2022	-0.55%	-3.47%	-0.23%	-0.21%	-0.28%	-1.02%	-2.42%	-1.03%	-1.41%	-0.79%	-0.11%	-0.47%	-0.38%	2.11
23/11/2022	-2.71%	-1.22%	-1.12%	-0.58%	-1.94%	-1.16%	-3.16%	-1.39%	-0.37%	-0.56%	-0.45%	-0.08%	-3.75%	2.14
24/11/2022	-3.72%	-1.53%	-0.14%	-0.90%	-0.79%	-0.78%	-1.99%	-4.80%	-2.60%	-0.45%	-0.56%	-0.90%	-4.62%	2.19
25/11/2022	-0.36%	-4.62%	-0.61%	-0.10%	-0.87%	-0.41%	-1.22%	-2.63%	-0.58%	-0.44%	-1.81%	-3.40%	-6.09%	2.23
28/11/2022	-0.48%	-1.91%	-0.56%	-0.00%	-3.26%	-0.65%	-0.54%	-4.06%	-2.04%	-0.02%	-2.31%	-1.12%	-0.37%	2.24
29/11/2022	-3.56%	-0.44%	-1.07%	-1.77%	-1.44%	-0.15%	-2.25%	-2.77%	-0.10%	-1.46%	-0.98%	-0.80%	-1.25%	2.23
30/11/2022	-4.31%	-1.53%	-0.52%	-1.01%	-0.37%	-1.37%	-0.05%	-0.72%	-1.79%	-0.15%	-0.52%	-0.27%	-0.82%	2.24
1/12/2022	-0.02%	-3.72%	-0.47%	-0.58%	-1.93%	-1.18%	-0.31%	-1.20%	-1.57%	-0.69%	-0.36%	-0.24%	-6.30%	2.24
2/12/2022	-3.65%	-0.01%	-7.05%	-1.22%	-2.82%	-2.68%	-1.32%	-1.43%	-5.84%	-2.71%	-0.68%	-0.06%	-1.90%	2.19
5/12/2022	-0.92%	-2.14%	-1.28%	-1.62%	-0.32%	-1.77%	-4.29%	-1.47%	-2.95%	-0.61%	-0.44%	-0.36%	-0.00%	2.16
6/12/2022	-1.65%	-1.26%	-0.46%	-0.67%	-0.42%	-0.33%	-3.65%	-1.07%	-1.40%	-0.05%	-1.02%	-0.06%	-13.49%	2.16
7/12/2022	-0.47%	-1.24%	-0.46%	-0.62%	-1.10%	-1.17%	-1.24%	-0.14%	-3.05%	-1.20%	-0.39%	-0.72%	-16.83%	2.15
8/12/2022	-0.84%	-3.02%	-0.66%	-0.57%	-2.64%	-1.97%	-6.14%	-2.47%	-0.38%	-1.17%	-0.74%	-0.30%	-0.73%	2.16

9/12/2022	-1.35%	0.96%	1.01%	1.02%	4.47%	0.35%	3.44%	-1.34%	-1.59%	0.97%	2.27%	2.61%	-1.55%	2.14
12/12/2022	2.37%	-1.27%	2.09%	0.96%	0.52%	0.92%	3.94%	1.83%	2.84%	0.17%	0.08%	3.86%	0.98%	2.08
13/12/2022	-0.91%	1.06%	0.73%	0.10%	4.53%	0.14%	0.00%	-1.09%	-0.58%	1.57%	0.88%	0.34%	2.90%	2.12
14/12/2022	-3.15%	-4.62%	0.39%	2.55%	1.08%	2.87%	-0.41%	-0.64%	-0.07%	1.32%	0.73%	0.64%	2.38%	2.10
15/12/2022	-1.15%	-3.79%	1.40%	0.63%	1.14%	1.10%	-1.17%	-1.53%	-3.98%	0.17%	1.57%	0.33%	2.54%	2.07
16/12/2022	-1.78%	-2.54%	0.88%	1.48%	1.16%	1.32%	-2.22%	0.05%	-0.50%	0.59%	0.26%	0.44%	-1.93%	2.06
19/12/2022	-1.21%	-0.72%	0.73%	3.05%	0.74%	1.24%	-0.50%	-1.31%	-0.66%	0.44%	0.87%	1.14%	-1.62%	2.05
20/12/2022	-2.57%	-0.78%	0.05%	0.67%	0.88%	0.80%	-1.67%	0.86%	0.27%	-1.30%	1.28%	0.93%	-1.73%	2.05
21/12/2022	-1.46%	0.56%	1.17%	2.14%	0.28%	1.55%	-3.12%	-1.12%	-2.30%	1.22%	1.19%	0.87%	-0.74%	2.08
22/12/2022	-1.46%	-2.14%	1.11%	0.37%	3.25%	1.40%	-0.32%	-0.46%	-0.72%	0.17%	0.48%	0.14%	-1.02%	2.06
23/12/2022	-0.00%	-2.38%	0.93%	2.95%	2.66%	1.57%	-0.75%	-0.10%	-1.80%	0.89%	0.15%	3.18%	-1.58%	2.08
27/12/2022	-0.89%	-2.77%	1.74%	1.04%	3.75%	1.98%	-0.95%	-0.12%	-0.19%	0.77%	1.18%	0.71%	-3.35%	2.08
28/12/2022	-2.27%	-1.32%	1.28%	1.53%	0.63%	0.38%	-0.66%	-0.50%	-1.42%	0.68%	2.50%	0.69%	-0.43%	2.08
29/12/2022	-2.10%	-2.36%	0.19%	3.74%	1.69%	0.86%	-0.00%	-0.10%	-1.46%	1.70%	0.15%	0.83%	-1.53%	2.07
30/12/2022	-3.59%	-1.93%	0.83%	1.80%	0.59%	1.48%	-3.23%	-0.10%	-2.33%	0.13%	0.19%	0.40%	-0.59%	2.08
2/1/2023	-5.38%	-0.45%	0.63%	0.96%	2.63%	1.06%	-0.71%	-0.48%	-2.08%	0.51%	0.19%	1.36%	-2.42%	2.06
3/1/2023	-3.88%	-2.64%	0.05%	0.51%	0.30%	1.41%	-2.49%	-0.32%	-3.87%	-2.41%	0.34%	1.77%	-3.44%	2.05
4/1/2023	-6.24%	-0.27%	-1.41%	0.21%	0.64%	1.66%	-2.63%	-0.66%	-0.17%	-0.61%	0.15%	0.51%	-0.76%	2.07
5/1/2023	-1.11%	-1.13%	-2.17%	0.67%	-2.40%	0.92%	-0.80%	-0.34%	-0.44%	-0.78%	-2.29%	0.36%	-2.06%	2.06
6/1/2023	-0.91%	-2.05%	-0.20%	1.78%	-1.67%	0.02%	-1.94%	-0.44%	-0.27%	-2.37%	-0.60%	0.20%	-0.27%	2.08
9/1/2023	-4.70%	-1.48%	-1.26%	0.10%	-3.97%	0.18%	-0.83%	-0.29%	-1.42%	-0.13%	-1.52%	0.33%	-0.61%	2.06
10/1/2023	-0.91%	-1.47%	-0.45%	0.60%	-1.26%	0.05%	-1.78%	-0.15%	-1.23%	-0.43%	-0.58%	1.12%	-0.75%	2.03
11/1/2023	-2.22%	-0.01%	-0.50%	0.00%	-1.15%	0.13%	-0.03%	-0.69%	-0.37%	-0.33%	-0.59%	0.64%	-0.07%	2.04
12/1/2023	-1.46%	-2.37%	-1.45%	-0.94%	-0.53%	-1.46%	-1.13%	-0.12%	-0.13%	-0.96%	-0.15%	0.00%	-1.15%	2.06
13/01/2023	-0.72%	-0.00%	-0.10%	-2.96%	-0.89%	-1.33%	-0.57%	-1.73%	-1.08%	-0.57%	-1.48%	-0.36%	-0.80%	2.00
16/01/2023	-2.76%	-4.16%	-0.15%	-0.78%	-0.65%	-1.12%	-0.86%	-4.73%	-1.23%	-0.10%	-1.61%	-0.83%	-2.18%	2.01
17/01/2023	-2.85%	-5.21%	-0.64%	-3.44%	-1.96%	-2.11%	-1.97%	-4.56%	-1.08%	-0.99%	-0.33%	-0.00%	-0.52%	1.99
18/01/2023	-5.45%	-1.12%	-0.05%	-2.56%	-1.41%	-3.10%	-2.22%	-4.32%	-0.95%	-0.64%	-1.15%	-1.04%	-0.84%	1.99
19/01/2023	-0.54%	-0.16%	-0.59%	-0.19%	-0.70%	-0.73%	-26.45%	-1.11%	-2.90%	-0.54%	-0.07%	-1.63%	-0.64%	2.01

20/01/2023	0.90%	1.19%	-0.65%	-0.88%	0.88%	-2.73%	-1.17%	0.58%	2.01%	-1.08%	0.11%	0.11%	-0.25%	2.01
23/01/2023	-0.97%	0.60%	0.95%	0.34%	1.14%	0.31%	0.86%	2.36%	0.92%	0.12%	0.59%	0.36%	0.95%	2.06
24/01/2023	-2.67%	3.06%	0.69%	2.16%	2.32%	1.60%	1.20%	3.23%	1.52%	0.94%	0.18%	0.22%	-1.48%	2.05
25/01/2023	3.34%	1.25%	-0.34%	-0.91%	2.70%	1.88%	0.12%	2.18%	-0.33%	1.40%	-0.84%	1.10%	0.07%	2.07
26/01/2023	5.51%	1.86%	-1.78%	1.26%	-0.44%	0.60%	0.95%	-3.81%	0.33%	0.92%	0.33%	0.40%	0.26%	2.08
27/01/2023	0.15%	0.41%	0.25%	0.15%	0.07%	0.26%	5.52%	7.80%	1.16%	1.71%	0.22%	2.43%	0.45%	2.09
30/01/2023	0.31%	-0.93%	1.71%	0.20%	0.42%	1.37%	1.15%	0.69%	0.20%	0.18%	-0.74%	1.20%	1.42%	2.10
31/01/2023	3.35%	1.78%	0.15%	1.13%	0.25%	1.19%	5.17%	-1.49%	0.16%	1.15%	0.67%	0.17%	1.12%	2.09
1/2/2023	2.80%	-0.81%	2.71%	0.92%	0.10%	0.65%	0.88%	1.56%	0.56%	0.92%	1.14%	0.97%	0.93%	2.09
2/2/2023	2.16%	1.02%	0.29%	0.98%	-3.30%	0.28%	4.87%	2.41%	0.86%	0.15%	1.45%	1.12%	2.01%	2.15
3/2/2023	0.28%	1.28%	0.33%	0.82%	1.05%	0.07%	1.47%	1.71%	0.07%	0.70%	0.66%	0.90%	2.39%	2.18
6/2/2023	-3.23%	0.02%	1.14%	0.38%	0.61%	0.33%	2.77%	2.16%	2.00%	0.39%	0.40%	0.03%	1.68%	2.18
7/2/2023	0.07%	-1.83%	1.32%	0.86%	0.04%	0.18%	0.51%	0.95%	0.98%	0.30%	0.88%	0.23%	0.21%	2.18
8/2/2023	-0.35%	0.02%	0.29%	-3.27%	0.43%	0.33%	2.42%	4.11%	3.80%	0.03%	0.04%	1.40%	0.14%	2.19
9/2/2023	1.03%	1.07%	0.24%	1.79%	0.34%	1.36%	2.62%	7.89%	0.76%	1.53%	0.26%	1.42%	0.00%	2.20
10/2/2023	2.20%	-1.64%	0.14%	0.33%	3.33%	2.21%	3.53%	2.14%	0.76%	0.02%	0.41%	1.26%	1.92%	2.21
13/02/2023	1.21%	2.23%	0.14%	0.89%	0.12%	1.65%	3.28%	3.58%	2.13%	0.34%	0.92%	0.06%	2.09%	2.18
14/02/2023	0.82%	1.25%	0.29%	0.28%	0.91%	1.56%	4.51%	4.79%	0.55%	0.76%	2.22%	1.13%	9.30%	2.17
15/02/2023	3.26%	-3.12%	1.76%	1.79%	1.94%	2.40%	3.23%	0.66%	0.07%	0.05%	1.52%	0.12%	1.67%	2.19
16/02/2023	3.96%	0.69%	1.03%	0.14%	2.28%	0.54%	1.31%	1.38%	0.10%	0.05%	1.00%	1.15%	4.44%	2.21
17/02/2023	1.89%	3.28%	1.28%	0.83%	0.55%	2.83%	2.75%	3.10%	0.00%	0.15%	2.06%	0.44%	4.18%	2.19
20/02/2023	1.91%	0.98%	0.67%	0.37%	0.64%	1.48%	0.45%	2.80%	1.86%	1.56%	1.75%	1.42%	0.52%	2.20
21/02/2023	2.11%	4.09%	0.00%	0.05%	2.29%	1.36%	2.87%	4.19%	0.07%	0.60%	0.43%	2.35%	4.53%	2.18
22/02/2023	3.78%	1.72%	0.33%	0.23%	0.18%	0.37%	1.87%	1.54%	0.07%	0.34%	1.18%	1.63%	5.14%	2.20
23/02/2023	0.42%	0.52%	0.48%	0.33%	0.53%	1.08%	0.39%	2.19%	3.83%	0.34%	1.28%	2.11%	2.22%	2.20
24/02/2023	1.01%	2.13%	1.77%	1.30%	3.94%	0.41%	1.02%	7.05%	1.63%	1.06%	0.43%	0.19%	0.14%	2.19
27/02/2023	2.23%	0.53%	1.61%	0.85%	3.43%	1.24%	1.50%	1.82%	0.63%	2.23%	1.38%	0.16%	0.51%	2.18
28/02/2023	1.05%	1.35%	1.64%	1.48%	0.34%	0.22%	0.37%	0.19%	0.64%	1.03%	2.24%	1.96%	0.80%	2.20
1/3/2023	2.17%	0.59%	0.24%	0.58%	2.59%	0.15%	3.89%	1.19%	0.39%	1.00%	2.09%	2.32%	1.59%	2.23

2/3/2023	-3.94%	0.13%	0.34%	1.55%	-0.14%	0.90%	2.22%	-1.81%	-0.56%	0.63%	0.04%	3.23%	2.13%	2.23
3/3/2023	-0.92%	-2.74%	3.14%	2.06%	1.58%	0.09%	1.79%	0.15%	-1.90%	0.64%	0.48%	0.12%	-0.29%	2.20
6/3/2023	0.77%	0.43%	0.00%	1.03%	-0.94%	-0.77%	6.48%	-0.82%	0.40%	-0.80%	-0.16%	0.52%	0.43%	2.21
7/3/2023	3.23%	0.82%	1.09%	2.13%	0.97%	1.58%	-1.30%	1.46%	-1.50%	0.13%	1.00%	-0.61%	2.23%	2.19
8/3/2023	2.04%	-1.47%	0.99%	1.18%	0.56%	2.39%	0.27%	4.10%	-3.16%	0.49%	0.24%	0.23%	0.91%	2.18
9/3/2023	-0.68%	2.90%	1.21%	0.67%	-0.89%	-1.01%	-0.22%	-0.55%	0.15%	-0.15%	-0.20%	-0.06%	0.97%	2.17
10/3/2023	1.50%	1.95%	0.75%	2.95%	1.30%	0.03%	1.49%	0.06%	0.82%	-0.86%	0.47%	1.77%	0.28%	2.13
13/03/2023	-3.97%	1.23%	0.28%	0.00%	3.05%	0.99%	-0.27%	3.96%	2.12%	-0.02%	0.56%	1.82%	1.94%	2.12
14/03/2023	-3.51%	-0.84%	-0.05%	1.02%	3.77%	2.10%	-0.41%	1.49%	2.37%	-0.70%	-0.28%	-0.25%	2.37%	2.14
15/03/2023	-3.43%	1.81%	-0.93%	-0.69%	-0.29%	-0.36%	-1.66%	-1.20%	-0.53%	0.15%	-1.78%	-0.50%	-0.53%	2.15
16/03/2023	-1.59%	-0.83%	-0.42%	2.12%	-0.89%	1.99%	-0.67%	1.13%	1.65%	1.01%	-0.82%	-0.23%	-0.86%	2.16
17/03/2023	-0.35%	-0.60%	1.36%	-0.45%	-0.86%	-0.06%	2.71%	1.52%	-1.37%	-0.64%	-0.15%	-0.59%	-0.86%	2.15
20/03/2023	-0.46%	1.94%	-1.76%	1.04%	-0.48%	-0.49%	1.02%	-1.99%	2.50%	-1.28%	-0.50%	1.05%	2.28%	2.11
21/03/2023	2.58%	0.98%	0.80%	1.12%	1.61%	0.54%	26.22%	2.37%	-2.89%	1.26%	0.15%	1.92%	4.39%	2.12
22/03/2023	-0.86%	-3.58%	1.45%	2.66%	-0.02%	-4.26%	-2.94%	-0.73%	-0.23%	-2.00%	-1.69%	-1.70%	-2.08%	2.10
23/03/2023	-4.10%	-1.19%	-0.78%	-0.65%	-2.63%	-1.40%	-1.57%	-2.67%	-4.00%	-0.62%	-0.42%	-0.24%	-0.88%	2.12
24/03/2023	-5.30%	-1.23%	-0.37%	-4.52%	-0.90%	-4.35%	-0.83%	-2.39%	-1.38%	-0.98%	-0.61%	-1.16%	-0.67%	2.13
27/03/2023	-3.20%	-1.27%	-1.37%	-2.95%	-0.36%	-1.22%	-2.09%	-0.83%	-0.25%	-1.77%	-0.15%	-0.00%	-0.00%	2.12
28/03/2023	-1.44%	-2.45%	-1.25%	-2.14%	-0.36%	-0.53%	-4.70%	-1.98%	-0.71%	-0.65%	-1.42%	-1.35%	-0.07%	2.12

THE IMPACT OF AGRICULTURAL VALUE CHAIN FINANCE ON ECONOMIC GROWTH IN NIGERIA [2010-2019]

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Theophilus Adewale Onadeko[1]

ABSTRACT:
This paper studied the relationships between agricultural finance and economic growth in Nigeria and derived agricultural value chain (AVC) Gross Domestic Product (AVCGDP) through a synthesis of 2010-2019 quarterly time series data from National Bureau of Statistics (NBS) GDP on agriculture and agriculture-related activity sectors in industry, trade and services. Government recurrent expenditure on agriculture (GREA), capital expenditure to the economic sectors (GCEES), commercial bank credit to the agricultural sector (CBCA), total loans under the agricultural credit guarantee scheme fund (ACGSF) and commercial agricultural credit scheme (CACS)] were obtained from the Central Bank of Nigeria (CBN) while annual 2010-2019 employment data were obtained from the World Bank. The results showed that even though the cumulative value of AVC Finance (AVCF) was ₦6.67 trillion, real AVCGDP was underestimated by a total value of ₦48.16 trillion translating to quarterly average underestimation of ₦1.20 trillion. The pairwise AVCGDP and unemployment correlation result showed a significant positive relationship ($r = 0.813$; $p<0.05$). However, growth in AVCGDP did not translate to additional jobs as employment in agriculture declined by 15.45%. This paper concluded that AVCGDP is a broader measure of the value of outputs from all agriculture-related activity sectors compared to agricultural GDP and recommended that CBN should incentivise financial institutions to support AVC projects that have high potential for job creation while the Federal Government should implement fiscal

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policies that co-locate agro-industrial clusters around water assets where they can optimise production resources for improved value chain activities.

***Keywords**: Impact, Agricultural value chain, Agricultural finance, Economic growth, Nigeria*

INTRODUCTION

Agricultural finance is defined as funds employed and invested in the agricultural sector. It includes both private and public funds. Agricultural finance could exist in the form of loans, investment, grants and their sources may include money markets, capital markets, government and non-governmental organizations. Furthermore, according to Ndubuaku, V., Okoro, O. E., Bello, K., & Alozie, C. P. (2019), agricultural finance can be divided into the non-debt and debt categories. Agricultural finance is also the provision of multiple services dedicated to supporting both on- and off-farm agricultural activities and businesses including input provision, production, and distribution, wholesale, processing and marketing (Agriculture for Impact, 2019).

AVCF is the flow of funds to and among the various links with the AVC in terms of financial services and products and support services that flow to and/or through to address and alleviate constraints, and fulfil the needs of those involved in that chain, be it a need for finance, a need to secure sales, procure products, reduce risks and/or improve efficiency within the chain and thereby enhance its growth (African Development Bank, 2013). In this paper, AVCF refers to all financing of AVC activity sectors as defined by NBS (2019). AVCF sources include FGN recurrent expenditure, capital expenditure, agricultural loans from financial institutions and loans disbursed under the CBN. Measuring CBCA strictly as lending to agriculture activity sectors - namely crop, livestock, fisheries and forestry – implies that lending to other AVC activity sectors such as industry (manufacturing), trade and services (accommodation & food services, financial institutions, insurance and education) are technically excluded. This suggests that the monetary value of AVC activity sectors

and contribution to real GDP are understated. The broad objective of this paper is to investigate the relationships between AVCF and economic growth and make policy recommendations.

Problem Statement

Sustained and inclusive economic growth can drive progress, create decent jobs and improve living standards (United Nations Development Programme, 2019). Agriculture has traditionally been characterized as the mainstay of Nigeria's economy but with the oil boom, agriculture's contribution to Nigeria's real GDP declined from about 34% in the 1970s and 25% in 2021 just as unemployment situation continued to deteriorate, declining marginally to 3.8% in the early 2000s and then rising sharply to 13.3% as at Q1 2017 and 33.3% in Q1 2021.

Measuring CBCA strictly as lending to agriculture activity sectors - namely crop, livestock, fisheries and forestry – implies that lending to other AVC activity sectors such as industry (manufacturing), trade and services (accommodation & food services, financial institutions, insurance and education) are excluded. This suggests that the monetary value of AVC activity sectors and contribution to real GDP are understated.

Research Questions

1. What was the trend of real agricultural value chain GDP between 2010 and 2019?
2. What was the value of financing to AVC activity sectors of Nigeria between 2010 and 2019?
3. What was the relationship between AVCF and economic growth of Nigeria between 2010 and 2019?
4. What was the value of sustainable agricultural value chain investments and its contribution to employment levels in Nigeria between 2010 and 2019?

Objectives of the paper

1. Assess the trend of real agricultural value chain GDP between 2010 and 2019.
2. Compute and discuss the value of financing of AVC activity sectors of Nigeria between 2010 and 2019.
3. Determine the relationship between AVCF and economic growth of Nigeria between 2010 and 2019.
4. Estimate the value of sustainable agricultural value chain investments and its contribution to employment levels in Nigeria between 2010 and 2019.
5.

Research hypotheses

*1.*AVCF had no significant relationship with economic growth of Nigeria.
2. AVCGDP did not contribute to employment levels in Nigeria.

Unemployment

The International Labour Organization (ILO) defined an employed person as a person aged 15 years or older who is engaged in activities to produce goods and services in exchange for pay or profit, in cash or in kind, for at least one hour during a given week or having a job from which being absent under conditions on the reason of absence (holidays, sick leave, maternity leave etc) or duration. NBS however defined an employed person as a person aged 15-64 years who is engaged in activities to produce goods and services for others in exchange for pay or profit, in cash or in kind, for at least twenty hours during a given week.

Macroeconomic Policies

Policy makers have two broad classes of policies with which they influence the economy - (a) monetary policy, controlled by the Central Bank, using money supply, interest rates and open market operations (OMO); and (b) fiscal policy, controlled by the legislative and usually initiated by the executive branch of government, using taxation and government spending. As presented in table 1, to achieve low unemployment and moderate inflation, government uses expansionary and contractionary fiscal and monetary policies to expand or slow growth respectively.

Table 1: Expansionary and Contractionary Macroeconomic Policy Tools

Macroeconomic policy tools	Expansionary	Contractionary
Monetary	Increase	Decrease
Money supply	Decrease	Increase
Interest rates	Buy	Sell
OMO		
Fiscal	Decrease	Increase
Taxation	Increase	Decrease
Government spending		

Source: Desk research (2024)

LITERATURE REVIEW

Agricultural value chain finance in Nigeria

Evbuomwan, G. O, Okoye, L. U., & Eke, O. P. (2018) clasified the sources of agricultural finance in Nigeria as broadly public and private. They opined that public sources of agricultural finance include FGN's total recurrent expenditure to various sectors of the economy, and capital expenditure for economic services as proportion of GDP while private sources on the other hand include personal savings, family and friends, angel investors, venture capital, private equity, bank loans and other forms of debt capital.

FGN's capital expenditure for economic services covers agriculture, road and construction, transportation and communication and other economic services. Since 1999, the Federal Government capital expenditure allocation to economic services has assumed a haphazard movement. Though it peaked at ₦506.01 billion in 2009, constituting 43.9% of the year's total sum of ₦1.152.64, it declined to ₦261.28 billion in 2016 translating to 41.2% of the total sum of ₦634.17 expended in the year. On average, FGN allocated ₦175.20 billion to economic services between 1981 and 2016 and this constituted 40 .8% of the annual allocations of ₦429.4 (Evbuomwan et al., 2018).

CBN as at June 2017 had disbursed a total sum of ₦1.181 trillion through several AVCF intervention schemes (Central Bank of Nigeria, 2017). Despite efforts by CBN in driving a sustainable and inclusive economic growth, the level of commercial bank lending to the agricultural sector is yet uncertain as ACGSF could not achieve its intended objectives because agriculture being both labour- and capital-intensive venture required huge capital outlay (Agunuwa, et al., 2015).

The International Standard Industrial Classification is the global reference for a coherent and consistent classification structure of all economic activities based on a set of internationally agreed concepts, definitions, principles and classification rules (United Nations, 2008). Table 2 shows Nigeria's AVC activity sectors in bold (activity sectors with available disaggregated data) and in italics (activity sectors relevant to agriculture but without disaggregated data).

Table 2: Nigeria's AVC Activity Sectors **Main Sectors**	**Activity Sectors**
AGRICULTURE	**Crop Production**
	Livestock
	Forestry
	Fishing
INDUSTRY	Crude Petroleum and Natural Gas
	Coal Mining
	Metal Ores
	Quarrying and Other Minerals
	Oil Refining
	Cement
	Food, Beverage and Tobacco
	Textile, Apparel and Footwear
	Wood and Wood Products
	Pulp, Paper and Paper Products
	Chemical and Pharmaceutical Products
	Non-Metallic Products
	Plastic and Rubber products
	Electrical and Electronics
	Basic metal, Iron and Steel
	Motor vehicles & assembly
	Other Manufacturing
	Electricity, Gas, Steam & Air Conditioning Supply
	Water Supply, Waste Management & Remediation
CONSTRUCTION	Construction
TRADE	*Trade*

SERVICES	**Accommodation & Food Services**
	Road Transport
	Rail Transport& Pipelines
	Water Transport
	Air Transport
	Transport Services
	Post and Courier Services
	Telecommunications & Information Services
	Publishing
	Motion Pictures, Sound and Music production
	Broadcasting
	Arts, Entertainment & Recreation
	Financial Institutions
	Insurance
	Real Estate
	Professional, Scientific and Technical Services
	Administrative & Support Services
	Public Administration
	Education
	Human Health & Social Services
	Other Services

Source: National Bureau of Statistics (2020)

Findings from literature on AVCF and Economic Growth

The common theme is that AVCF, mostly ACGSF and commercial bank lending to the agricultural sector, has immense potential to impact growth in the agricultural sector (Obansa & Maduekwe, 2013), Agunuwa, *et al;* (2015), Olowofeso *et al;* (2017), Ajayi *et al*; (2017), Udeorah& Vincent (2018), Evbuomwan *et al*; (2018) and Ndubuaku *et al;* (2019) were unanimous in their views about ACGSF and how a sustained flows of agricultural financing enhanced by the appropriate fiscal policy environment can ensure a positive impact on the development of the agricultural sector.

The conclusions that financial intermediation had a long-run relationship with economic growth in Nigeria and the recommendation on the reduction of Cash Reserve Ratio (CRR) by Adediran *et al* (2017) are novel. The CBN Real Sector Support Facility (RSSF) under the differentiated CRR suggested a good coordination between monetary policy and academic research hence the need for more industry-focused researches.

METHODOLOGY

Descriptive statistics were used to analyse the time series data set. The values of all AVC activity sectors from NBS were synthesized as real AVCGDP. CBN time series used as source of AVCF included total commercial bank credit to the agriculture, total loans disbursed under ACGSF, total loans disbursed under CACS, FGN recurrent expenditure on agriculture and FGN capital expenditure to economic services. World Bank time series on employment levels were also employed.

RESULTS AND DISCUSSION

Table 3: Summary of Time Series Data

Variable	*Obs*	*Mean*	*Std. Dev.*	*Min*	*Max*
avcgdp	40	5,107.87	935.046	3,3710.277	6,746.037
cbca	40	15.917	28.527	-34.450	99.190
acgsf	40	2.054	0.733	0.830	3.450
cacs	40	14.491	23.653	-70.260	98.820
grea	40	10.786	3.541	5.580	21.420
gcees	40	123.415	58.413	55.150	301.260
mpr	40	11.856	2.455	6.000	14.000
fx	40	217.150	68.232	150.080	306.950

Source: Desk research (2024)

Figure 1 shows that output from agricultural industry and services, combined, grew from over ₦800 billion in Q4 2010 to over ₦1.4 trillion as at Q4 2019. This value represents the value of AVC activity sectors that were excluded in the GDP estimation.

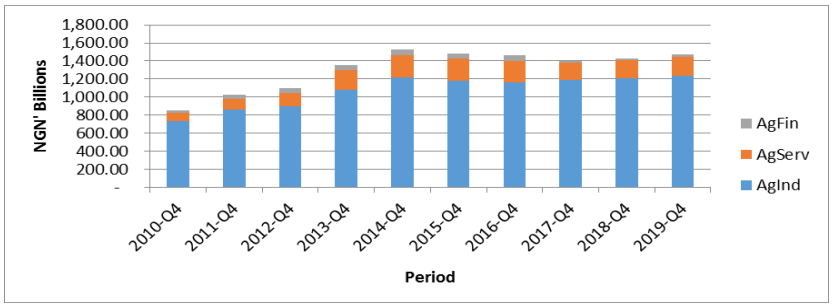

Figure 1: Agricultural Industry & Services: 2010-2019

*Source: Desk research (2024)*Figure 3 shows the GDP of agriculture compared to the GDP of agricultural value chain activity sectors during the study period. Whereas Agriculture GDP grew from ₦3.58 trillion in Q4 2010 to ₦5.09 trillion in Q4 2019, Agricultural Value Chain GDP grew from ₦4.405 trillion to ₦6.54 trillion within the referenced period. The difference represents the underestimations of the contributions of AVC activity sectors.

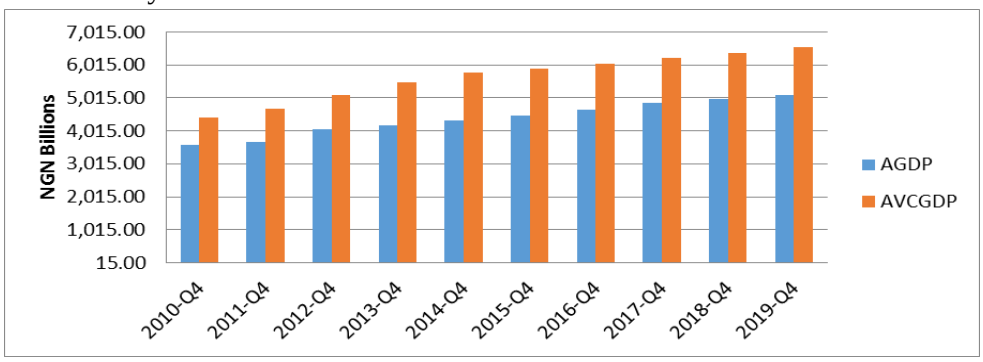

Figure 3: Agriculture and AVC GDP: 2010-2019

Source: Desk research (2024)

Figure 4 shows that agriculture quarterly average contribution to GDP was 23.89%, valued at ₦3.904 trillion, starting at 24% in Q4 2010 and closing at 26.09% in Q4 2019 while AVC activity sector quarterly average contribution to GDP was 31.27%, valued at ₦5.108 trillion, starting at 29.78% in Q4 2010 and closing at 33.48% in Q4 2019. The average quarterly underestimation of the contribution of agricultural value chain activity sector, within the study period, was 7.38% valued at ₦1.2 trillion.

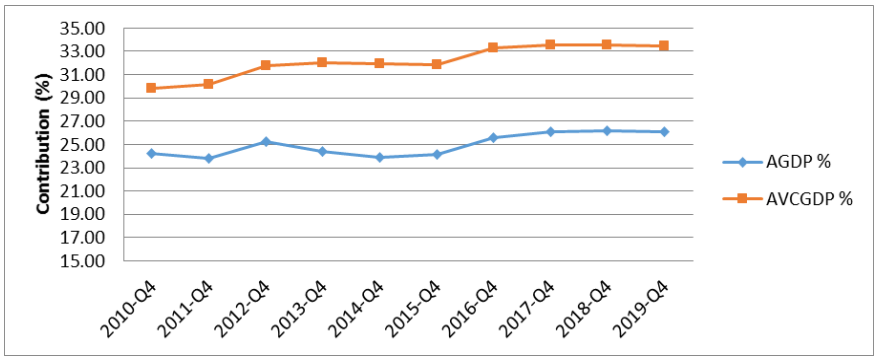

Figure 4: Agriculture and AVC contributions to GDP: 2010-2019
Source: Desk research (2024)

Figure 5 shows that total value of AVCF started from ₦494 billion in 2010 and continued to grow annually until it reached the peak of ₦1.178 trillion in 2019. Unemployment equally trended upward starting at 3.78% in 2010 and reaching the peak of 8.5% in 2019. The observed pattern of relationship between AVCF investment and unemployment is contrary to general expectation that AVC activity sectors, including agriculture, are the highest employers of labour.

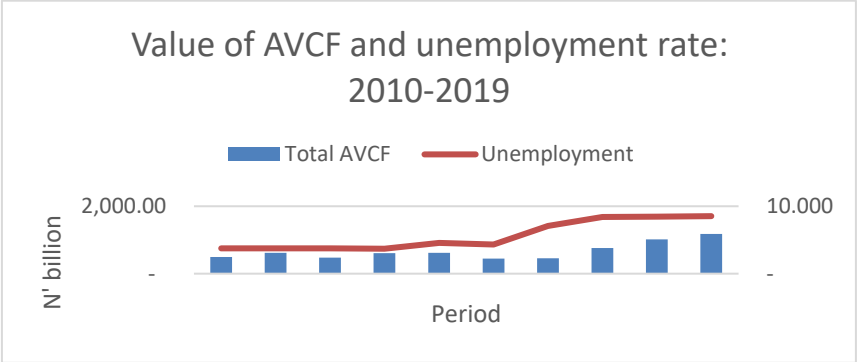

Figure 5: Value of AVCF and unemployment rate: 2010 - 2019
Source: Desk research (2024); World Bank (2019)

The argument that most AVCF investments did not create additional jobs is evidenced by Figure 6 where employment in Agriculture declined from 41.36% in 2010 to 34.97% in 2019 whereas employment in Industry grew from 10.25% in 2010 to 12% in 2019.

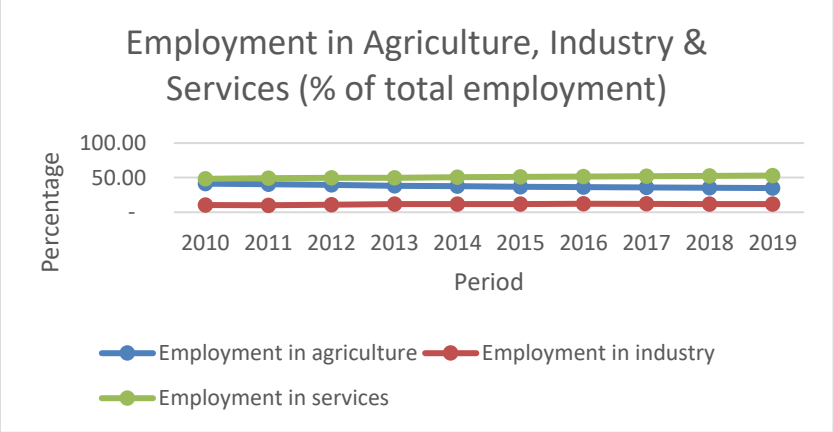

Figure 6: Employment in Agriculture, Industry & Services: 2010 - 2019
Source: World Bank (2019)

Table 4 shows the pairwise correlation output of r = 0.813 demonstrating that AVCGDP is strongly correlated to unemployment and is significant at 95% confidence level.

Table 4: Correlation Between AVCGDP on Unemployment: 2010 - 2019

	Unemployment	AVCGDP
Unemployment	1.0000	
AVCGDP	0.8130* 0.0042	1.0000

Source: Desk research (2024)

Conclusion

The difference in absolute values make AVCGDP a broader measure of the value of outputs from all agriculture-related activity sectors compared to agricultural GDP. The inability to capture the entire value created by agricultural value chains could have far reaching effects on the attractiveness of the entire sector for commercial bank financing.

The consistent growth of commercial banking credit to agriculture as a proportion of commercial banking credit to the economy to a peak of

14.86% in Q4 2014 suggests that the sector can attract more funding if the perceived risks are well managed through a value chain finance approach. The contribution of agricultural value chain activity sector to employment generation in Nigeria has not been substantiated. The increase in unemployment despite increase in value of agricultural value chain finance supports the widespread believe that the agricultural sector has not demonstrated the capacity to generate full and productive employment.

Recommendations

CBN should incentivize financial institutions to prioritize support for AVC projects that have high potential for job creations – jobs that guarantee at least 20 hours of work during a given week. For example, making irrigation a mandatory requirement will increase the number of production cycles and translate to additional hours of work which invariably helps to increase the employment count. FGN should implement focused fiscal policies that co-locate agro-industrial clusters close to water assets where they can optimise production resources.

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EFFECT OF MICRO-FINANCE CREDIT, AGRICULTURAL CREDIT GUARANTEE SCHEME FUND ON NIGERIA'S AGRICULTURAL OUTPUT

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Abstract

The agricultural sector have been plagued with inability to access funds that would improve the sector and also help the sector to be a co-joined contributor to the gross domestic product in Nigeria. In quest of this plaque, this study examines the effect of micro-finance credit and agricultural credit scheme funds on Nigeria's agricultural sector. The study employed secondary data that was sourced from the Central Bank of Nigeria Statistical Bulletin and National Bureau of Statistics. The study employed the Johansen co-integration and fully modified ordinary least square to determine the long-run relationship between the dependent variable of agricultural output and independent variables of micro-credit, Agricultural Credit Guarantee Scheme Fund (ACGSF) loans to farmers, Agricultural Credit Guarantee Scheme Fund (ACGSF) value of loans to farmers, Agricultural Credit Guarantee Scheme Fund (ACGSF) value of loans to co-operative society's, broad money supply and interest rate. The findings revealed that Agricultural Credit Guarantee Scheme Fund loans to farmers has negative significant effect on Agricultural output at (β: -0.89: $p<0.05$). Agricultural Credit Guarantee Scheme Fund value of loans

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to farmers) has a positive significant effect on Agricultural output (β: 1.01: p<0.05) Agricultural Credit Guarantee Scheme Fund value of loans to co-operative societies has negative significant effect on Agricultural output (β: -0.12: p<0.05). Interest rate has a negative significant effect on Agricultural output (β: -1.70: p<0.05). It therefore recommended that the Central Bank of Nigeria should ensure the volume and value of micro-credit given under the Agricultural Credit Guarantee Scheme Fund (ACGSF) is improved upon and also monitored so has to reap the dividend of the increase in agricultural output.

Keyword: Micro-credit, Agricultural credit guarantee scheme, Fund, Agricultural output, Nigeria
Word Count: 283

1.0 Introduction

The Agricultural Sector in Nigeria is endowed with lush grassland, lakes and forests, which helps contribute meaningfully to the overall Gross Domestic Product of the Economy (World Bank, 2017). In 2020, the agricultural sector contributed 24.65% to the country's overall GDP. The contribution of the sector to the GDP as at the second quarter of 2021 was 23.78 (National Bureau of Statistic, 2022; Fakayode, Adewunmi and Salau and Afolabi, 2009). This contribution to the GDP is relatively high compared to the contribution of the other sectors of the economy. The Agricultural Sector is also the biggest employer of labor, which helps in the reduction of employment challenges, with the sector accounting for 60% of the labor force in the country (Oguwuike, 2018).

In a country, where oil has been the major contributor to financing macroeconomic agents, inadequate financing of the agricultural sector has continually retarded the effectiveness of the agricultural sector. Opeyemi, Nwankwo & Olagunju (2021) illustrated that the micro-finance credit that has been explored by the rural farmers has not been able to help the farmers or rural dwellers to move from peasant farming to capital/large-scale farming, which would further increase the overall gross domestic product's contribution from the sector (Chukwu, Agbaeze & Efanga, 2023).

Despite, the fact that the Agricultural sector makes a pivotal contribution to job opportunities and the nation's Gross Domestic Product (GDP). The sector still experiences a massive decline in the level of output to the Nigerian economy. The decline of this sector is due to the lack of capital and inappropriate federal government. Apart from lack of capital, the agricultural sector faces challenges like climate change, low land tenure operations and degradation in the land (Obioma, Ihemeje, Ogbonna, & Amadi, 2021; Adu, 2023).

However, the federal government of Nigeria has been able to create some programs and initiatives which are micro-finance programs, to solve the capital or credit fund challenges that farmers and rural dwellers face in ensuring continuity in their agricultural productivity. The Agricultural Credit Guarantee Scheme was an initiative enacted by the Federal Government to grant micro-credit to farmers and other stakeholders like marketers and processors in the agricultural sector. This particular scheme was created in 1977, to be a funding hub to improve the agricultural sector in Nigeria (Santoso, Gan, Revindo & Massie, 2020; Al-mic and Mamum, 2022; Ahmad, Chani, and Afzal, 2018).

According to the CBN (2021) and Nwanyanwu (2011), microfinance is a developmental tool that aids in providing financial services to low-income earners at a low interest rate. Micro-finance entails the ability of financial institutions like the Agricultural Promotion Policy (APP), Agricultural Credit Support Scheme (ACSS), and Agricultural Credit Guarantee Scheme Fund (ACGSF) and NGOs to provide finance to small-scale enterprises and farmers for investment in agricultural value chain. Micro-finance schemes and credit are intervention by the government to improve the productive capacity of the vulnerable poor masses or rural dwellers towards their attainment of agricultural growth and development. The Agricultural Credit Guarantee Scheme Fund (ACGSF) is a policy intervention by the government of the state and the apex financial institution of the country to provide micro-financing to farmers and small and medium scale enterprises towards the improvement of the agricultural sector in the economy.

Other schemes are the commercial Agriculture credit scheme, FADAMA project, and Nigeria Agricultural Insurance Co-operation (NAIC). Various notable micro-lending schemes have been created to enhance credit towards the poor financial intermediation strategy that is saddled with improving socio-economic realities (Dada, Yusuf, Yusuf, Olusegun, Olatunji, & James, 2023). Adu (2023) revealed that micro-finance credit is an effective tool in poverty alleviation and improving the quality and quantity of agricultural productivity in the economy. The availability of micro-finance credit from financial institutions and government schemes like ACGSF (Agricultural Credit Guarantee Scheme Fund) helps to scale up agricultural production, adoption of modern technology, ability enable farmers to purchase modern technologies. The micro-finance credit aids give small farmers the impetus to improve their production capacity which would spur human and physical capital attainment in the economy (Adu, 2019).

1.1 Objective of the Study

This study aims to investigate how micro-finance loans and agricultural credit guarantee scheme funds impact agricultural output in Nigeria.

1.2 Research Hypothesis

H_0= Micro-finance loans, agricultural credit guarantee scheme fund has no significant impact on agricultural output in Nigeria.

2.0 Theoretical Review and Literature Review

Credit is generally recognized as a vital tool for supporting small and medium-sized enterprises and agricultural activities. It involves obtaining credit for a business or project with the commitment to repay it later. Specifically in agriculture, microcredit finance entails providing refundable loans to farmers through microcredit institutions, catering to those who are typically underserved by traditional banks (Adu, 2023).

The Cyclical Interdependency Poverty Theory, proposed by Myrdal & Sitohang (1957) suggests that when a significant portion of a society is unemployed and lacks government support, it tends to raise the poverty levels within that community. Insufficient capital resources to engage in

economic activities, negatively impacts the community, as only a small percentage of individuals contribute to taxes. This interrelation among factors contributes to an increase in poverty rates, particularly during times of economic decline.

Financial Growth Theory is the theory was proposed by Berger & Udell (2005) this depicts that the financial needs and financing avenue for small and medium scale enterprises changes as the economies of scale of the business grows due to the fact that the business become more experienced and improve in their overall profitability level. The theory also suggest that large firms rely on age/ size and information while the smaller firms depend on left end continuum indicating that the insider finance option and angel finance are the source available to them. The growth cycle model predicts that when firms increase in size and age, it will have the ability to gain access to venture capital as a source of intermediate debt. At the last stage, the growth paradigm believes organisation becomes older, more experienced and have good information that makes them transparent that allows then gain access to public equity (PE) or long-term debt.

The commercial loan hypothesis suggests that banks offer highly liquid short-term loans, primarily used for financing the movement of goods from producers to consumers. These loans are considered self-liquidating because the sales of the financed items generate funds to repay the loan. Adam Smith highlights the liquidity of these loans, as they involve movable collateral and serve specific commercial purposes. Ewubare (2018) introduced the idea of multiple lending, which predicts that in strong equity markets and after consolidation, banks are less inclined to syndicate loans. External equity, mergers, and acquisitions enhance a bank's lending capacity, reducing the necessity for diversification and control through shared lending.

Abdulaziz, Ibrahim, and Maitala (2023) conducted a study on the influence of microfinance bank credit on the performance of Nigeria's agricultural sector. They aimed to investigate the impact of microfinance bank agricultural loans, interest rates, exchange rates, and broad money

supply on the agricultural sector's contribution to the GDP. Using secondary data from 1992 to 2020 sourced from the World Bank development database and the Central Bank statistical bulletin, they employed ordinary least squares analysis. The findings revealed a positive and statistically significant correlation between agricultural GDP and agricultural microcredit. The study highlights the importance of financial intermediation in microfinance operations. However, it suggests that future research could enhance the study's robustness by examining the individual contributions of each sector to microfinance credit and other agricultural sectors in Nigeria. Additionally, it notes that relying solely on static ordinary least squares analysis may not fully capture whether microfinance credit affects the agricultural contribution to GDP in the long or short run.

Adu (2023) investigates how microfinance bank credits impact agricultural productivity in the Ado-Odo Ota Local Government area. The study aims to understand the relationship between microfinance bank credits and farmers' agricultural productivity. While profit and revenue might not be easily quantifiable measures, including brackets for profit or revenue in the questionnaire could help explain these variables better. Adu employs descriptive analysis, correlation analysis, and regression analysis in her study. The findings indicate a positive correlation between microfinance credit and farmers' profit and revenue. Additionally, the study suggests that microfinance credit accounts for 54.5% of the variation in the dependent variable. Adu's research differs from studies by Jamal, Hafeez, Shafique, Razzaq, Asif, & Ashraf, (2021) and and Mastoi, Mastoi, Khetran, Alizai, Baig, Khan, & Shah (2021) as it not only considers socio-economic factors in obtaining loans from microfinance banks but also focuses on the impact of these loans on agricultural productivity.

Ahmed and Ali (2023) conducted a study focusing on the impact of advancements in agricultural credit on the productivity of the agricultural sector in Pakistan. Their research delved into the performance of agricultural loans in the province, aiming to evaluate how agricultural financing influences farmers' productivity and income. The findings

underscored the crucial role of agricultural financing in bolstering the growth and development of Punjab's agricultural sector, as well as in enhancing farmers' productivity and income. However, the study also pinpointed challenges such as high rates of non-performing loans and limited access to financing for small-scale farmers, which hinder the effectiveness of agricultural loans in the province. The research underscores the ongoing need for concerted efforts by the government and other stakeholders to enhance the availability and accessibility of agricultural financing, thereby supporting the continued growth and development of Punjab's agricultural sector.

Bakare, Ogunleye, and Kehinde (2023) explore the relatively unexplored topic of the impact of microcredit access on the adoption of climate change adaptation strategies and rice yield improvement. Their study investigates how access to microcredit influences the adoption of such strategies and rice yield among farmers. Using a multistage sampling method, they selected 320 rice farmers for their research. Data analysis involved descriptive statistics, the Multivariate Probit regression model, the Poisson regression model with endogenous treatment, and the Endogenous Switching Regression Model. Descriptive results indicate average values for age, household size, farming experience, and farm size. Most farmers are male, married, educated, and affiliated with rice farmer associations. The majority have access to microcredit and rely on funds from other enterprises. Adoption of high-quality improved seeds is widespread among farmers. Further analysis suggests that age, education, household size, farm size, and farming experience significantly influence the choice of climate change adaptation strategies. Additionally, access to microcredit significantly impacts the intensity of adopting these strategies, while factors such as age, education, and farm size influence rice yield. The study underscores the importance of promoting policies that enhance microcredit access to support farmers in adopting climate change adaptation strategies and improving rice yield.

Caleb, Lawal, and Ahmed (2023) examined into bank credit and agricultural output in Nigeria. The study adopted the auto-regressive distributed lag and the granger causality test in determining the

relationship and impact of agricultural output growth rate on the bank credit, exchange rate and interest rate. The study was able to investigate if the bank credit rate of the deposit money banks in the economy influence the agricultural growth rate in the economy along with some financial stability measures like the exchange rate and interest rate. The findings of this study revealed that agricultural output growth rate have a negative relationship with bank credit rate and interest rate and agricultural output rate have positive relationship with exchange rate. The study is anchored on the keynesian theory. The study is quite good capturing the overall bank rate on the agricultural output in the economy, this would inform the deposit money bank to know if their intermediation tool, would improve the agricultural sector in Nigeria.

Chukwu, Agbaeze, and Efanga (2023) investigated agricultural financing and poverty alleviation in Nigeria. The subject matter of this inquiry was to examine the various agricultural credit in all developmental, financial and deposit money bank on the holistic measure and micro measure of poverty and income in the country. The dependent variables are the gross domestic product while the independent variables includes all agricultural schemes and loans to all sectors. The secondary data was sourced from CBN statistical bulletin from 1981 to 2021. The study employed the multiple regression analysis to determine the relationship between the variables. The findings reveals that government spending on the agricultural sector contributes positively but insignificantly to Nigeria's gross domestic product, while commercial bank credit, loans from the Agricultural Sector Guarantee Scheme Fund, and lending rates all have a positive and significant impact. The study is quite unique, in determining how agricultural financing in the economy influences poverty alleviation. Dada, Yusuf, Yusuf, Olusegun, Olatunji, and James (2023) conducted a study examining the impact of microcredit on the welfare of rural households in Oyo State, Nigeria. They collected primary data through semi-structured questionnaires, interviewing 150 rural household heads selected through a multi-stage sampling technique. Analysis was conducted on 134 (89.33%) of the questionnaires. The data was analyzed using descriptive statistics, Mean Per Capita Household Expenditure (MPCHE), and ordered logistic regression models. Results showed that a

majority of respondents were male, married, and literate. The mean age, household size, and years of formal education were 38.9 years, 6.22, and 9.59 years respectively. The findings highlighted that factors such as household size, years of formal education, years of experience, interest charged on the credit, time lag of credit delivery, payback period, and distance to credit source significantly influenced microcredit access in the study area.

Vora (2023) examines the impact of microfinance on the development of small-scale enterprises (SMEs) in Gujarat, focusing on its implications for SME growth in India. The study employed a simple random sampling method, involving sixty microfinance banks and 140 SMEs. It found that a considerable number of SMEs are aware of microfinance institutions (MFIs) and recognize the positive effects of MFI loans on their growth. The study suggests that in addition to providing financial assistance, MFIs should offer expert guidance to SMEs to help them assess the appropriate loan amount for their projects. Furthermore, it recommends that MFIs conduct seminars and workshops to educate SMEs about their policies, prudent money management practices, and loan evaluation criteria. To build trust and confidence among SMEs, microfinance banks should also initiate additional development initiatives.

Wanigasuriya and Ramanayake (2023) investigated the impact of microfinance on income generation in Kurungala District, focusing on its role in improving income levels within local communities through micro-credit, micro-insurance, micro-training, and micro-savings. The study considered income generation as the dependent variable, with explanatory variables including micro-credit, micro-insurance, micro-savings, and micro-training. Primary data was collected via questionnaires and interviews from microfinance beneficiaries in Kurunegala, Narammala, Kuliyaptiya, and Nikaweratiya. Results from correlation and regression analyses revealed a positive relationship between microfinance indicators and income generation. While the study lacked a theoretical framework to validate how financial intermediation within microfinance banks could enhance income generation, its unique approach of incorporating various components of microfinance contributes to its novelty.

Ighoroje and Akpokerere (2022) explored the impact of microfinance bank credit accessibility on poverty reduction in Nigeria. Their inquiry aimed to understand how microfinance bank operations influence the prospects of reducing poverty in the economy. Secondary data from the Central Bank Statistical Bulletin spanning from 2000 to 2021 was utilized. The study integrated theoretical frameworks such as the cyclical interdependency poverty theory, economic and political and social distortion poverty theory, demand-following and supply-leading hypothesis, and financial liberalization theory. GDP per capita income served as the dependent variable, while deposit and loan/advances of microfinance banks in Nigeria were the independent variables. Results indicated that microfinance bank loans and advances had a negative and insignificant impact on poverty reduction. The study noted limitations in capturing the social perspective of poverty solely through GDP per capita, and suggested including interest rates in the analysis to enhance its robustness.

Jamal, Hafeez, Shafique, Razzaq, Asif, and Ashraf (2021) investigated the impact of microcredit finance on the socioeconomic status of citizens in Punjab, considering the mediating effects of knowledge sharing and financial/legal awareness. The study aimed to understand how microcredit finance programs, knowledge sharing abilities, and financial/legal awareness influence the socioeconomic status and household income/expenditure. The study involved 325 respondents selected from both micro and non-micro participants of bank clients. Regression analysis, analysis of variance, and structural equation modeling were employed to analyze the primary data collected through structured questionnaires. Findings indicated that microcredit finance significantly contributed to transforming and improving the socioeconomic conditions of the respondents. Although the study lacked a theoretical framework, its focus on socio-economic factors and respondent participation levels makes it unique.

Mastoi, Mastoi, Khetran, Alizai, Baig, Khan and Shah (2021) investigated the impact of micro-finance on the Agricultural development in Balochistan Pakistan. This subject matter was to determine the eligbility,

education and obstacles the respondents are faced with in obtaining micro-finance loans in the selected bank, Zaria Taraquiati Bank Limited. The study employed the random sampling techniques in choosing ten respondents in the bank. The findings of the inquiry revealed that 50 percent are within the age limit of 31-40 years, 36.25% have elementary education that should help them during the loan process, 28.75% have large landholding. The study also shows that the interest rate on the loan are quite high and the formalities are quite discouraging to obtain the loans. The study is quite unique combining the quantitative and qualitative challenges that could affect the farmers in obtaining loans from the microfinance banks. The descriptive analysis of frequency and percentage was employed to determine the component of the research title. The study does not have a theoretical framework. The analysis was quite lucid and explanatory for policy recommendations.

Adebisi (2020) examined the relationship between micro finance credit and micro enterprise development in the Agricultural Sub-sector of the Nigerian Economy. The subject matter of the inquiry was to examine the agricultural credit scheme fund performance in the agricultural sector in the economy. The study employed the outreach paradigm approach which encouraged the use of simple percentage and chi-square in the economy. Using the empirical position of the Central bank of Nigeria, it reveals that Agricultural Scheme is not a stable fund to enhance the agricultural sector but have a good capacity to improve the agricultural sector activities. The study also depicts that within the operation of the agricultural scheme, the process and procedure in securing a loan should not be problematic, so as to encourage the agriculturist in the economy to get loans for their operations. The inquiry have a good conceptualization, but the usage of chi-square may not be a good technique to capture the relationship between the three construct captured in the study

3.0 Methodology

This study investigates the effect of micro-finance credit and agricultural credit scheme on Nigeria's agricultural sector. The secondary data was sourced from the Central Bank of Nigeria Statistical Bulletin, National Bureau of Statistics and World Bank Indicators between 1991-2022. The

study intends to measures micro-finance credit from deposit money bank lending to rural dwellers, loan numbers and value of micro credit by the Agricultural Credit Scheme Fund (ACGSF) to various agricultural clients of the organization as operated by the Central Bank of Nigeria. The agricultural sector was measured by the agricultural output which is the ratio of agricultural output to gross domestic product. These models was adapted and adjusted to suit the present study from the study of Olowookere et al (2021), Bangura et al (2020), Ofeimum et al (2018) and Abdulaziz et al (2020).

The linear equation is given below;

$$AGIC\_OUT_t = f(Mic\_Credit, ACGSF\_Sch) \quad \ldots\ldots 1$$

$$Mic\_Credit_t = f(Mic\_loan, ACGSF\_Ln, ACGSF\_Vn, ACGSF\_VNC, INT, BRD) \quad \ldots\ldots 2$$

$$AGIC\_OUT_t = (\alpha_0 + \beta_1 Mic\_loan_t + \beta_2 ACGSF\_Ln_t + \beta_3 ACGSF\_Vn_t + \beta_4 ACGSF\_VNCn_t + \beta_5 INT_t + \beta_6 BRD_t + \mu_t)$$

Where;

AGIC_OUT; Agricultural output at time t

Mic_Credit; Micro-finance credit at time t

ACGSF_Ln; Agricultural Credit Guarantee Scheme Fund (ACGSF) loans to farmers at time t

ACGSF_Vn; Agricultural Credit Guarantee Scheme Fund (ACGSF) value of loans to farmers at time t

ACGSF_VNC; Agricultural Credit Guarantee Scheme Fund (ACGSF) value of loans to co-operative society's time t

INT; Interest rate at time t

BRD; Broad money supply at time t

U= Disturbance term/White noise at time t

α = Intercept

$\alpha_1 - \alpha_6$ = Coefficient of the Independent Variables.

Table 1: Description of Variables

Variables	Description	Source
Independent Variables		
Mic_Credit	It is the total amount of loan issued to the agricultural sector by the microfinance banks	Central bank statistical bulletin 2022
ACGSF_Ln	It is the total amount of loans granted within a year by the central bank through the operation of the scheme	Central bank statistical bulletin 2022
ACGSF_Vn	It is the total value of loans granted within a year by the central bank through the operation of the scheme	Central bank statistical bulletin 2022
ACGSF_Vnc	It is the total value of loans granted within a year by the central bank through the operation of the scheme to the co-operative societies	Central bank statistical bulletin 2022
Dependent Variables		
AGIC_OUT	It is the percentage of the country's Gross Domestic Product contributed by the agricultural sector	Central bank statistical bulletin 2022/World Bank Indicators

Author's Compilation, 2024

4.0 Results and Discussion

Table 2: Descriptive Analysis

	MICRO_CREDIT	AGDP	ACGSF_VNC	ACGSF_VN	ACGSF_LN	BRD	INT
Mean	1.939601	3.691250	4.509249	6.199485	4.494753	1.208114	1.254382
Median	1.830836	3.875831	4.499962	6.609598	4.485892	1.181844	1.245158
Maximum	2.887828	5.500022	5.768632	7.113843	4.859270	1.544068	1.474216
Minimum	0.700072	2.090736	2.000000	4.907657	4.109207	1.000000	1.086716
Std. Dev.	0.596999	0.756442	0.810429	0.764945	0.229517	0.148651	0.072047
Skewness	-0.181211	-0.233598	-0.696162	-0.481422	-0.079451	0.527953	0.628134
Kurtosis	2.159832	2.890905	4.218146	1.655780	1.660447	2.464900	4.991235
Jarque-Bera	1.081423	0.297307	4.420657	3.531410	2.350384	1.809972	7.160000
Probability	0.582334	0.861868	0.109665	0.171066	0.308760	0.404547	0.027876
Sum	60.12762	114.4287	139.7867	192.1840	139.3374	37.45155	38.88585
Sum Sq. Dev.	10.69225	17.16616	19.70384	17.55423	1.580338	0.662916	0.155725
Observations	31	31	31	31	31	31	31

Author's Compilation, 2024 (Eview, 10)

The mean value shows the mean value of the variables. Micro-credit has a mean value of 1.93%%, a median value of 1.83%, and a Standard deviation of 0.59. AGDP has a mean value of 3.69%%, a median value of 3.87%, and a Standard deviation of 0.75. ACGSF_VNC has a mean value of 4.50%%, a median value of 4.49%, and a Standard deviation of 0.81. ACGSF_VN has a mean value of 6.19%%, a median value of 6.60%, and a Standard deviation of 0.76. ACGSF_LN has a mean value of 4.49%%, a median value of 4.48%, and a Standard deviation of 0.22. BRD has a mean value of 1.20%, a median value of 1.18%, and a Standard deviation of 0.14. INT has has a mean value of 1.25%, a median value of 1.24%, and a Standard deviation of 0.07.

The skewness in the variable includes; Micro-credit indicates a short-tailed (negative skewness) at -0.18. AGDP indicates a short-tailed (negative skewness) at -0.23. ACGSF_VNC indicates a short-tailed (negative skewness) at -0.69. ACGSF_VN indicates a short-tailed (negative skewness) at -0.48. ACGSF_LN indicates a short-tailed (negative skewness) at -0.07. BRD indicates a long-tailed (positive skewness) at 0.52. INT indicates a long-tailed (positive skewness) at 0.62.

The Kurtosis in the variable include: Micro-credit is leptokurtic at 2.15, (2.15<3), AGDP is leptokurtic at 2.89, (2.89<3), ACGSF_VNC is platykurtic at 4.21, (4.21>3), ACGSF_VN is leptokurtic at 1.65, (1.65<3), ACGSF_LN is leptokurtic at 1.66, (1.66<3), BRD is leptokurtic at 2.46, since (2.46<3) and INT is platykurtic at 4.99, (4.99>3).

4.1 Correlation Matrix

Table 3: Correlation Analysis

	MICRO_CREDIT	AGDP	ACGSF_VNC	ACGSF_VN	ACGSF_LN	BRD	INT
MICRO_CREDIT	1						
AGDP	0.7833	1					
ACGSF_VNC	0.3841	0.3218	1				
ACGSF_VN	0.7921	0.7974	0.5396	1			
ACGSF_LN	0.6933	0.6772	0.6408	0.7939	1		
BRD	-0.2938	-0.1560	0.2345	0.0269	0.2621	1	
INT	-0.5409	-0.6549	-0.1565	-0.5307	-0.3495	0.0848	1

Author's Compilation 2024 (Eview, 10)

The table above helps to show the multicollinearity among the dependent and independent. It also helps to shows the relationship between two or more independent variables so has the avoid error of variable omission. The multicollineairty of 0.90 shows indicates that variables would generate a spurious ordinary least square results. The independent variables of micro-credit, ACGSF_VNC ACGSF_VN ACGSF_LN has a positive relationship with AGDP but has a negative relationship with BRD and INT.

4.2 Unit Root Analysis

Table 4: Unit Root Analysis

Variable	Level T-Stat	Critical Value @ 5%	First Difference T-stat	Critical Value @ 5%	Prob	Order of Integration
AGDP	-1.7172	-2.9677	-9.8154	-2.9677	0.0000	I(I)
MICRO_CREDIT	-2.14935	-2.9877	-6.6582	-2.9677	0.0000	I(I)
ACGSF_VNC	-3.0623	-2.9639	----------	----------	0.0405	I(0)
ACGSF_VN	-1.7589	-2.9677	-3.0097	-2.9677	0.0458	I(I)
ACGSF_LN	-1.3110	-2.9677	-4.0520	-2.9677	0.0040	I(I)
BRD	-2.1159	-2.9718	-9.9587	-2.9677	0.0000	I(I)
INT	-3.6627	-2.9639	---------	----------	0.0102	I(0)

Author's Compilation, 2024 ((Eview, 10)

The Augumented Dickey-Fuller unit root results which aid in pre-estimation test help to give econometrics direction and analysis that would be accurate for inference drawing. ACGSF_VNC and INT are both stationary at level I(I). ACGSF_VN, ACGSF_LN, BRD and AGDP are both stationary at first difference I(0). Based on the order of integration of the variables, the Co-integration and Fully Modified Ordinary least square was used to validate the relationship and impact between the outcome variable and explanatory variable. This is adhered to so as not the go against the position of Granger 1957, in drawing inference from a faulty parameter.

4.3 Johansen Co-integration

Table 5: Johansen Co-integration Analysis

Trend assumption: Linear deterministic trend
Series: AGDP MICRO_CREDIT ACGSF_LN ACGSF_VN ACGSF_VNC INT BRD
Lags interval (in first differences): 1 to 1

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.880855	200.5999	125.6154	0.0000
At most 1 *	0.762777	138.9049	95.75366	0.0000
At most 2 *	0.709941	97.18108	69.81889	0.0001
At most 3 *	0.572662	61.28867	47.85613	0.0017
At most 4 *	0.457278	36.63347	29.79707	0.0070
At most 5 *	0.363887	18.90986	15.49471	0.0147
At most 6 *	0.181011	5.790855	3.841466	0.0161

Trace test indicates 7 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.880855	61.69494	46.23142	0.0006
At most 1 *	0.762777	41.72384	40.07757	0.0323
At most 2 *	0.709941	35.89241	33.87687	0.0284
At most 3	0.572662	24.65519	27.58434	0.1134
At most 4	0.457278	17.72361	21.13162	0.1405
At most 5	0.363887	13.11901	14.26460	0.0752
At most 6 *	0.181011	5.790855	3.841466	0.0161

Max-eigenvalue test indicates 3 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Author's Compilation, 2024 (Eview, 10)

The above table from the Trace and Max-Eigen value shows that there exists a long-run relationship between the dependent variable and the independent variable. The Trace results shows there exist a long-run relationship between the all the variables selected in the inquiry while the Max-Eigen reveals there exist a long-run relationship between three of the variables. The (FMOLS) below would help in shows the extent of the long-run relationships between the outcome variables and explanatory variables in absolute terms and magnitude.

4.4 Fully Modified Ordinary Least Square

Table 6: Fully Modified Ordinary Least Square

Dependent Variable: AGDP (Agricultural Output)				
Variables	**Coefficient**	**Std.Error**	**t-statistic**	**Prob**
MICRO_CREDIT	0.078833	0.138530	0.569071	0.5748
ACGSF_LN	-0.892627	0.344945	-2.587736	0.0165
ACGSF_VN	1.017204	0.152353	6.676619	0.0000

ACGSF_VNC	-0.123545	0.042012	-2.940724	0.0073
BRD	-0.207600	0.255103	-0.813791	0.4241
INT	-1.705500	0.453994	-3.756656	0.0010
C	4.190947	0.939238	4.462072	0.0002
R-Squared	0.894399	Mean dependent		3.74460
Adjusted R-squared	0.866851	S.D dependent		0.70757
S.E of regression	0.258191	Sum squared resi		1.53323
Long-run variance	0.019780			

Author's Compilation, 2024 (Eview, 10)

The long-run co-integration results revealed that Micro-credit has a positive insignificant effect on ($p > 0.05$) AGDP. The co-efficient further shows that a percentage increase in Micro-credit will lead to 0.07 increase in AGDP. ACGSF_LN has negative significant effect on ($p<0.05$) AGDP. The co-efficient further shows that a percentage increase in ACGSF_LN will lead to -0.89 decrease in AGDP. ACGSF_VN has a positive significant effect on ($p<0.05$) AGDP. The co-efficient further shows that a percentage increase in ACGSF_VN will lead to 1.01 increase in AGDP. ACGSF_VNC has negative significant effect on ($p<0.05$) AGDP. The co-efficient further shows that a percentage increase in ACGSF_VNC will lead to -0.12 decrease in AGDP. BRD has negative significant effect on ($p<0.05$) AGDP. The coefficient further shows that a percentage increase BRD will lead to a percentage decrease in AGDP. INT has a negative significant effect on ($p<0.05$) AGDP. The coefficient further shows that a percentage increase in INT (Interest rate) will lead to -1.70 decrease in AGDP.

The model also shows that Micro-credit, ACGSF_LN, ACGSF_VN, ACGSF_VNC, BRD, and INT was able to explain AGDP at R-square of

89.43%, if any additional variable is included the model would still explain the dependent variable at 86.68%.

5.0 Conclusion and Recommendations

The study inferences revealed that ACGSF_LN and ACGSF_VNC has negative significant effect on AGDP while ACGSF_VN has positive effect on AGDP. It implies that Central Bank of Nigeria, that is operator of the agricultural scheme and fund should continually ensure that micro-credit from that scheme are directed towards the farmers and corporative societies in the country. It means the credit given to the farmers and corporative societies through this channeled improve the overall agricultural output of the economy. It shows that fund given to farmers and corporative societies are used for agricultural means and investment in Nigeria. The number of loans given to farmers could be improved upon in various agricultural endowments of the country. INT has a negative significant effect on AGDP. It implies reasonable credit would spur investment in the agricultural sector, but a high interest rate would reduce borrowing and reduce investment in the agricultural sector of the economy. It therefore recommended that the Central Bank of Nigeria should ensure the volume and value of micro-credit given under the Agricultural Credit Guarantee Scheme Fund (ACGSF) is improved upon and also monitored so has to reap the dividend of the increase in agricultural output.

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Appendixes

YEAR	Micro_credit	AGDP	ACGSF_Ln	ACGSF_Vn	ACGSF_Vnc	INT	BRD
1989	3.47	88.26				26.80	
1990	4.22	106.63				25.50	
1991	5.01	123.24	21,206	89,031.80	6,999.30	20.01	25.90
1992	6.98	184.12	24,206	88,031.80	6,858.30	29.80	26.80
1993	10.75	295.32	15,514	80,845.80	9,048.50	18.32	18.00
1994	17.76	445.27	16,572	103,186.00	9,000.10	21.00	14.80
1995	25.28	790.14	18,079	164,162.10	19,285.80	20.18	10.10
1996	33.26	1,070.51	19,036	225,502.50	34,425.40	19.74	16.80
1997	27.94	1,211.46	17,840	242,038.20	34,379.00	13.54	15.00
1998	27.18	1,341.04	14,637	215,697.20	8,960.00	18.29	15.60
1999	31.05	1,426.97	12,859	246,082.50	42,325.50	21.32	10.00
2000	41.03	1,508.41	14,102	361,450.40	22,928.00	17.98	14.60
2001	55.85	2,015.42	20,298	728,545.40	100.00	18.29	12.20
2002	59.85	4,251.52	23,681	1,051,589.80	14,170.00	24.85	15.30
2003	62.10	4,585.93	24,303	1,164,460.40	16,230.00	20.71	15.00
2004	67.74	4,935.26	35,035	2,083,744.70	31,620.00	19.18	16.00
2005	48.56	6,032.33	46,238	3,046,738.50	38,537.30	17.95	15.00
2006	49.39	7,513.30	54,032	4,263,060.30	171,963.81	17.26	27.00
2007	149.58	8,551.98	43,233	4,425,861.84	27,751.30	16.94	24.10
2008	106.35	10,100.33	52,787	6,721,074.56	165,475.00	15.14	35.00
2009	135.70	11,625.44	53,639	8,349,509.28	586,992.00	18.99	20.80
2010	128.41	13,048.89	50,849	7,740,507.63	249,703.07	17.59	29.30
2011	255.21	14,037.83	56,328	###########	305,171.40	16.02	13.80
2012	316.36	15,816.00	48,736	9,706,761.23	267,309.50	16.79	24.60
2013	343.70	16,816.55	56,277	9,424,449.95	372,810.00	16.72	15.20
2014	478.91	18,018.61	72,322	###########	467,720.00	16.55	14.52
2015	449.31	19,636.97	69,436	###########	41,860.00	16.85	15.24
2016	525.95	21,523.51	58,548	8,104,810.63	312,700.00	16.87	10.98
2017	528.24	23,952.55	41,341	5,849,388.73	27,203.00	17.58	10.29
2018	610.15	27,371.30	30,612	4,377,626.29	49,590.00	16.72	10.48
2019	772.38	31,904.14	28,903	4,070,032.47	2,000.00	15.21	12.99
2021	132.38	316,244.14	30,267	4,321,663.85	3,210.00	12.21	15.70
2022	255.21	14,037.83	31,591	5,786,729.88	15,080.00	16.02	10.26
				8,481,574.78	57,160.00		14.92

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