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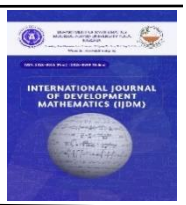

The Implication of the New CBN Cashless Economy Policy on Nigerian Banking Stocks: GARCH Models Approach

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ABSTRACT

The importance of the banking sector to any nation's economy cannot be overemphasized. An efficient banking system enhances effective resource allocation and therefore promotes economic growth. Since this sector is important to any economy, the central bank in every nation plays a leading role in formulating policies aimed at regulating and stabilizing the banking system with the ultimate aim of achieving macroeconomic stability. The Cashless policy was first introduced in Nigeria in January 2012 to ease the difficulty inherent in cash-related transactions. However, at the time the policy was introduced, deposit banks were not prepared to ensure a smooth working cashless economy system. The policy was thus suspended in August 2015 and consequently re-introduced in January 2023. This study investigated the effect of this cashless policy on Nigerian banking stocks using GARCH and tGARCH models. The study reveals that banks' stocks return was affected at the time under review by the cashless economy policy. The study further shows that it will take about a month and nine days for the conditional variance in the series to revert halfway. The convergence of the parameters based on Monte Carlo simulations indicates that both the models can capture the volatility in the stock returns, except that tGARCH seems to be skewed to the right as is expected.

1. Introduction

Over the years, technological advancement has led to the automation of tasks which were hitherto cumbersome. This means less time and effort put into these tasks will result in an equally good or even better output given a certain level of technology. The cashless economy policy is therefore one of such innovations brought about by the advancement in technology. The goal of the cashless economy policy is to reduce to the barest minimum the amount of paper currency in circulation, leading to electronic payment. This electronic payment system is aimed at providing convenient and more efficient cashless option for all sort of financial transactions which includes acquisition of shares from the stock market. This is expected to facilitate ease of doing business within all the sectors of the economy. It is also expected to reduce the need for human involvement in bank operations, and thereby likely to reduce operating expenses in terms of salaries and wages, and maximize banks' profitability.

On the 17th of April, 2012, the Central Bank of Nigeria rolled out the much-anticipated pilot phase of the Cashless Lagos Initiative. This initiative which was first mentioned in a circular in February 2011 would take off in Lagos and would be extended to other states, if successful. The CBN has defined a cashless society as one where the flow of cash in the economy is minimized and the use of electronic channels for transactions is maximized. The ultimate aim of this policy is to reduce the cost of banking services and improving the effectiveness of monetary policy. However, as at the time the policy was introduced, infrastructural requirement to ensure a smooth working of the system were lacking. The policy was thus suspended in August 2015 by Godwin Emefiele led CBN. The suspension was to allow for banks to put adequate infrastructure needed to run the policy seamlessly. Needless to mention, this policy has implications for various sectors in the economy and various variables, but our interest is in examining the implications of this policy on Nigerian Banking Stocks (Ayeni and Nwaoboli, 2023; Adigwe, 2022).

Considering the advancement in the technological infrastructure of Nigeria, especially the banking industry,

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since the suspension of the policy in 2015, the policy was thus re-introduced in 2019. The CBN Governor, Godwin Emefiele announced the full implementation of the Cashless policy effective, January 9, 2023. However, following systemic and human difficulties encountered an extension until February 10, 2023was again authorized. But even with the extension, Nigerian business sector had some set back contrary to the goal of the cashless policy, as the new notes could not be accessed while the old bank notes were withdrawn from circulation. Nigerians witnessed long queue for cash at banks, point of sales, Point of Sale (POS)machines and automated teller machine, Automated Teller Machine (ATM). Some could not afford to pay for their daily needs while other went into trade by barter. This resulted to difficulty in buying and selling and in some instance, there were cut in the market prices, especially for local food produce and other consumables. The resultant effect may affect the instability of stocks prices. This study seeks to appraise the implication of the noble goal of the CBN new cashless economy policy on banking stocks in Nigeria.

2. Review of Related Literature

Driving development and modernization of our payment system is one of the benefits of cashless economy policy (Uchechukwu, Kanu, Douglas, Christopher and Chinyere, 2014). Cashless policy can increase the level of conveniences of the consumer in terms of access to banking services and reduced risk of cash movement to the barest minimum. Akhalumeh and Ohiokha (2012) examined Nigerian first intended cashless policy by assessing its feasibility vis-à-vis: timeliness and preparedness considering nation's level of technological development. The citizens allay their fears regarding tendency for cyber fraud and illiteracy as major challenges to the successful implementation of cashless economy policy. Otitoju, Dirisu, Ojokojo and Abdul (2023) reviewed some of the benefits and drawbacks of the cashless economy policy introduced by the CBN on a theoretical basis. However, the policy made life difficult and unbearable for most general population during the implementation period, they concluded that the implementation timeline was ill-advised. The policy was reported to adversely affected Nigerian economy. In the first quarter, Q1 2023,the economy for instance witnessed a decline in gross domestic product (GDP) in comparison to the first quarter, Q1 of 2022 and fourth quarter, Q4 of 2023, with the values of 3.52%, 3.11%and 2.31% reported forQ1, 2022,Q4, 2023 andQ1, 2023 respectively (Kareem, 2023).

In the area of stocks, Chondough (2021) used vector error correction model to appraise the impact of the CBN cashless economy policy on commercial banks performance, particularly, the policy's effect on ATM, POS and web-based transaction on earnings per share. It was concluded that the cashless policy has long-run effect on the earnings per share of the banking sector. Akara and Asekome (2018) based on result from a multiple regression model attest to strong relationship between the profitability recorded by the commercial banks and the cashless economy policy adopted. And the relationship between profitability in the banking sector and market share is positive in other climes around the world (Genchev, 2012), although not yet established in the Nigerian case. This then implies a positive relationship between cashless economy policy and stocks returns in the banking sector.

The resultant cash crunch at the time of implementation in 2023 affected oil and gas sales across the country negative. Many retailing stations across the country were reported to have refused online payments through POS or bank transfers. This has the tendency to affect energy supply for several aspects of the economy and consequently, retardation in business activities and profitability. Many other businesses across multiple sectors of the country were said to have suffered losses not only in profits but also in capital because of cash scarcity due to the cashless policy, among these are breweries, food and beverage and transport companies are some of the affected businesses (Monye, 2024). In February, 2023, Nigerian Breweries for instance recorded sales less than any other February in a period of about fifteen years. United Africa Company that operates in the food and beverage adversely affected too. Although, the impact of this cashless economy policy on the profitability of several business organizations has been adequately investigated, the extent of this impact on the stock is not given consideration yet

The GARCH models are considered as viable tool for capturing the volatility in stock market. Lim and Sek (2013) for instance investigated the volatility of the stock market before, during and after 1997Malaysian crisis using GARCH family of models. This study therefore investigates the effect of the new cashless policy on the stock market of Nigerian banking sector, using GARCH with normal innovation and GARCH with student-t error structure.

3. Methodology

3.1 Source of data

The data (Daily Stock Prices for Nigerian banking sector) for this study was sourced from ***ng.investing.com*** for the period of January, 2018 – June, 2023.

3.2 The models

Preliminary investigation reveals that the data is leptokurtic and skewed to the right with the coefficient of kurtosis and skewness, 4.28 and 0.62 (see Table 1) respectively. Hence, a GARCH model with skewed (student-t) error and a normal innovation error GARCH model are suggested by the data. The $GARCH(p,q)$ model is given as:

$$a_t = \sigma_t \varepsilon_t, \qquad \sigma_t^2 = \alpha_0 + \sum_{i=1}^{p} \alpha_i a_{t-i}^2 + \sum_{j=1}^{p} \beta_j \sigma_{t-j}^2 \tag{1}$$

where $a_t = r_t - \mu_t$

$\varepsilon_t \sim N(0,1)$,

α_i and $\beta_j$are the parameters of the ARCH and the GARCH models respectively,

$\alpha_0 > 0, \alpha_i \geq 0, \beta_j \geq 0$, and for the stability of the GARCH model, $\sum_{i=1}^{\max(p,q)} (\alpha_i + \beta_j) < 1$ (Tsay, 2005).

In general, the GARCH model is popular in modelling financial returns. The threshold GARCH (tGARCH) model is capable to handle inherent volatility in financial time series. The $tGARCH(p,q)$ model is specified by:

$$\sigma_t^2 = \alpha_0 + \sum_{i=1}^{q} (\alpha_0 + \gamma_i N_{t-i}) a_{t-i}^2 + \sum_{j=1}^{p} \beta_j \sigma_{t-j}^2 \tag{2}$$

The parameters$\alpha_i, \gamma_i, and\ \beta_j$are non-negative and$N_{t-i}$is an indicator variable for a_{t-i},

$$N_{t-i} = \begin{cases} 1\ if\ a_{t-i} < 0, \\ 0\ if\ a_{t-i} \geq 0, \end{cases}$$

The first-order TGARCH for $p = q = 1$,$tGARCH(1,1)$ model is:

$$\sigma_t^2 = \omega + (\alpha + \gamma N_{t-1}) a_{t-1}^2 + \beta \sigma_{t-1}^2 \tag{3}$$

(Tsay, 2005; Kuhe, 2018; Ahmed et. al, 2018).

3.3Model Selection

The performance metric for assessing the models is the likelihood ratio test, standard error as well as the Aikaike Information Criteria (AIC). The likelihood ratio test is designed to compare the performance of the restricted and unrestricted model. Assuming the restricted model, GARCH(1,1) nested into tGARCH(1,1) is labeled ω and the unrestricted τ, by definition,

$$logL_\omega \leq logL_\tau \tag{4}$$

The test is specified as:

$$LR = 2(logL_\tau \leq logL_\omega) \sim \chi_\upsilon^2 \tag{5}$$

Doubling the difference between the models, unrestricted and restricted, is a chi-square random variate with υ degrees of freedom, where υ is the number of restrictions. In this case, $\upsilon = 1$, the number of parameters excluded in the *restricted* model. The standard error and AIC were based on equations (6) and (7),

$$s^2 = \sum_{i=1}^{n} (y_i - \hat{\theta} x_i)^2 / \nu \tag{6}$$

$$AIC = -2\ln(L) + 2k$$

Where ν is the degrees of freedom and k is the number of parameters.

4. Results and Discussions

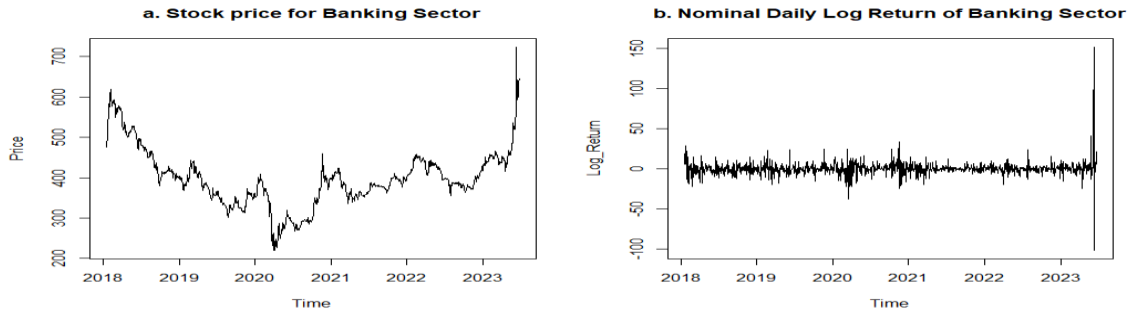
The descriptive statistics of various stocks used in this study are presented in Table 1 below.

Table 1: Descriptive Statistics of Stock Price

Statistic	Banking
Min.	219.90
Max.	723.70
Mean	396.90
Skewness	0.62
Kurtosis	4.28

Table 1 clearly indicates that stock series for the banking sector is non-normal with the value of kurtosis greater than three (3). The series is leptokurtic in nature, most likely, student-t disturbances will be appropriate. The coefficient of skewness is a testament to the fact that the data is right-skewed. The average stock price for the period

considered is three hundred and ninety-six Naira, ninety kobo (₦396.90), while the maximum and minimum price are seven hundred and twenty-three Naira, seventy kobo (₦723.70) and two hundred and nineteen Naira, ninety kobo (₦219.90) respectively. The following is the time plot of the series.



(a) **(b)**

Figure 1: Time series plot (a) and log return plot of the banking sector stock return

Figure 1(a)above shows the time series plot of stock prices of the banking sector for the period considered in this study at level. It is evident from the plot that the series seems non-stationary. Worth of notice from the time plot is the adverse effect of COVID-19 on the stock price. There was a sharp decline in the late part 2022 and the beginning of 2023, owing possibly to the adoption of the new cashless economy policy.
The log of the returns (Figure 1(b)) for the stocks is statistically stationary based on Argument Dickey Fuller (ADF) test statistic, shown in Table 2, the P-value for the test statistic is 0.0000. The finding as suggested by AIC shows that single order (i.e. $p = q = 1$) is adequate to fit the data to GARCH model as shown in Table 3: GARCH (1,1) with two different error structures, namely normally distributed and student t-distribution error.

Table 2: Stationarity test results

Variable	Level of test	Number of lags	Test statistic (ADF Test)	Critical value 5%	P-value	Remark
Banking	No difference	0	-27.631	-3.410	0.0000	Stationary

Table 3: Estimated coefficients for bank stock return

Model	Parameter	Coefficient	Std. Error	P-value
GARCH	Omega	2.50	0.44	0.00
	Alpha	0.25	0.03	0.00
	beta	0.73	0.03	0.00
tGARCH	Omega	2.99	1.03	0.00
	Alpha	0.29	0.06	0.00
	Beta	0.71	0.06	0.00
	shape	3.08	0.25	0.00

From Table 3 above, it is clear that all the parameters of the two models are all significant based on the P-value, including the shape parameter for tGARCH model. This suggests that, adequacy of model with skewed error for the data. Although, the values of the standard error are in favour of the normally distributed error model, results from the likelihood ratio test (chi-square critical value is 3.84, test statistic is -321.09, and P-value: 0.00) indicates that there is not enough statistical evidence to reject that the two models perform similarly. The Jarque Bera normality test of the residuals is P-value < 2.2e-16 for GARCH(1,1) and tGARCH(1,1) respectively. The Half-life for our GARCH(1,1) is 39.02 time periods. Indicating that will take about a month and nine days for the conditional variance to revert back halfway or for the shock to die out.
Using the fitted model, we simulated 1000 series from both GARCH(1,1) and tGARCH(1,1). The student-t error model is seen to be more volatile and skewed to the right. Figure 2 is the volatility plot of the simulated series.

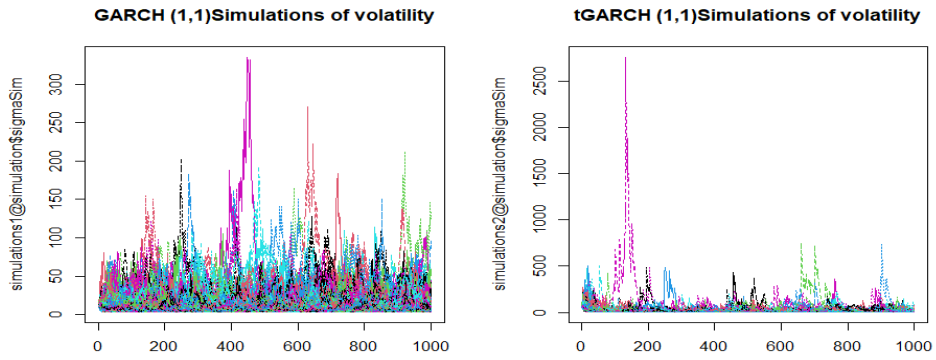


Figure 2: Simulation of Volatility for GARCH(1,1) and tGARCH(1,1)

The normal innovation considered for GARCH(1,1) is clearly reflected in Figure 2. The convergence of the parameters of the two models was also investigated through Monte Carlo simulations. Figure 3 is the density plot of the parameters.

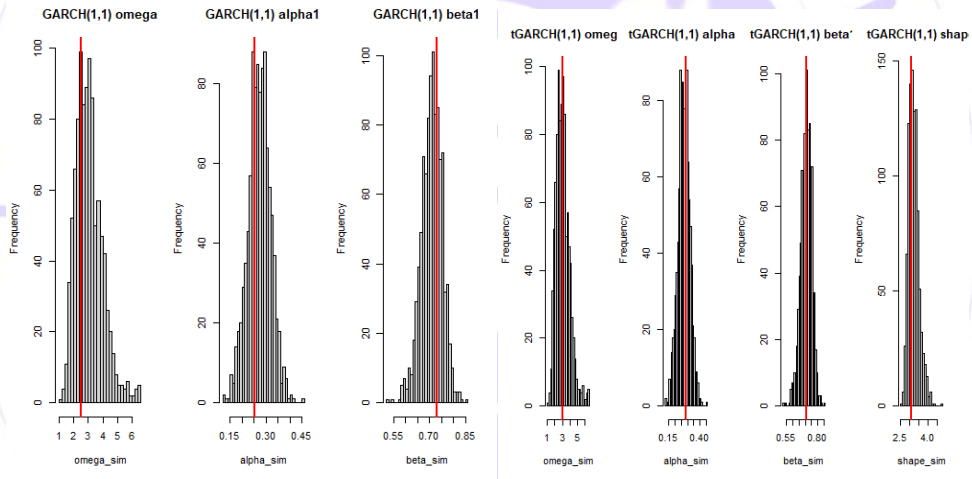


Figure 3: Distribution of the Simulated Parameters around the True Values

The long vertical line added is the estimated parameters from the two GARCH models. The figure shows convergence of the parameters to their true values.

5. Conclusion and Recommendation

The study investigated the effect of the new cashless policy on the Nigerian banking sector; particularly, its stock market. The result shows that, the introduction of the new cashless policy had a significant impact on the stock returns as indicated by the preliminary investigation of the series plot as well as the parameters of the models. Furthermore, comparison between GARCH and tGARCH shows that both of the models can capture the volatility in the stock returns, except that tGARCH seems to be skewed as is expected.

The study recommends that for better implementation of the policy, the government should:

i. Implement the cashless policy gradually, allowing citizens and businesses time to adapt to the changes. Also, cash options alongside digital transactions must be maintained during the transition phase to avoid disrupting daily transactions

ii. Robust Technological infrastructures must be made available and reliable in both urban and rural areas to support digital transactions.

iii. Expand access to banking services and ensure the availability of ATMs and point-of-sale (POS) devices across regions.

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