REVIEW OF DEVELOPMENTS IN BANKING AND FINANCE IN THE FIRST AND SECOND QUARTERS OF 2016.

1.0 INTRODUCTION

The banking sector recorded a number of developments during the first and second quarters of 2016. Some of these developments were bye-products of the Central Bank of Nigeria (CBN) Monetary Policy Committee meetings.

2.0 CBN Monetary Policy Committee Meetings

The CBN Monetary Policy Committee (MPC) met on March 21 and 22 and also on May 23 and 24, 2016 to review the economic conditions and challenges confronting the Nigeria economy, against the backdrop of slowing global growth and a weakening domestic economic environment largely attributable to the down turn in oil prices and disruptions in oil production.

3.0 International Economic Developments

During the period under review, global output continued to decline as a result of the weak fundamentals in both advanced and emerging economies, highlighted by volatility in global financial markets, slow global trade and soft commodity prices. Global output was estimated at 3.2% for 2016, 0.1% higher than the corresponding period in 2015. Key impediments to growth in the advanced economies included low consumer spending and vulnerabilities in the financial market despite mild oil price recovery in April 2016.

The European Central Bank (ECB) at its April 21, 2016 meeting maintained its soft monetary policy by keeping its refinancing rate at 0.0% and deposit rate at 0.4%. The Bank also moved inflation towards its long term objective of 2.0%. It

was noted that the key impediments to growth in the advanced economies included unfavourable labour market conditions, suppressed foreign demand and weaker than anticipated domestic aggregate demand.

Growth in the U.S. slowed to 0.5% in the first quarter of 2016 as a result of slowdown in government spending and private consumption, a stronger dollar which harmed exports and contraction in energy businesses.

The Bank of England continued its £375 billion ($543.75 billion) monthly asset purchase program, retained its policy rate at 0.5% with the hope of achieving its desired long run inflation rate of 2%.

Japan's recovery remained fragile despite the policy stimulus by the Bank of Japan. The Bank's asset purchase programme which injects ¥6.7 trillion (US$56.71 billion) monthly into the economy has started losing its desired effect. Growth is projected at 0.5% in 2016.

For the Emerging Markets and Developing Economies (EMDEs), external and domestic challenges have persisted, stemming from rising cost of funds, geopolitical factors and adverse commodity prices. The International Monetary Fund (IMF) has downgraded the 2016 growth forecast from 4.3% to 4.1%.

4.0 Domestic Economy and Financial Developments

On the domestic scene, output continued to decline due to energy shortages and price hikes, scarcity of foreign exchange and depressed consumer demand, among others. The delay in the passage of the budget, denied the economy of the complementary fiscal policy to stimulate economic activity.

The real GDP fell by 2.47% in the first quarter of 2016 to -0.36%, representing the first negative growth in many years. Aggregate output contracted in almost all sectors of the economy, with the non-oil sector declining by about 0.18% in Q1 2016, compared with 3.14% expansion in the preceding quarter. Only

agriculture and trade grew by 0.68% and 0.40%, respectively, while Industry, Construction and Services recorded negative growth of -0.93, -0.26 and -0.08 percentage points, respectively.

5.0 INFLATION

There had been notable increase in year-on-year headline inflation to 13.7 and 15.6% in April and May 2016, respectively. The inflation rate in May 2016 represented the highest point in over six years. The increase in headline inflation was mainly as a result of an approximate 67% increase in the price of petrol. Food inflation rose to 13.19 and 14.86% in April and May respectively while Core inflation rose sharply to 13.35 and 15.05% in April and May respectively. The core factors responsible for rising inflation were low oil prices coupled with disruptions in oil production reducing our foreign exchange earnings. Adding to these are high electricity tariffs, lack of coordination of fiscal and monetary policies, low industrial and food outputs as well as high transport cost.

6.0 MONEY SUPPLY

Broad Money Supply (M2) grew by 1.26% from March to April, 2016 and contracted by 0.03% from April to May 2016. It however increased from 3.46% in May to 8.26% in June 2016, indicating a 4.80 percentage points increase. When annualized, M2 grew by 16.52% in June 2016, against the provisional growth benchmark of 10.98% for 2016.

Net domestic credit (NDC) grew by 12.58% in June 2016, which annualized to a growth rate of 25.04%. The growth rate of NDC was above the provisional benchmark of 17.94% for 2016 mainly due to significant growth in credit to the government of 35.97% for the month. Credit to the private sector grew by 14.45% in June 2016, which annualized to a growth of 28.90%, below the benchmark growth of 13.28% for the year.

7.0 CAPITAL MARKET

The Nigerian Stock Exchange All Share Index (ASI) fell to 25,062.41 in April 2016 from 25,306.22 in March 2016 and rose to 27,663.16 in May 2016 and increased further to 29,597.79 in June 2016.

The market behaviour can be attributed to the recent MPC decision to allow for more flexibility in the foreign exchange market and introducing a floating exchange regime. The improved investor sentiment led to bullish behaviour as the market rebounded in anticipation of the new floating currency regime. Also adding to the bullish behaviour was anticipation of the implementation of the 2016 budget as well as removal of the fuel subsidy. Moving forward, a possible rate hike in the United States and the BREXIT referendum will have its impact on the market.

The NSE Market Capitalization declined by 2.9% in February 2016 from ₦8.55 trillion in January 2016 to ₦8.31 trillion, possibly due to the reduced Foreign Direct Investment (FDI) and disparity between the official and the autonomous market rates. The market capitalization rose by 6.3% in March 2016 while it declined by 2.8% as at April 26 2016, probably due to excess liquidity in the system, inflows of treasury bills, disparity in exchange rate between the official and autonomous market and expansionary monetary policy measures put in place by the CBN.

The NSE Market Capitalization declined slightly between March and April 2016 from ₦8.704 trillion to ₦8.621 trillion. It however increased in May to ₦9.5 trillion and rose further in June to N10.17 trillion, all possibly due to the factors stated above.

8.0 EXCHANGE RATE

Following the adoption of new forex policy and introduction of the single market structure where the exchange rate would be market driven, the rate of exchange of the Naira/Dollar was set at N280/$ on June 21, 2016. The key elements of the policy included:

- The CBN shall operate a single market structure through the autonomous/ interbank market i.e. the Inter-Bank Foreign Exchange Market with the CBN participating in the FX market through interventions; either directly in the inter-bank market or through dynamic secondary market intervention mechanisms.
- To promote the global competitiveness of the market, the inter-bank FX market will be supported by the introduction of additional risk management products offered by the CBN and Authorized Dealers to further deepen the FX market, boost liquidity and promote financial security in the market.
- Furthermore, to improve the dynamics of the market, the CBN introduced the FX Primary Dealers (FXPDs). These shall be registered Authorized Dealers designated to deal with the CBN on large trade sizes on a two-way quote basis. The FXPDs shall operate with other Authorized Dealers (non-FXPDs) in the inter-bank market

These measures are aimed at facilitating a liquid and transparent foreign exchange market, stabilize the foreign exchange market, promoting global competitiveness of the market, curtailing speculative behaviour in the market, improving international trade and the Balance of Payment Position, and curtailing inflation.

9.0 FOREIGN RESERVE MANAGEMENT

Gross official reserves decreased during the period under review from US$28.16 billion as at 29th January, 2016 to US$26.4 billion as at June 30, 2016, representing a decrease of 6.67%. The depletion of the reserves from April 2016 till date signalled the urgent need for the overhaul of the forex policy as well as other initiatives to safe guard the reserves.

10.0 NIGERIA AND CHINA CURRENCY SWAP

The visit of President Muhammadu Buhari to the People's Republic of China between April11 – 15th 2016 resulted in the signing of a currency swap deal between the Industrial and Commercial Bank of China Ltd and the Central Bank of Nigeria. Little details emerged about the specifics of the deal, and only speculations can be made about its potential implications. A currency swap between Nigeria and China would mean that Nigerian traders who import mainly from China could conclude their transactions in the Yuan instead of a third currency such as US dollar, pound sterling, and euro. Currency swaps are usually for a pre-determined time period usually three (3) years.

A potential currency swap between Nigeria and China exists because of the significant level of bi-lateral trade between the two countries. The likely implications of the proposed deal includes the following:

i. In the short-term, it would ease the liquidity strain on the US dollar. A large portion of Nigeria's import is from China, however, this huge import bill is paid for in dollars. Due to the paucity of dollar reserves, imports had reduced with its own attendant consequences which included, rising inflation; loss of manufacturing jobs; scarcity of products in the market etc. A potential deal where imports could be purchased in Yuan would ease the strain on the demand for dollar and increase the value of the domestic currency.

ii. An official Naira/Yuan exchange rate had not been determined which means a cross exchange rate with the dollar would be used for trade between Nigeria and China. As the Naira was currently overvalued compared to the dollar, it potentially means the income Nigeria derives from exports to China would be reduced, implying that China would purchase Nigeria's crude oil and other exports for a cheaper price.

iii. For the banking sector, a currency swap would diversify the foreign currency portfolio of banks, thereby reducing foreign exchange rate risk. Regulators would have to monitor more keenly the Foreign Exchange risks banks are expose to.

iv. As part of the deal, the Federal Ministry of Finance is currently working on issuing Yuan Panda bonds to raise revenue to fund the budget. The NDIC could look into the possibility of investing part of its Deposit Insurance Fund (DIF) in panda bonds when floated to increase its operating income and further diversify its portfolio.

In the short-run, the currency swap appears to be a potential solution for the foreign exchange liquidity crisis, however, if the balance of trade does not even out, the currency swap would hurt Nigeria's economy and be more beneficial to China.

11.0 CBN CIRCULARS

11.1 INTRODUCTION OF NEGOTIABLE CURRENT ACCOUNT MAINTENANCE FEE NOT EXCEEDING ₦1/MILLE

The CBN in a circular referenced FPR/DIR/GEN/CIR/01/003 dated 20th January, 2016 introduced Current Account Maintenance Fee not exceeding ₦1 per mille in respect of all customer induced debit transactions due to the phasing out of the Commission on Turnover (COT) charges effective from January 2016.

11.2 REFUND OF MANDATORY CAUTION DEPOSIT ON BUREAU DE CHANGE (BDC)

In a circular referenced FPR/DIR/GEN/CIR/01/004 dated 22nd January, 2016, the CBN, due to the recent development in the operations of BDCs in the economy decided as follows:

- Refund of Mandatory Caution Deposit of ₦35 million to all BDC operators.
- Retention of ₦1 million licensing fee.

Therefore, all eligible BDCs were advised to apply for a refund of their caution deposits.

11.3 EXTENSION OF BVN FOR NIGERIAN BANKS' CUSTOMERS IN DIASPORA

The CBN in a circular referenced BPS/DIR/GEN/CIR/03/001 dated 4th February, 2016 extended the deadline for the registration and linkage of BVN to accounts of Nigerian Banks' Customers in diaspora to 30th June, 2016.

The CBN had initially set the deadline for January 31, 2016 but had to extend it when it observed that the low percentage of registration was as a result of lack of accessibility and availability of registration centres in some cities where Nigerians reside abroad.

11.4 CLARIFICATION ON ACCOUNTS WITH BVN RELATED ISSUES

The CBN in a circular referenced BPS/DIR/GEN/CIR/16/003 dated 24th February 2016, made clarifications on accounts with BVN related issues such as customers who could not link their accounts due to discrepancies between the records on database and the records on the core banking applications of the DMBs.

In that regard, the CBN had directed that issues such as; Correction of date of birth on BVN record should be allowed once, with supporting documents,

evidencing the correct date of birth; Customer's name on the BVN database should be the same in all his/her accounts across the banking industry and where the bank raises suspicion on the activity of its customer, Suspicious Transaction Report should be filed with the Nigeria Financial Intelligence Unit.

11.5 EXPOSURE DRAFT ON THE GUIDE TO CHARGES FOR BANKS AND OTHER FINANCIAL INSTITUTIONS IN NIGERIA

The CBN issued a circular referenced FPR/DIR/CIR/GEN/01/005 dated March 11, 2016 to all Banks and Other Financial Institutions in respect to exposure draft on the guide to bank charges which came into effect on April 1, 2013.

The CBN had commenced the review of the extant Guide to bank charges which was in line with the philosophy of periodically ensuring that the provisions of the Guide is in line with current realities as well as addressing complaints from consumers of financial services.

11.6 CBN DIRECTIVE ON REPORTING OF ILLEGAL CHARGES BY BANKS

The CBN had asked customers of banks to report any excessive and illegal charges by their banks to it.

The CBN's Revised Guide to Bank Charges clearly specifies allowable charges for all banking services and the CBN does not in any way condone the fleecing of banking customers under any pretence.

In that regard, banks' customers have been advised to always forward their complaints to the Consumer Protection Department of the CBN.

11.7 EXPOSURE DRAFT GUIDELINES ON THE REGULATION AND SUPERVISION OF NON INTEREST MICROFINANCE IN NIGERIA

In a circular referenced FPR/DIR/GEN/CIR/01/007 and dated May 11, 2016, the CBN released the Guidelines for the regulation and supervision of Non-Interest Micro Finance Banks (NIMFBs) in Nigeria for comments and inputs. This is in

response to several enquiries from persons seeking to establish Non-Interest Micro Finance Banks as well as to encourage the development of the microfinance subsector towards financial deepening.

11.8 REVISED GUIDELINES FOR OPERATION OF THE NIGERIAN INTER-BANK FOREIGN EXCHANGE MARKET

The CBN had released the Guidelines for the operation of the Nigerian Inter-Bank forex market dated 15th June, 2016. The Guidelines unveiled a new flexible foreign exchange regime that would be determined by market forces. That is part of measures being explored by the CBN in response to the current declining value of the Naira against foreign currencies and the attendant effect on the foreign exchange reserve position, inflationary pressures and the economy. The guideline also is expected to end speculation in the forex market.

11.9 REVISED GUIDELINES ON TRANSACTION SWITCHING IN NIGERIA

In a circular referenced BPS/DIR/GEN/CIR/011 dated 3rd May, 2016, the CBN issued the following Guidelines on Transactions Switching in Nigeria. The Guidelines was served to supersede the previous Guidelines on Transaction Switching Services and the Operational Rules and Regulations for the Nigeria Central Switch (NCS).

The Guidelines set out the procedures for the operation of switching services in Nigeria, including the rights and obligations of the parties to the switching contract. It also compels the switching companies to meet with minimum standards for switching, as approved by the CBN.

11.10 GUIDELINES ON OPERATIONS OF ELECTRONIC PAYMENT CHANNELS IN NIGERIA

In a circular referenced BPS/DIR/GEN/CIR/012 and dated 3rd May, 2016, the CBN issued a revised set of Guidelines on Operations of Electronic Payment

Channels in Nigeria. The Guidelines supersede the previous Standards and Guidelines on ATM Operations in Nigeria and Guidelines on PoS Card Acceptance Services, issued by the CBN. The Guidelines seeks to increase financial inclusion as well as the development of cashless policy initiative.

FINANCIAL CONDITION AND PERFORMANCE OF INSURED DEPOSIT MONEY BANKS (DMBS) IN THE FIRST AND SECOND QUARTERS OF 2016

BY

RESEARCH POLICY & INTERNATIONAL RELATIONS AND INSURANCE AND SURVELLANCE DEPARTMENTS

1.0 INTRODUCTION

A review of the two quarters under review showed a diverse performance in most of the indices in the banking industry. This was not unrelated to the down-turn being experienced in the general economy resulting from falling oil prices, foreign exchange shortages, declining GDP growth rate and rising inflation among others. The impact of these was evident in the quality of risk assets, quantum of earnings, and credit as well as deposit base of the banking industry in the period under review.

The first quarter of 2016 showed a net increase in the banking industry Total Assets by 1.31%, from ₦26.96 trillion in December 2015 to ₦27.32 trillion in March 2016. However, the period witnessed a mixed performance of asset changes as some appreciated while others declined. Loans and Advances to customers, which constituted 43.65% of the Total Assets decreased by 1.58% from ₦12.11 trillion as at December 31, 2015, to ₦11.92 trillion as at 31st March, 2016. Similarly, Loans and Advances to banks which accounted for 1.57% of the industry Total Assets decreased by 9.80% from ₦476.83 billion in December 2015 to ₦430.09 billion as at March 2016**.** The quality of these assets deteriorated during the period under review as the ratio of impaired Credits to Total Credits increased from 4.87% in December 2015 to 9.49% as at March 2016.

Similarly, in the second quarter of 2016, Total Assets of the industry recorded a growth of ₦2.668 trillion or 9.77% from ₦27.32 trillion in March 2016 to ₦29.99 trillion as at June 30, 2016. Loans and Advances to customers, which constituted 47.09% of the Total Assets increased by ₦2.19 trillion or 18.43% from ₦11.92 trillion as at March 31, 2016 to ₦14.12 trillion as at 30th June, 2016.

The profitability of the banking industry showed an upward movement during the two quarters under review. Profit-Before-Tax of the banking industry increased from ₦113.82 billion to ₦130.48 billion between December 2015 and March 2016. Similarly, there was an increase of about 49.18% in the Profit before Tax between March and June 2016, as it stood at ₦194.65 billion as against the ₦130.48 billion reported for the quarter-ended March 2016

The banking industry Capital to Risk Weighted Assets Ratio (CAR) declined marginally from 17.66% as at 31st December 2015 to 16.56% as at March 2016. Also, in the second quarter of 2016, the CAR declined from 16.56% as at 31st March, 2016 to 14.74% as at 30th June 2016. However despite the decline in this index in the two quarters under review, the industry CAR were still above the prudential requirement of 10%. On the other hand, the Average Liquidity Ratio (ALR) for the industry improved from 58.18% in December 2015 to 64.02% as at March 2016 but depreciated to 55.97% in June 2016.

The rest of the paper comprises of three sections. Section two presents the Structure of Assets and Liabilities; Section three assesses the financial condition of Insured DMBs, while Section four concludes.

2.0 STRUCTURE OF ASSETS AND LIABILITIES

During the two quarters under review, the Total Assets of the industry increased by 1.31%, from ₦26.96 trillion in December 2015 to ₦27.32 trillion in March 2016. Similarly, in the second quarter of 2016 the industry asset recorded a growth of ₦2.67 trillion or 9.77% from ₦27.32 trillion in March 2016 to ₦29.99

trillion as at June 30, 2016. The structure of the industry's total assets and liabilities as at the end of the first and second quarters of 2016 are presented in Table 1 and Charts 1A and 1B.

TABLE 1

Structure of Banks' Assets and Liabilities

as at June 2016 and March 2016

Assets	**June 2016 (%)**	**March 2016 (%)**	**Liabilities**	**June 2016 (%)**	**March 2016 (%)**
Cash Balances	1.39	1.67	Deposits from Customers	61.82	64.82
Balances with Banks and Central Bank	21.26	22.61	Deposits from Banks	3.80	2.51
Loans and Advances to Banks	1.76	1.57	Financial Liabilities held for Trading	0.03	0.02
Loans and Advances to Customers	47.09	43.65	Due to Other Banks	-	-

Investment Securities Available for Sale	8.32	9.84	Borrowings	9.34	8.23
Investment Security Held to Maturity	8.14	9.39	Other Liabilities	9.39	9.32
Other Assets	5.10	4.26	Debt Instrument	3.08	2.63
Property, Plant and Equipment	2.80	2.98	Shareholders' Funds (Unadjusted)	0.75	13.64
Assets Pledged as Collateral	1.41	1.10	Others	-	-
Others	2.73	2.93			
Total	**100.00**	**100.00**	**Total**	**100.00**	**100.00**

Source: NDIC

Chart 1A: Structure of Banks' Assets as at June 2016 and March 2016

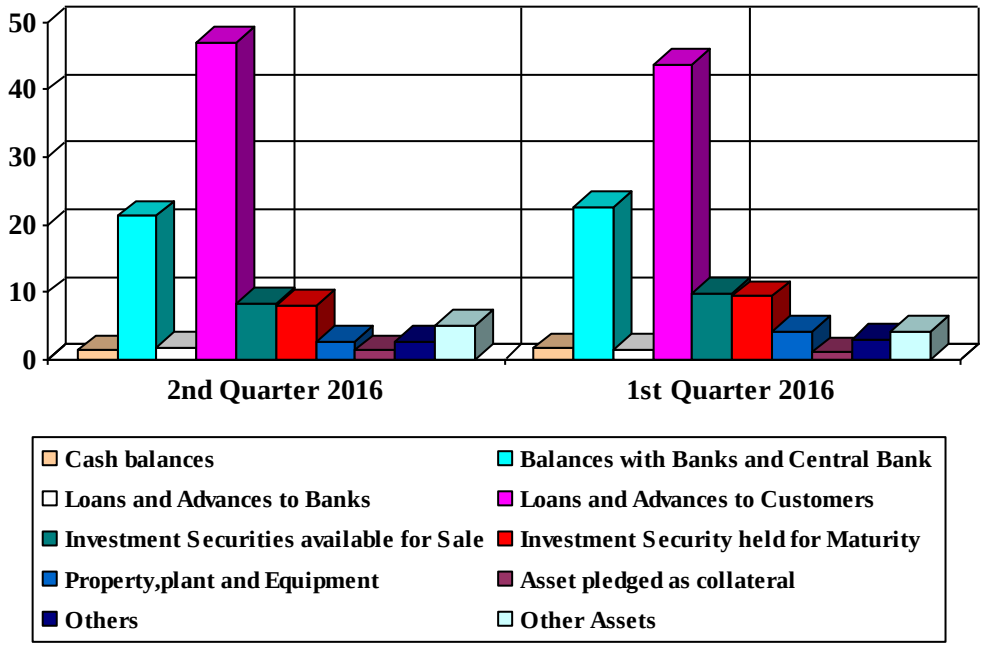
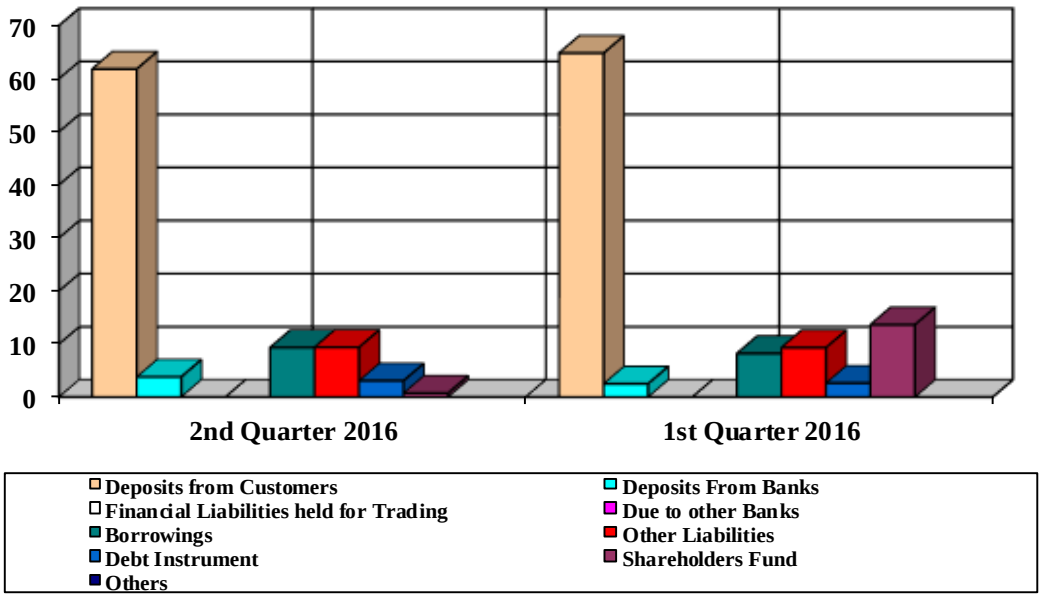


Chart 1B: Structure of Banks' Liabilities as at June 2016 and March 2016



Loans and Advances to Customers have the highest component of the assets of the banking industry for both first and second quarters of 2016. As at March 31st 2016, it accounted for 43.65% of the Total Assets. This showed a decrease of 1.58% from ₦12.12 trillion as at December 31, 2015, to ₦11.92 trillion as at 31 March, 2016. However, there was a 18.43% increase in the second quarter from the ₦11.92 trillion recorded in March, to ₦14.12 trillion in June 2016. Loans and advances to customers accounted for 47.09% in the second quarter of 2016.

Similarly, Loans and Advances to Banks accounted for 1.57% of the industry Total Assets, and it decreased by 9.80% from N476.83 billion in December 2015 to ₦430.09 billion as at March 2016. In the second quarter, it accounted for 1.76% of the industry Total Assets and it recorded an increment of 22.57% from ₦430.09 billion to ₦527.18 billion.

However, for the other components of the industry's Total Assets in the first quarter of 2016; balances with banks and Central Bank (CBN), accounted for 22.61% of the total asset. Investment Securities Available for Sale accounted for 9.84% of the Total Asset, while Investment Security Held to Maturity accounted for 9.39% of the total assets. In the second quarter, balances with banks and central bank accounted for 21.26% of the total asset. Investment securities available for sale accounted for 8.32% of the total asset, while investment security held at maturity accounted for 8.14% of the total asset

On the liability side, Total Deposits had the highest component of liability with 63.88% of the industry Total Liabilities in the first quarter of 2016, and it declined slightly from ₦17.46 trillion in December 2015 to ₦17.45 trillion as at March 2016.

Similarly, in the second quarter of 2016, Total Deposits from Customers have the highest component. It constituted 61.82% of the industry Total Liabilities which

recorded an increase of 6.24% from ₦17.45 trillion in March 2016 to ₦18.54 trillion in June 2016.

3.0 ASSESSMENT OF THE FINANCIAL CONDITION OF INSURED DMBS

Asset Quality

In the first quarter of 2016, the industry's Total Credit marginally declined by 2.56% from ₦13.33 trillion in December, 2015 to ₦12.99 trillion in March 2016. In the second quarter of 2016, it increased by 17.84% from ₦13.28 trillion in March 2016 to ₦15.65 trillion in June 2016. The decline experienced in the first quarter was due to the increase in Cash Reserve Ratio (CRR) and Monetary Policy Rate (MPR) and the increased aversion displayed by banks towards lending in a recessionary period among others.

The quality of loans declines as in absolute terms, Non-Performing Loans (NPLs) increased by 4.87% in March 2016 from ₦648.91 billion as at the end of December 2015 to ₦1.26 trillion at the end of March 2016 with a ratio of 9.45%. The trend continued in the second quarter as the NPLs increased by 9.32% in March 2016 from ₦1.26 trillion to ₦1.38 trillion in June 2016. The NPL ratios in both first and second quarter exceeded the maximum threshold of 5% prescribed by the CBN.

Furthermore, the ratio of Non-Performing Credits to Shareholders' Funds increased from 28.66% in March 2016 to 41.06 in June 2016. The Ratio of Provision for Impaired Credit to Impaired Credit decreased slightly from 69.98% in March 2016 to 63.17% in June 2016, while Impaired Credit to Total Credit increased from 28.66% in March 2016 to 41.06% in June 2016. Table 2 and Chart 2 present the indicators of Insured DMBs Asset Quality for June 2016 and March 2016.

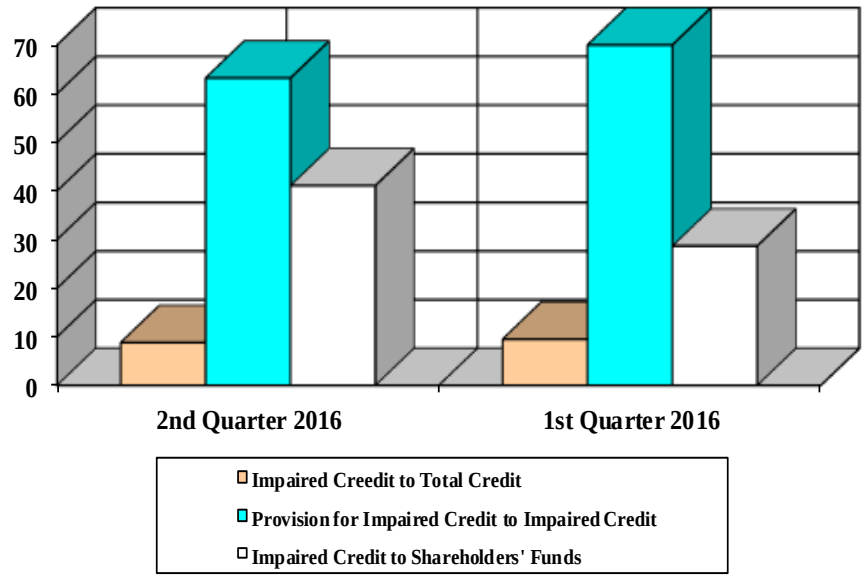
TABLE 2

Insured DMBs Asset Quality

Asset Quality Indicator	Period	
	June 2016 (%)	March 2016 (%)
Impaired Credit to Total Credit	8.80	9.49
Provision for Impaired Credit to Impaired Credit	63.17	69.98
Impaired credit to Shareholders' Funds	41.06	28.66

Source: NDIC

Chart 2: Indicators of Insured Banks' Asset Quality as at June 2016 and March 2016



3.2 Earnings and Profitability

As at 31st March 2016, Profit-Before-Tax increased by 14.63% to ₦130.48 billion from ₦113.83 billion reported for the quarter ended December 2015. The increment was as a result of a 15% increment in recoveries and the decline in operating expenses by 22.98%. On the flip side, Interest Income declined by 18.27% from ₦609.43 billion reported for the quarter ended December 2015 to ₦498.08 billion for the quarter ended March 2016. Non-Interest Income declined by 65.52%, from ₦162.08 billion in December 2015 to ₦46.26 billion in March 2016. Also, Interest Expenses declined by 24.13% from ₦239.22 billion in December 2015 to ₦181.49 billion in March, 2016.

In the second quarter, Profit-Before-Tax increased by 49.18% in June 2016 to ₦194.66 billion when compared with the ₦130.48 billion reported for the quarter-ended March 2016. Interest Income increased by 17.01% from ₦498.08 billion in March 2016 to ₦582.79 billion in June 2016. Non-Interest Income recorded a remarkable growth of 503.03%, from ₦55.88 billion in March 2016 to ₦336.98 billion in June 2016. Similarly, Interest Expense increased by 10.49% from ₦181.49 billion in March 2016 to ₦200.52 billion in June 2016. Operating Expenses also increased significantly by ₦213.74 billion or 68.20% from ₦313.40 billion in March 2016 to ₦527.14 billion in June 2016.

Furthermore, Return-on-Assets (ROA) increased from 0.38% as at December 2015 to 0.57% as at March 2016, and then again to 0.72% as at June 2016. However, Return-on-Equity (ROE) first depreciated from 2.90% in March 2015 to 1.41% then increased to 1.82% in June 2016. These and other indices are depicted in Table 3 and Chart 3.

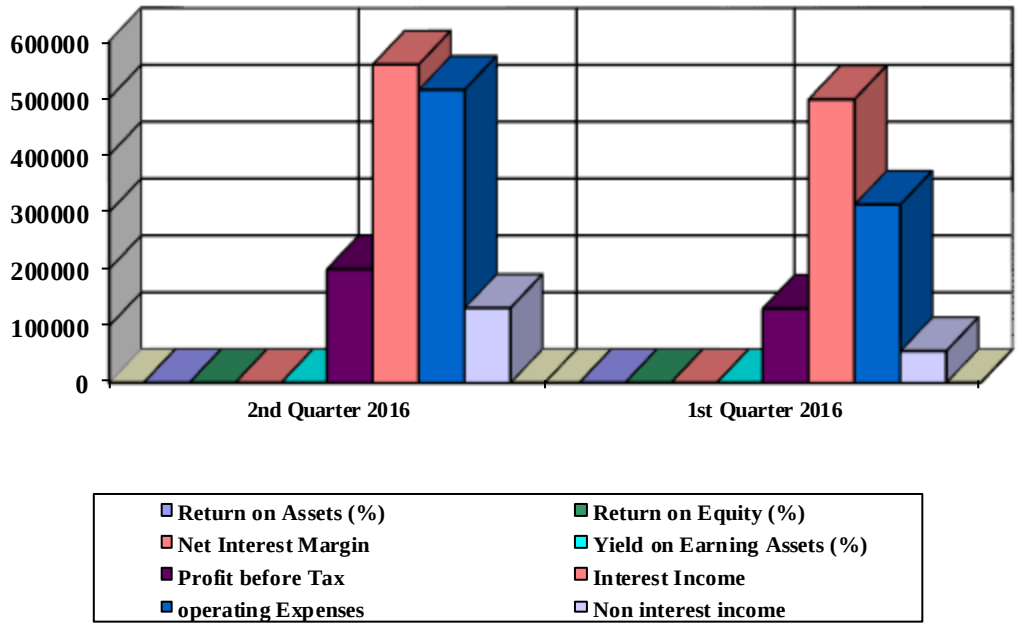
TABLE 3

Insured DMBs' Earnings and Profitability Indicators as at June 2016 and March 2016

Earnings/Profitability Indicator	Period	
	June 2016	**March 2016**
Return on Assets (%)	0.72	0.57
Return on Equity (%)	1.82	1.41
Net Interest Margin	3.2	2.65
Yield on Earning Assets (%)	1.04	2.03
Profit Before Tax (N' billion)	199,777	130,482
Interest Income (N' billion)	559,677	498,080
Operating Expenses (N' billion)	515,308	313,400
Non-Interest Income (N' billion)	131,597	55,881

Source: NDIC

Chart 3: Insured Banks' Earnings and Profitability as at June 2016 and March 2016



3.3 Liquidity Profile

The banking industry experienced increased liquidity as depicted by the relevant indices. The improvement was partly due to slight increase in the cash reserve requirement for banks from 20% to 22.50% by the CBN. Average Liquidity Ratio increased to 64.02% as at the end of March 2016 from 58.18% in December 2015, but depreciated from 64.02% in March 2016 to 55.97% in June 2016. The depreciation was due to the monetary policies the CBN initiated in that period. The average liquidity ratio of the industry remained above the 30% minimum requirement all through the two quarters under review.

Also in the first quarter of 2016, the Net Credit to Deposit Ratio increased to 76.28% in March 2016 from 73.76% in December 2015. Interbank Takings to

Deposits Ratio decreased to 400.95 % from 472.63% during the same period. The increment in the first quarter was sustained in the second quarter as The Net Credit to Deposits Ratio also increased from the figure in March 2016 to 84.40% in June 2016. The substantial increase was attributable to the increase in Net Credit from ₦13.311trillion as at March 31, 2016 to ₦15.60 trillion as at June 30, 2016.

All banks in the system met the required Liquidity Ratio of 30% within the period except one bank in first quarter of 2016 while three banks failed to meet the required 30% liquidity ratio in second quarter of 2016. Table 4 and Chart 4 present the liquidity profile of the banking industry as at June 2016 and March 2016.

TABLE 4

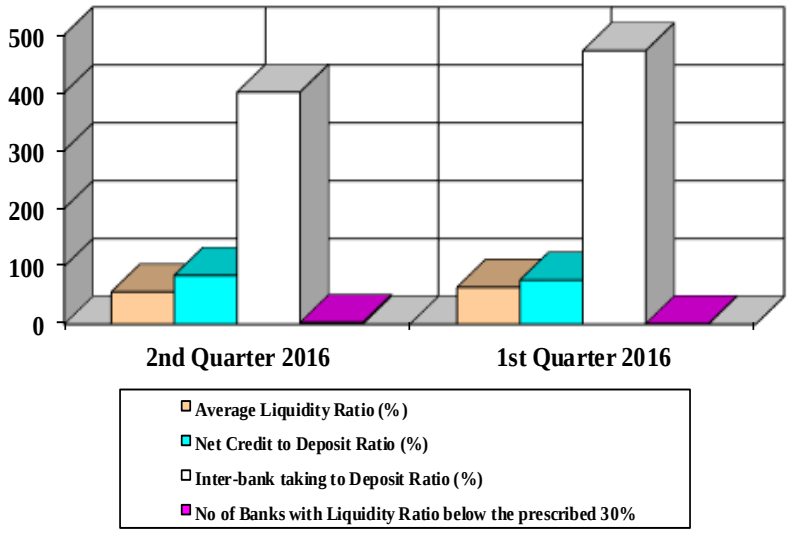
Indicators of Insured DMBs' Liquidity Profile

as at March 2016 and June 2016

Liquidity	**Period**	
	June 2016	**March 2016**
Average Liquidity Ratio (%)	55.97	64.02
Net Credit to Deposit Ratio (%)	84.40	76.28
Inter-bank taking to Deposit Ratio (%)	400.95	472.63
No of Banks with Liquidity Ratio below the prescribed minimum	3	1

Source: NDIC

Chart 4: Indicators of Insured Banks' Liquidity Profile as at June 2016 and March 2016



3.4 Capital Adequacy

During the periods under review, the banking industry Capital to Risk Weighted Assets Ratio (CAR) declined marginally from 17.66% as at 31st December, 2015 to 16.56% as at March end 2016. The slight decline was brought about by the combined effects of both the Total Risk Weighted Assets (Credit, Operational and Market) and the Total Qualifying Capital (Tier 1& and Tier 2). Also, Total Risk Weighted Assets increased from ₦18.34 trillion as at December 2015 to ₦18.10 trillion or 3.43% as at March 2016. Total Qualifying Capital decreased by 2.99%, from ₦3.24 trillion in December 2015 to ₦3.15 trillion in March 2016. Adjusted Capital Ratio also slightly deteriorated from 22.00% as at December, 2015 to 20.31% as at 31st March 2016. However, three (3) banks have capital adequacy ratio less than the prescribed 10% and 15%, respectively, for both National and International Banks as at 31st March 2016.

In the second quarter of 2016 on the other hand, the banking industry CAR also declined marginally from 16.56% as at 31st March, 2016 to 14.74% at June 30th 2016. The slight decline was brought about by the combined effects of the Total

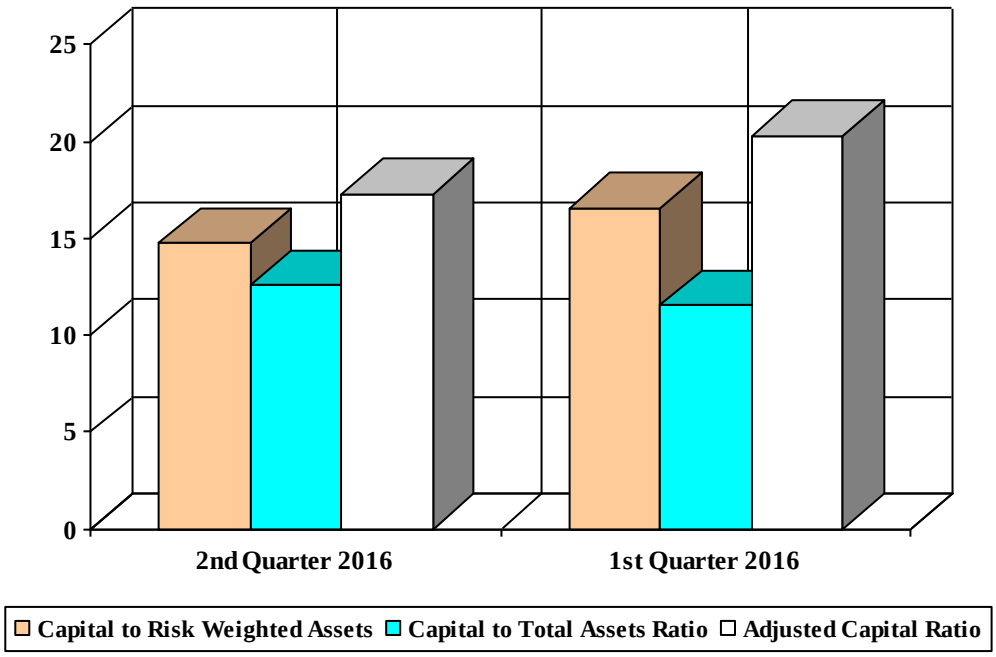
Risk Weighted Asset (Credit, Operational and Market) and the Total Qualifying Capital. While Total Risk Weighted Assets increased exponentially from ₦18.10 trillion as at March 2016 to ₦21.48 trillion or 13.08% as at June 2016, Total Qualifying Capital grew marginally by 0.66%, from ₦3.15 trillion in March 2016 to ₦3.17 trillion in June 2016 due to increase in provisioning requirement. Adjusted Capital Ratio slightly deteriorated from 20.31% as at March 2016 to 17.26% as at June 2016. Three (3) banks had CAR less than the prescribed 10% and 15%, respectively, for both national and international Banks as at June 2016. Table 5 and Chart 5 depict the capital adequacy position of the industry for the periods under review.

TABLE 5

Indicators of Insured DMBs' Capital Adequacy Position as at June 2016 and March 2016

Capital Adequacy Indicator	Period	
	June 2016	**March 2016**
Capital to Risk weighted Assets Ratio (%)	14.74	16.56
Capital to Total Asset Ratio (%)	12.54	11.52
Adjusted Capital Ratio (%)	17.26	20.31

Chart 5: Insured Bank's Capital Adequacy as at June 2016 and March 2016



4.0 CONCLUSION

In conclusion, the banking industry during the two quarters under review had a mixed performance. In the first quarter of 2016, Total Assets, Shareholders Funds, CAR, Liquidity Ratio, all improved during the quarter; while on the flip side, Total Credits, Total Deposit Base and Earnings declined during the period. Similarly in the second quarter, Total Assets, Shareholders Funds, CAR, Profitability, Total Deposits, Total Earning Assets as well the quality of the assets all improved during the period, while CAR and Liquidity Ratio depreciated in the second quarter. Although the banking industry had done well in most of the indices in the two quarters, the negative indices can be attributed to the deteriorated macroeconomic environment in which the banks operated.

Nigerian Foreign Exchange: Stylised Facts and Volatility Modelling

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Exchange rate plays an increasingly significant role in any economy as it directly affects domestic price level, profitability of traded goods and services, allocation of resources and investment decisions. The exchange rate and its risk are key factors that influence economic activities in Nigeria. An important measure in finance is the risk associated with an asset and asset volatility is perhaps the most commonly used risk measure. Volatility is used in risk management, value-at risk, portfolio analysis and derivatives pricing. It is well-known that economic and financial news have an impact on volatility and that "good" news and "bad" news do not have the same impact on future volatility. In Nigeria, the 2014 and 2015 exchange rate decisions by the Central Bank of Nigeria (CBN) have been of interest to risk managers, researchers, regulators, traders and other financial market participants.

In this paper, statistical analysis of Nigerian exchange rate (Naira/USD, Naira/Pound, Naira/Euro and Naira/Yuan) data is performed and a set of stylized empirical facts is observed in the data. We find that a good volatility model for the Naira and other currencies return series should capture serial correlation, time-varying variance, peakedness as well as fat tails. Furthermore, due to the existence of asymmetry of the return distributions observed, it is necessary to model left and right tails separately in order to capture their distinct characteristics. We also find that FIGARCH models with fat-tailed distributions are capable of capturing serial correlation, time-varying variance, long-memory, peakedness as well as fat tails for the Naira/USD. For the Naira/Yuan, Naira/Pound and Naira/Euro, the APARCH (1,1) model with student-t or skewed student-t error distributions are able to capture the stylised facts observed in the data.

1.0 INTRODUCTION

Academics, policymakers, regulators, and market practitioners have for long studied and modelled foreign exchange volatility in recognition of its importance for risk management and policy evaluation. Both financial market participants and regulators use volatility forecasts as inputs to models of risk management such as Value-at-Risk (VaR). Academics sought to model foreign exchange volatility because the volatility process reveals how news affects asset prices and

what information is important. Policymakers are interested in measuring asset price volatility to learn about market expectations and uncertainty about policy. For instance, according to Erdemlioglu et. al. (2012), all things being equal, a clear understanding of policy objectives and tools would tend to reduce market volatility.

Volatility measures the dispersion of asset price returns. Asset price returns exhibit stylized facts that include non-normality, serial correlation, time-varying variance, peakedness and fat tails (Bollerslev et. al. (1992), Campbell et. al. (1997), Granger et.al. (2000), Engle (1993), Engle (2002), Figlewski (2004)). Risk forecasting is central to financial regulations, risk management, and macroprudential policy. Regulators and financial institutions increasingly depend on statistical risk forecasting. VaR is the most prominent statistical risk measure adopted by the Bank for International Settlement in its Basel II/III regulatory framework to set minimum capital requirements and to measure general financial risks. VaR has become the standard measure that financial analysts use to quantify market risk. Volatility is a key parameter in some of the VaR models that are used for risk capital estimation as introduced by the Basel Committee as well as for setting risk limits used by banks' trading desks.

As noted by Engle (2001), volatility models have been applied in a wide variety of applications. In most cases, volatility is itself an interesting aspect of the problem. In some cases, volatility is an input used for purposes of measurement, like in the example of estimating value at risk given earlier. In other cases, volatility may be a causal variable in models where expected volatility is a determinant of expected returns.

Moreover, most researchers agree that volatility is predictable and there is considerable disagreement on how volatility predictability should be modelled

(Engle and Ng, 1993). In addition, economic and financial news has an impact on volatility and that "good" news and "bad" news do not have the same impact on future volatility, a key stylized fact of volatility dynamics, (Engle and Ng, 1993; Glosten et.al. 1993). Therefore, several models have been proposed to model and forecast volatility in an attempt to capture the stylised facts of asset and volatility dynamics (Danilesson and Macrae, 2011).

After the CBN Monetary Policy Committee meeting of the 24th and 25th November 2014, the midpoint of the official window of the foreign exchange market was moved from ₦155/US$ to ₦168/US$[1]. In effect, the CBN devalued the currency by 8.3 per cent or ₦13 by moving the midpoint of the official window of the foreign exchange market.

In addition, on 19 February, 2015, the CBN closed the Retail and Wholesale Dutch Auction System of the foreign exchange market, signalling a further devaluation of the exchange rate from N168/US$ to N198/US$. The interbank forex market rate would represent a unified foreign exchange market rate. Along with the RDAS/WDAS closure, the naira exchange rate was devalued from N168/US$1 to N198/$1.

In this paper, we analyse the stylized facts of asset returns to the four pairs of Nigerian foreign exchange data. Specifically, we used the returns of the Naira/USD, Naira/Yuan, Naira/Pound and Naira/Euro exchange rates both on the day of the announcement and two business days after and then characterise the stylised facts in each of the four series based on the two announcement days. We seek answer to the following question: Do the asset returns of the four pairs of Nigerian exchange rate exhibit the widely observed stylised facts of asset returns based on the CBN policy announcements of **25th November 2014 and** 19 February, 2015?

[1] Central Bank of Nigeria Communique No. 98 of the Monetary Policy Committee Meeting of held on November 24 and 25, 2014, http://www.cenbank.org/documents/mpc.asp, Published 12/15/2014

This paper therefore also applies Autoregressive Conditional Heteroscedasticity (ARCH), symmetric GARCH and three asymmetric GARCH models (which are Exponential GARCH or EGARCH, GJR-GARCH and Asymmetric Power ARCH), unit-root GARCH models (IGARCH) and long memory in volatility, that is Fractionally Integrated GARCH or FIGARCH with variations in the distribution of the errors to be normal, student t and skewed student t that capture most stylized acts about exchange rate returns such as volatility clustering and leverage effect to the four pairs of Nigerian foreign exchange data. The question asked in this regard is 'Which volatility model best fits each of the four pairs of Nigerian foreign exchange data?'

There are several reasons for the analysis of returns and empirical volatility modelling. First, volatility is a statistical risk forecast, which according to the Basel Committee (2013, 2014), increasingly drives decisions of financial institutions and financial regulators. The choice of a model for volatility can influence the market risk capital charge by several percentages, either lower or higher by 0-200% as shown in the analysis of the Swiss foreign exchange risk modelling (Danielson, 2015b). Volatility is a key input in market risk capital estimation. Danielson (2008, 2015) showed that two risk measures behave differently in smaller sample sizes because of the choice of the model. Second, the hazard of working with a potentially incorrect model is called model risk. There are several volatility models and the accuracy of the volatility risk models depends crucially on the extent to which the data can be reliably modelled. Therefore, choosing an appropriate model to compute market risk measures like volatility estimates is an important and difficult task and helps in model risk management. Third, it is widely stated that model risk produced the crisis and that risk models don't perform well during crisis periods. Finally, there is the

belief that a really complicated statistical model is needed for risk forecasting and that regulators should not rely on simpler methods.

Our goals are:

(i) To demonstrate empirical analysis of GARCH processes.

(ii) To compare different GARCH models.

(iii) Explore the role of alternative distributional assumptions in the estimation of GARCH models using the conditional normal, the Student-t and the skewed Student-t.

(iv) for bank regulators, the choice of the wrong VaR estimate, which in most cases rely on the particular volatility model, can make a great deal of difference in the actual capital to be set aside by the bank. Similarly, the bank risk managers can set the wrong or inappropriate limit for trading based on the wrong choice of volatility model.

We find that the Naira/Euro had the highest standard deviation value while the Naira/USD reported the lowest value of standard deviation. Furthermore, 2 days after the 19th February, 2015 policy announcement produced the highest value of standard deviation for each of the 4 exchange rates in comparison to the other periods used for the analysis. In terms of skewness, the four pairs of exchange rates produced positive skewness except the data used for 2 days after the 19th February, 2015 policy announcement, where all the rates produced negative skewness. Furthermore, the period that produced the highest skewed values, in decreasing order, are 2 days after 19th February, 2015 policy announcement, on 25th November 2014 policy announcement, on 19th February, 2015 policy announcement and 2 days after November 2014 policy announcement.

These findings suggest that a good volatility model for the Naira vs other currencies return series should capture i) serial correlation, ii) time-varying variance, iii) peakedness as well as iv) fat tails. Furthermore, due to the existence of asymmetry of the return distributions observed, it is necessary to model left and right tails separately in order to capture their distinct characteristics. In the case there is evidence of positive (negative) skewness, which means that the right (left) tails are particularly extreme.

Generally, modelling volatility of the four pairs of the exchange rate based on the announcements, the ARCH models produced lowest log-likelihood values compared to the GARCH-based models. The GARCH models are therefore preferred. In the GARCH models, APARCH models with skewed student t distribution is preferred for modelling volatility in all currency pairs except in the case of Naira/USD that portrayed FIGARCH as the best model. Also, the Naira/USD exchange rate produced the highest log-likelihood values while the Naira/Euro exchange rate produced the lowest fit in terms of the log-likelihood values. Moreover, the models with Student t and Skewed Student t distribution of residuals produced better fit for the exchange rate than those based on Normal distribution.

This paper is structured as follows. Section 2 presents the literature review of stylized facts of asset returns and GARCH volatility models. Section 3 analyses the stylized facts of the four pairs of the exchange rate both on the day of the announcement and two business days after the announcements of 24 November 2014 and 19 February 2015. Section 4 empirically models the four pairs of the exchange rate using several GARCH volatility models. The last Section concludes, presents findings and offers some policy implications of modelling foreign exchange volatility.

2.0 STYLIZED FACTS OF ASSET RETURNS

There are characteristics that asset returns and its associated volatility, as empirically observed over the years, should follow and referred to as Stylised Facts/Behaviour of Asset Returns. **In the light of the previous research of (**Bollerslev et. al. (1992), Campbell et. al. (1997), Granger et.al. (2000), Engle (1993), Engle (2002), Figlewski (2004))**, we focus on the following stylised facts in this paper (especially the first four).**

i. **Log returns are not Gaussian: The (unconditional) distribution of log returns seems to display fat-tails (a power-law or Pareto-like tails) for most data sets studied.**

ii. Slow decay of autocorrelation in absolute returns: The autocorrelation function of absolute returns decays slowly as a function of the time lag, roughly as a power law. This is sometimes interpreted as a sign of long-range dependence**.**

iii. **Volatility clustering: Different measures of volatility display a positive autocorrelation indicating that high-volatility events tend to cluster in time.**

iv. **Gain/loss asymmetry: Large drawdowns in stock prices and stock index values but not equally large upward movements. In other words, the distribution is skewed.**

v. **Aggregational gaussianity: As one increases the time scale over which returns are calculated, their distribution looks more and more like a normal distribution.**

vi. Leverage effect: Most measures of volatility of an asset are negatively correlated with the returns of that asset.

vii. Volume/volatility correlation: Trading volume is correlated with all measures of volatility.

2.1 MODELLING AND FORECASTING VOLATILITY

Volatility simply measures the degree randomness plays in price behaviour. Figlewski (2004) argues that, in practice volatility is very hard to predict. It is a function of time, exhibiting a combination of deterministic and random behaviour and should therefore be measured for each project. The volatility of the main financial prices - exchange rates, interest rate futures, stock indexes - is often understood or perceived as a measure of risk. Volatility is indeed one of the most important risk indicators that is available to market participants and market observers. Volatility is a key determinant of the value of commodity-based contingent claims, whether financial or "real". Volatility is simply the standard deviation of returns.

2.2 METHODS OF ESTIMATING VOLATILITY

Two of the most commonly used volatility estimates in financial analysis are: historical volatility (volatility is estimated from historical data) and implied volatility (volatility is estimated by examining the prices at which options on these assets trade). A third type, stochastic volatility, is harder to model but gives more accurate representation of actual volatility (Fouque et al., 2000). The method to use in estimating volatility depends on the data. Each method has its merits and may work well in some circumstances.

Historical volatility are simple average measures – for example, the standard deviation of daily, weekly or monthly returns over a 4-year period. They are therefore the simplest of the volatility models to calculate. If the data is reasonably constant through time then historical volatility can serve as a good estimate of future volatility. However, if the volatility exhibits high random

behaviour, then historical volatility will over or underestimate the future volatility (Clewlow & Strickland, 2000).

Historical volatility possess a number of drawbacks. First, it would not take advantage of short-term persistence in volatility that could lead to more accurate short-term forecasts given that historical volatility can be slow to respond to changing market circumstances and the observations are unweighted. Second, it is not able to accurately capture an extreme event like a big currency devaluation or market crash (Brooks, 2008).

Implied volatility is the volatility embedded in the Black-Scholes Options formula. According to Darrel (1998), implied volatility can be calculated from Black-Scholes by inverting the volatility implied by the option price.

Stochastic volatility, like Autoregressive Conditional Heteroscedasticity (ARCH) models have been extensively used to model financial data and have been regarded as stochastic volatility models. Generalised ARCH (GARCH) models are used to estimate volatility instead of ARCH. GARCH models use lagged values for the dependent variable in addition to the residuals to estimate volatility whereas ARCH models rely only on the residuals and hence give a better estimate. Jarrow (1998) state that GARCH models provide a better estimate of volatility than ARCH and GARCH (1,1) is adequate for almost all financial econometrics.

GARCH models overcome the problems associated with historical volatility model due to the fact that a GARCH model that is "stationary in variance" will have forecasts that converge upon the long-term average as the horizon increase. GARCH models will also overcome the two problems with unweighted averages described above. Thus it is important to apply a "reality check" to estimated GARCH models to ensure that the coefficient estimates are intuitively plausible. An interesting property of ARCH models is that the kurtosis of shocks is strictly

greater than the kurtosis of a normal distribution. This is because, an ARCH model is a variance-mixture of normals which must produce a kurtosis greater than three.

For detailed discussion on volatility estimation, forecasting and diagnostics, the reader is referred to Brooks (2008) and Figlewski (2004).

This paper is concerned with the following volatility models.

2.3 Historical Volatility

If n denotes number of observations, S exchange rate at at time period t=1,2,3,4… *T* then our continuously compounded rate of return as given in (1) is defined as:

$r_t = \ln(S_t / S_{t-1})$ (1)

To calculate the historical volatility σ, we first calculate the logarithmic price returns r_t, then calculate the standard deviation of the logarithmic price returns and annualize the standard deviation by multiplying it by the current factor.

The best forecast of volatility at time t σ is the average of all past realized volatilities at time *t*.

$$\sigma^2(r_t) = \frac{1}{t-1}\sum_{t=1}^{T}(r_t - \bar{r})^2 \quad (2)$$

Where the sample average of the returns, $\bar{r} = \sum_{t=1}^{T} r_t$

2.4 ARCH Model

Let the dependent variable be labeled r_t be the return on an asset or portfolio. The mean value m and the variance *h* will be defined relative to a past information set. Then, the return *r* in the present will be equal to the mean value of *r* (that is, the expected value of *r* based on past information) plus the

standard deviation of *r* (that is, the square root of the variance) times the error term for the present period.

ARCH models based on the variance of the error term at time *t* depends on the realized values of the squared error terms in previous time periods. The model is specified as:

$$y_t = u_t \tag{3}$$

$$u_t \sim N(0, h_t)$$

$$h_t = \alpha_0 + \sum_{t=1}^{q} \alpha_j u_{t-i}^2 \tag{4}$$

This model is referred to as ARCH (q), where q refers to the order of the lagged squared returns included in the model. The complete ARCH (q) model of Engle (1982) relates the current level of volatility to the past q squared shocks. If we use ARCH (1) model it becomes

$$h_t = \alpha_0 + \alpha_1 u_{t-1}^2 \tag{5}$$

Since h_t is a conditional variance, its value must always be strictly positive; a negative variance at any point in time would be meaningless. To have positive conditional variance estimates, all of the coefficients in the conditional variance are usually required to be non-negative. Thus coefficients must be satisfy $\alpha_0 > 0$ and $\alpha_1 \geq 0$. Unfortunately, like most models, ARCH models typically require 5-8 lags of the squared shock to adequately model conditional variance (Sheppard, 2013).

2.5 GARCH Model

Bollerslev (1986) developed the GARCH (p,q) model. The model allows the conditional variance of variable to be dependent upon previous lags; first lag of the squared residual from the mean equation and present news about the volatility from the previous period which is as follows:

$$h_t = \alpha_0 + \sum_{i=1}^{q} \alpha_i u_{t-i}^2 + \sum_{i=1}^{p} \beta_i h_{t-i} \quad (6)$$

This model is also a weighted average of past squared residuals, but it has declining weights that never go completely to zero. The most used and simple model is the GARCH (1,1) process, for which the conditional variance can be written as follows:

$$h_t = \alpha_0 + \alpha_1 u_{t-1}^2 + \beta_1 h_{t-1} \quad (7)$$

We can easily find that

$$h = \alpha_0 + \alpha_1 h + \beta_1 h. \quad (8)$$

Solving the equation we have

$$h = \frac{\alpha_0}{1 - \alpha_1 - \beta_1} \quad (9)$$

For this unconditional variance to exist, it must be the case that $\alpha_1 + \beta_1 < 1$ and for it to be positive, we require that $\alpha_0 > 0$.

This model forecasts the variance of date t return as a weighted average of a constant, yesterday's forecast, and yesterday's squared error. Of course, if the mean is zero, then from the surprise is simply r_{t-1}^2. Thus the GARCH models are conditionally heteroskedastic but have a constant unconditional variance. According to GARCH, the best predictor of the variance in the next period is a weighted average of the long-run average variance, the variance predicted for this period, and the new information in this period that is captured by the most recent squared residual. Such an updating rule is a simple description of adaptive or learning behavior and can be thought of as Bayesian updating (Engle, 2001).

2.6 GJR GARCH

Glosten, et.al (1993) develop the GARCH model which allows the conditional variance to have a different response to past negative and positive innovations. The GJR model is a simple extension of GARCH with an additional term added to account for possible asymmetries (Brooks, 2008). GJR GARCH captures the propensity for the volatility to rise more subsequent to large negative shocks than to large positive shocks, known as the "leverage effect".

$$h_t = \alpha_0 + \sum_{i=1}^{q} \alpha_i u_{t-i}^2 + \gamma_i u_{t-i}^2 d_{t-1} + \sum_{i=1}^{p} \beta_j h_{t-j} \tag{10}$$

Where

$$d_{t-1} = \begin{cases} 1 \text{ if } u_{t-1} < 0, & \text{bad news} \\ 0 \text{ if } u_{t-1} \geq 0, & \text{good news} \end{cases}$$

In the model, effect of good news shows their impact by α_i, while bad news shows their impact by $\alpha + \gamma$. In addition if $\gamma \neq 0$ news impact is asymmetric and $\gamma > 0$ leverage effect exists. To satisfy non-negativity condition coefficients would be $\alpha_0 > 0$, $\alpha_i > 0$, $\beta \geq 0$ and $\alpha_i + \gamma_i \geq 0$. The GARCH model is simply a restricted version of the GJR-GARCH, with $\gamma = 0$

2.7 Exponential GARCH

Exponential GARCH (EGARCH) proposed by Nelson (1991) which has form of leverage effects in its equation. The GARCH process fails in explaining the "leverage effects" which are observed in the financial time series. The leverage effects represent the tendency of variation in the prices of stocks to be negatively correlated with changes in the stock volatility. In other words, the effect of a shock upon the volatility is asymmetric, meaning that the impacts of "good news" (positive lagged residual) and of "bad news" (negative lagged

residual) are different. The EGARCH) model accounts for such an asymmetric response to a shock.

In the EGARCH model the specification for the conditional covariance is given by the following form:

$$\log(h_t) = \alpha_0 + \sum_{j=1}^{q} \beta_j \log(h_{t-j}) + \sum_{i=1}^{p} \alpha_i \left| \frac{u_{t=i}}{\sqrt{h_{t=i}}} \right| + \sum_{k=1}^{r} \gamma_k \frac{u_{t-k}}{\sqrt{h_{t-k}}} \qquad (11)$$

In the equation γ_k represent leverage effects which accounts for the asymmetry of the model. While the basic GARCH model requires the restrictions the EGARCH model allows unrestricted estimation of the variance.

If $\gamma_k < 0$ it indicates leverage effect exist and if $\gamma_k \neq 0$ impact is asymmetric. The meaning of leverage effect bad news increase volatility.

The EGARCH model does not require any restriction on the parameters because, since the equation is on log variance instead of variance itself, the positivity of the variance is automatically satisfied, and that is the main advantage of the EGARCH model.

2.8 Integrated GARCH

A number of authors have found parameter estimates in GARCH (1,1) models close to the unit root region, and have proposed using the integrated GARCH or IGARCH process which imposes this restriction, see for example Engle and Bollerslev (1986).

Thus, IGARCH models are unit-root GARCH models. Similar to ARIMA models, a key feature of IGARCH models is that the impact of past squared shocks is persistent.

An IGARCH (1,1) model can be written as

$$h_t = \alpha_0 + (1-\beta_1)u_{t-1}^2 + \beta_1 h_{t-1}$$

(12)

Where $1 > \beta_1 > 0$.

2.9 Asymmetric Power ARCH (APARCH) Model

The APARCH model also delivers the long-memory property of returns discussed in Ding et.al (1993). In the APARCH model, the standard deviation is modeled rather than the variance. It is a very changable ARCH model and the model is specified as follows:

$$h_t^{\delta} = \alpha_0 + \alpha_1 (|u_{t-1}| - \gamma u_{t-1})^{\delta} + \beta h_{t-1}^{\delta}$$

(13)

Besides leptokurtic returns, the APARCH model, as the GARCH model, captures other stylized facts in financial time series, like volatility clustering. The volatility is more likely to be high at time t if it was also high at time $t-1$. The APARCH model, as the GJR-GARCH model, additionally captures asymmetry in return volatility. That is, volatility tends to increase more when returns are negative, as compared to positive returns of the same magnitude.

2.10 FIGARCH: A Long Memory Model for Volatility

Most financial time series have d = 1, d is the degree of integration, for the (raw or log) levels, for instance log of exchange rates. It is the volatility which typically has a fractional value of d. What is needed, then, is a long memory model for the volatility of returns which allows the returns themselves to be a Martingale Difference.

The Fractionally Integrated GARCH (FIGARCH) model of Baillie, Bollerslev, and Mikkelsen (1996), is written as: FIGARCH (p , d , q) for p ∈ {0, 1} and q ∈ {0, 1}. FIGARCH is a fractionally integrated version of GARCH, which is usually represented using its ARCH (∞) representation.

$$h_t = \alpha_0 + \sum_{i=1}^{\infty} \lambda_i u_{t-i}^2 \tag{14}$$

Where

$$\delta_1 = d$$

$$\lambda_1 = \phi - \beta + d .$$

$$\delta_1 = \frac{i-1-d}{i}\delta_{i-1}, i = 2,..$$

$$\lambda_1 = \beta\lambda_{i-1} + \delta_i - \phi\delta_{i-1,} i = 2,....$$

3.0 EMPIRICAL ANALYSIS OF EXCHANGE RATE SERIES

Our raw data represents 1000 observations of the Naira/USD, Naira/Yuan, Naira/Pound and Naira/Euro exchange rates both on the day of the announcement (**25th November 2014 and** 19 February, 2015) and two business days after. We therefore have 8 data series for the analysis. For the policy announcement of the **25th November 2014, data was downloaded from CBN website**[2] **covering** 10/28/2010 to 11/21/2014 and 11/01/2010 to 11/25/2014 for 2 days after the announcement. Similarly, the 19 February, 2015 policy decision had data downloaded covering 1/25/2011 to 2/18/2015 and from 1/27/2011 to 2/20/2015 for 2 days after the announcement.

Table 1 gives a selection of descriptive statistics for the daily raw of the four series and are plotted In Figure 1.

[2] www.cenbank.org

Let the daily return of Naira vs (USD, Euro, Pound or Yuan) exchange rate be calculated as follows:

$$r_t = \log(P_t / P_{t-1})$$

Where P_t is the closing price on tth day and r_t is the continuously compounded return on tth day.

Table 1a: Descriptive Statistics of Nominal (Raw) Price for policy announcement of the **25th November 2014**

PRICE	**MEAN**	**MEDIAN**	**MIN**	**MAX**	**STD**	**MODE**	**SKEWNESS**	**KURTOS**
Naira/USD	154.18	155.24	148.00	157.91	2.216	155.25	-1.50	3.81
Naira/Yuan	236.57	237.41	225.44	246.71	3.90	231.62	-0.36	3.03
Naira/Euro	206.09	206.09	187.87	226.89	7.16	203.64	-0.04	2.70
Naira/Pound	246.70	246.21	228.70	266.51	8.00	240.11	0.33	2.66

Table 1b: Descriptive Statistics of Raw Price for policy announcement of the **25th November 2014 but** two days after the announcement

PRICE	**MEAN**	**MEDIAN**	**MIN**	**MAX**	**STD**	**MODE**	**SKEWNESS**	**KURTOS**
Naira/USD	154.21	155.24	148.00	162.00	2.23	155.25	-1.39	4.00
Naira/Yuan	236.56	237.41	225.44	246.71	3.91	231.61	-0.36	3.01
Naira/Euro	206.08	206.09	187.87	226.89	7.16	203.64	-0.04	2.69

Naira/Pound	246.73	246.28	228.70	266.51	8.00	240.11	0.32	2.65

Table 1c: Descriptive Statistics of Raw Price for policy announcement of the 19 February, 2015

PRICE	**MEAN**	**MEDIAN**	**MIN**	**MAX**	**STD**	**MODE**	**SKEWNESS**
Naira/USD	155.251	155.2500	149.4500	167.5000	3.4388	155.2500	2.0695
Naira/Yuan	237.1239	237.6916	226.7846	246.7062	3.5638	242.7450	-0.1659
Naira/Euro	206.0314	206.1997	187.3655	226.8884	7.3400	203.6414	-0.1555
Naira/Pound	248.1492	247.3569	230.8716	306.8215	8.1911	240.1097	0.9353

Table 1d: Descriptive Statistics of Raw Price for policy announcement of the 19 February, 2015 **but** 2 days after the announcement

PRICE	**MEAN**	**MEDIAN**	**MIN**	**MAX**	**STD**	**MODE**	**SKEWNESS**
Naira/USD	155.3486	155.2500	149.4500	198.5000	3.9374	155.2500	3.9640
Naira/Yuan	237.1802	237.7020	226.7846	280.9410	3.8129	242.7450	1.3495
Naira/Euro	206.0733	206.2674	187.3655	226.8884	7.3907	203.6414	-0.1330
Naira/Pound	248.1492	247.3569	230.8716	306.8215	8.1911	240.1097	0.9353

From Tables 1(a-d), the various exchange rates (USD, Euro, Pound and Yuan) against the Naira shows evidence of non-normality: not symmetric with skewness not equal to 0, have fat tails with kurtosis not equal to 3.

Figures 1a and 1b show that nominal exchange rates have stochastic trend, that is, they are nonstationary. Other nominal rates for Naira/Pound and Naira/Euro depicted similar characteristics. The absence of normality and stationarity observed in the nominal exchange rates of Naira vs other currencies is as observed in previous studies of exchange rates (Erdemlioglu et al, 2012).

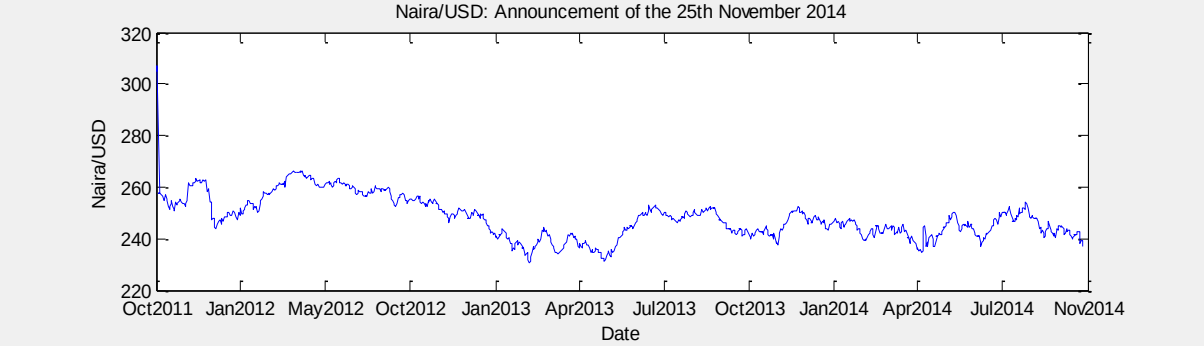


Figure 1a: Naira/USD Exchange Rate for policy announcement of the **25th November 2014**

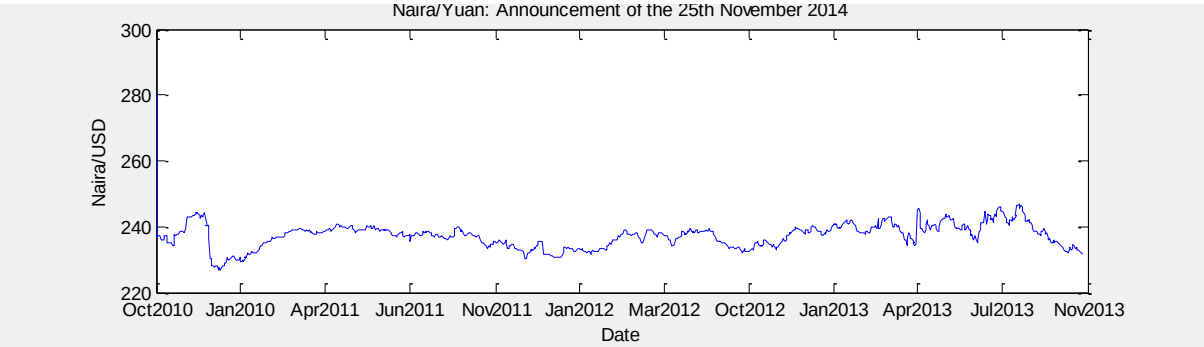


Figure 1b: Naira/Yuan Exchange Rate for policy announcement of the **25th November 2014.**

From Figure 1, we observe that the prices have been very volatile[3]. The trajectory of the exchange rates is visible at various times, which concide with

[3] Though there are 4 foreign exchange prices, we have only plotted two to save space. All the four series exhibited similar pattern because they are global currencies priced against the Naira.

policy decisions that affect the exchange rates. Nevertheless, its gains and losses in the second decade fall back into with other world markets.

We therefore consider a stationary series so as to carry out empirical analysis of the exchange rates with associated risk measure.

Tables and 2a and 2b gives a selection of descriptive statistics for the daily log returns of the four series of the **25th November 2014 announcement as well as announcement of two days later, respectively.**

3.1 Analysing Stylized Facts of Asset Returns of Foreign Exchange Return based on the policy announcement of the 25th November 2014[4] and 2 days later

Table 2a: Descriptive Statistics of Foreign Exchange Return based on the policy announcement of the **25th November 2014**

RETURN SERIES	**MEAN**	**MEDIAN**	**MIN**	**MAX**	**STD**	**MODE**	**SKEWNESS**	**KURTOSIS**
Naira/USD	0	0	-0.0144	0.045	0.18%	0	14.93	412.98
Naira/Yuan	0	0	-0.02	0.044	0.33%	0	2.17	37.09

[4] To save space, not all plots of the four series will be shown as presented in the analysis of policy announcement of 24th November 2014. This is because the different exchange rates displayed similar characteristics. The reader can observe the characteristics of those not shown based on those plotted.

			0					
Naira/Euro	0	0	-0.0087	0.0866	0.69%	0	0.20	51.80
Naira/Pound	0	0	-0.0200	0.0400	0.47%	0	0.49	8.10

Table 2b: Descriptive Statistics of Foreign Exchange Return based on 2 days after the policy announcement of the **25th November 2014**

RETURN SERIES	**MEAN**	**MEDIAN**	**MIN**	**MAX**	**STD (%)**	**MODE**	**SKEWNESS**	**KURTOSIS**
Naira/USD	0	0	-0.0200	0.0389	0.47	0	0.4876	8.0996
Naira/Yuan	0	0	-0.0200	0.0438	0.33	0	2.1476	36.905
Naira/Euro	0	0	-0.0200	0.0389	0.47	0	0.4876	8.0996
Naira/Pou	0	0	-	0.086	0.6	0	0.1635	50.748

nd			0.0867	3	9			

Nonnormality

Arithmetic mean and median as measures of central tendency, are very close to zero for both **25th November 2014 announcement (Table 2a) as well as announcement of 2 days later (Table 2b)**. Thus the standard assumption of the Random Walk model that the expected value of daily returns equals zero is met. In terms of daily standard deviation from Table 2a, the Naira/USD had the lowest (0.18%) and the Naira/Euro the highest (0.69%), more than triple the Naira/USD. However, for 2 days after the **25th November 2014 announcement,** the Naira/Yun had the lowest (0.33%), the Naira/Pound the highest (0.69%) value and both the Naira/USD as well as Naira/Euro had 0.47% as the standard deviation.

In terms of assessing the normality of logarithmic returns of the exchange rates, the results for the four pairs of returns series[5] all show strong departure from normality, as the coefficients of skewness (value not equal to zero) and kurtosis (greater than 3) are statistically different from those of a normal distribution. All the pairs of series[6] have asymmetric tails and clearly leptokurtic (the sample kurtosis is much greater than 3), which justifies the assumption of fat-tailed distributions. Because of the existence of asymmetry of the return distributions observed, it is necessary to model left and right tails separately in order to capture their distinct characteristics. In this case there is evidence of positive skewness, which means that the right tails are particularly extreme.

[5] both **25th November 2014 announcement (Table 2a) as well as announcement of 2 days later (Table 2b)**

[6] both **25th November 2014 announcement (Table 2a) as well as announcement of 2 days later (Table 2b)**

We now conduct formal tests of normality for the pairs of the return series based on the two policy announcements. The Jarque-Bera, Kolmogorov-Smirnov and Anderson-Darling normality tests and their p-values for each of the logarithmic daily returns both on **25th November 2014 announcement as well as announcement of 2 days later are shown in Tables 2c and 2d, respectively**. The Jarque-Bera test uses sample skewness and kurtosis to measure the deviation of a distribution from normality. Under the null hypothesis, both the skewness and excess kurtosis. The **Kolmogorov-Smirnov** (kstest) returns a test decision for the null hypothesis that the data in a vector comes from a standard normal distribution, against the alternative that it does not come from such a distribution. The Anderson-Darling test is commonly used to test whether a data sample comes from a normal distribution. However, it can be used to test for another hypothesized distribution, even if you do not fully specify the distribution parameters. Instead, the test estimates any unknown parameters from the data sample.

Table 2c: Jarque-Bera, Kolmogorov-Smirnov and Anderson-Darling normality tests for the foreign exchange return series based on the policy announcement of the **25th November 2014**

Return Series	**Jarque-Bera(5%)**	**p-value**	**Kolmogorov-Smirnov (5%)**	**p-value**	Anderson-Darling **(5%)**	**p-value**
Naira/USD	1	0.001	1	0.000	1	0.000
Naira/Yuan	1	0.001	1	0.000	1	0.005
Naira/Euro	1	0.020	1	0.000	1	0.008

Naira/Pound	1	0.010	1	0.000	1	0.000

Table 2d:Jarque-Bera, Kolmogorov-Smirnov and Anderson-Darling normality tests for the pairs of return series based on the policy announcement 2 days after the **25th November 2014**

Return Series	**Jarque-Bera(5%)**	**p-value**	**Kolmogorov-Smirnov (5%)**	**p-value**	Anderson-Darling **(5%)**	**p-value**
Naira/USD	1	0.001	1	0.000	1	0.0005
Naira/Yuan	1	0.001	1	0.000	1	0.0005
Naira/Euro	1	0.001	1	0.000	1	0.0005
Naira/Pound	1	0.001	1	0.000	1	0.0005

The Anderson-Darling, Jarque-Bera and Kolmogorov-Smirnov Normality tests from the two tables show that all the series strongly reject the null hypothesis of normality for all the series.

Quantile-Quantile Plot

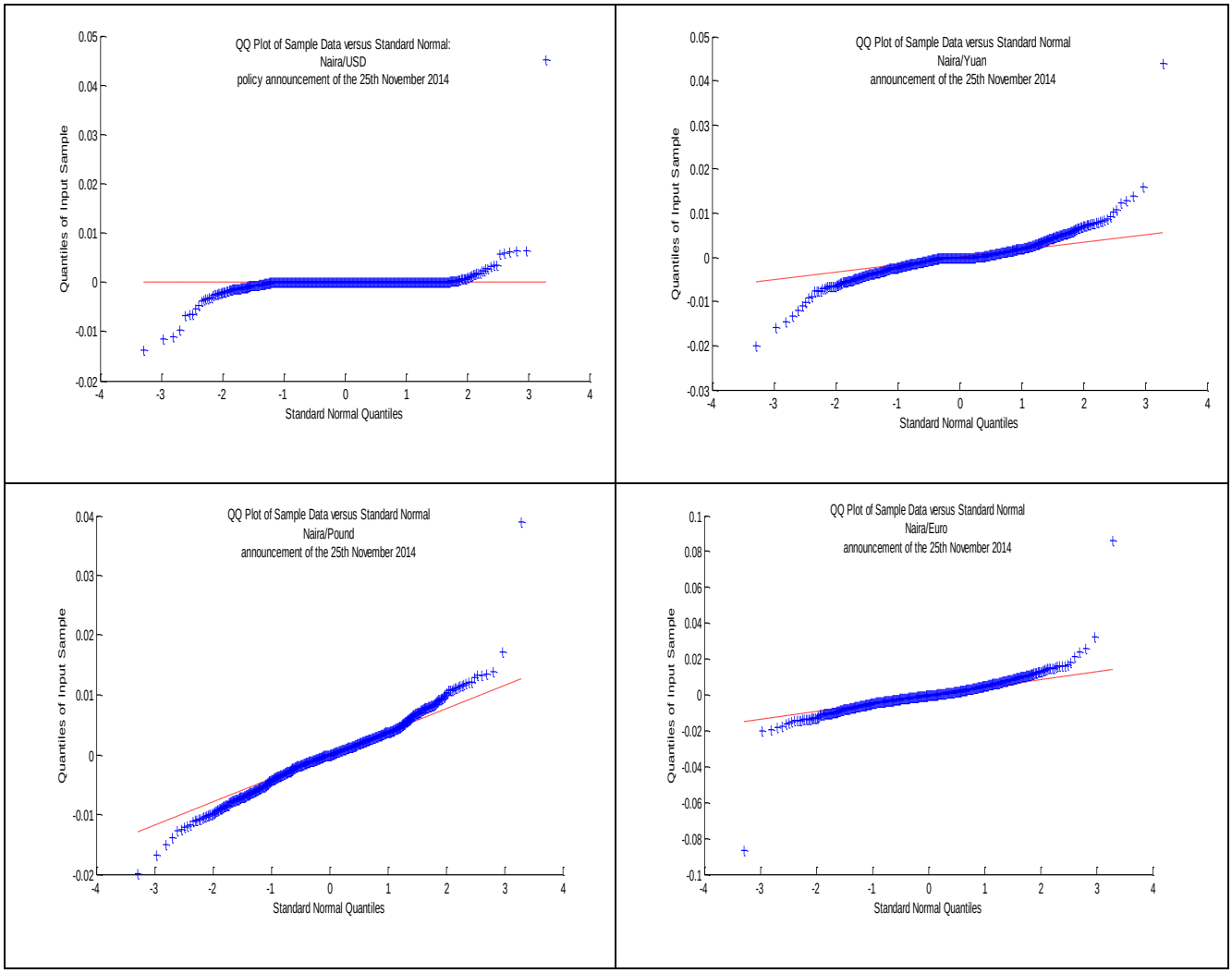
Quantile-quantile plots (also called qq plot) are used to determine if two data sets come from populations with a common distribution (whether normally distributed or not). In such a plot, points are formed from the quantiles of the data. If the resulting points lie roughly on a line with the drawn slope, then the distributions are the same. The logarithmic daily returns on the four exchange rate series is normal, if the sample quantiles of the logarithmic daily returns on

the four exchange rate series versus theoretical quantiles from a normal distribution is close to linear.

In particular, if the qq-plot is linear, then the specified distribution fits the data, and we have identified the distribution to which our data belongs. In addition, departures of the qq-plot from linearity in the tails can tell us whether the tails of our empirical distribution are fatter, or thinner, than the tails of the reference distribution to which it is being compared (Dowd, 2005).

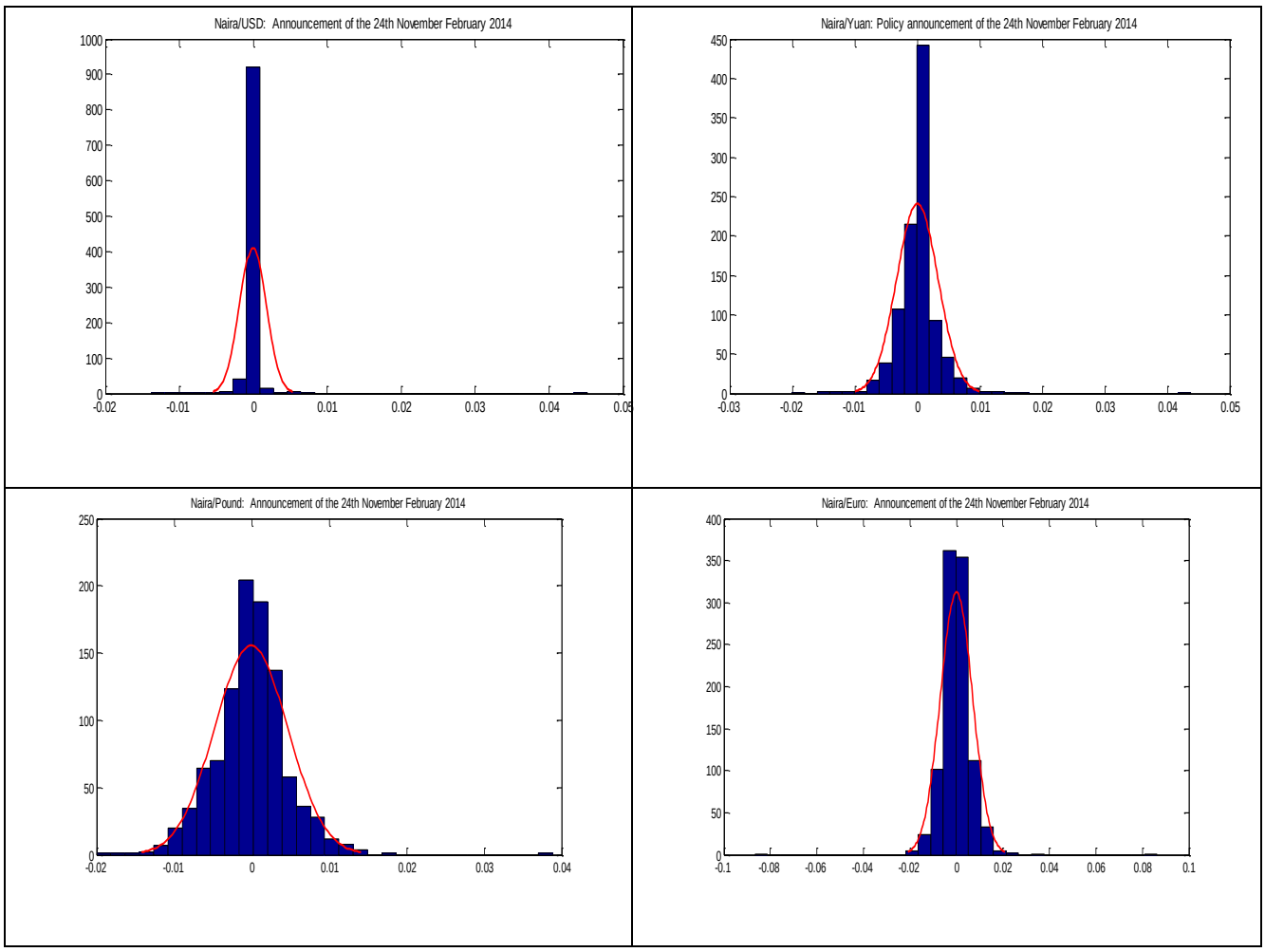
Figure 2 shows the qqplot of the logarithmic daily returns on the four exchange rate series (the empirical distributions) against standard normal quantiles. All the 4 qq-plots have steeper slopes at their tails while the central mass of the empirical observations are approximately linear, this suggests that empirical distributions have heavier tails than the reference distribution. A qq-plot where the tails have slopes different than the central mass is therefore suggestive of the empirical distribution having heavier, or thinner, tails than the reference standard normal distribution. In addition, outliers are visible in the upper right and lower left corners of all the plots. Fat tails mean that crashes and huge increases appear far more often than predicted by the normal law.

Figure 2: qqplot of the logarithmic daily returns of the four exchange rate series against standard normal quantiles for 25th November 2014 announcement



To further confirm the normality assumption for the four foreign exchange return series based on the policy announcement of the **25th November 2014, we consider how well these series individually fit a normal density function using a histogram, as plotted in Figure 3.** The histogram is a traditional way of displaying the shape of a group of data. It is well-known that the mathematical model of the normal distribution produces a perfectly smooth, symmetrical, bell-shaped curve. The mean and standard deviation of the data determine the shape of the bell. The mean locates the bell peak on the horizontal axis, and the standard deviation determines the width of the bell. The ideal shape to look for in the case of normality is a bell-shaped distribution. The red (solid) line with the bell shows a normal or Gaussian distribution.

Figure 3: Histogram of the logarithmic daily returns on the four exchange rate series for 25th November 2014 announcement



The empirical distributions are all more peaked than the normal density around the mean. Therefore, the logarithmic daily returns on the four exchange rate series exhibit fat tails (leptokurtic).

Figure 4 (upper row) shows the qqplot of the logarithmic daily returns of exchange rate series (the empirical distributions) against standard normal quantiles for 2 days after policy announcement of 25th November 2014. All the 4 qq-plots have steeper slopes at their tails while the central mass of the empirical

observations are approximately linear, this suggests that empirical distributions have heavier tails than the normal distribution. The empirical distributions of the exchange rate superimposed on a histogram with normal density (lower row) shows that the exchange rates are all more peaked than the normal density around the mean. Therefore, the logarithmic daily returns on the four exchange rate series exhibit fat tails (leptokurtic).

Figure 4: qqplot and histogram of the logarithmic daily returns of the exchange rate series against standard normal quantiles (upper row) and fitted to a histogram (lower row) for 2 days after the 25th November 2014 announcement

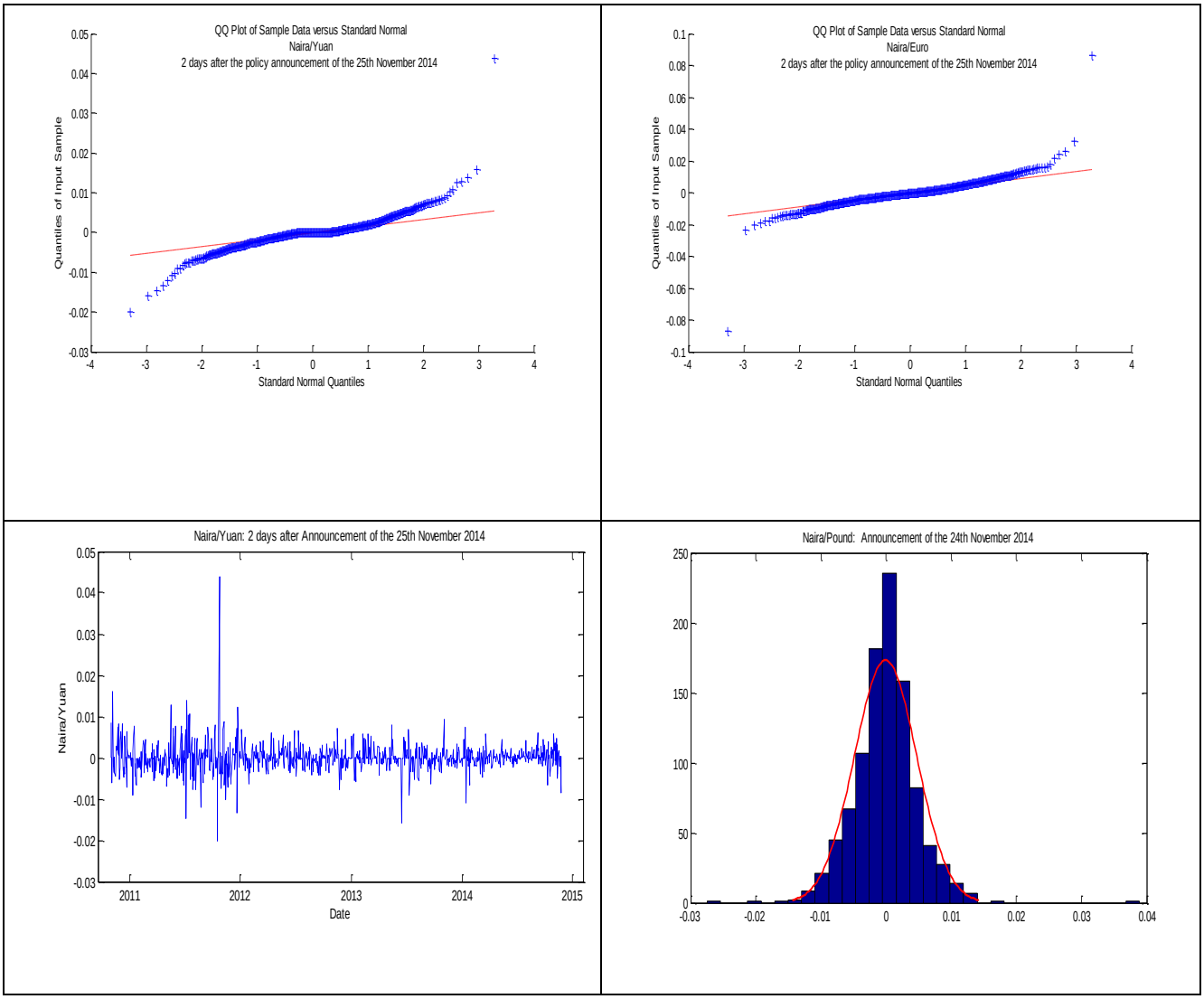


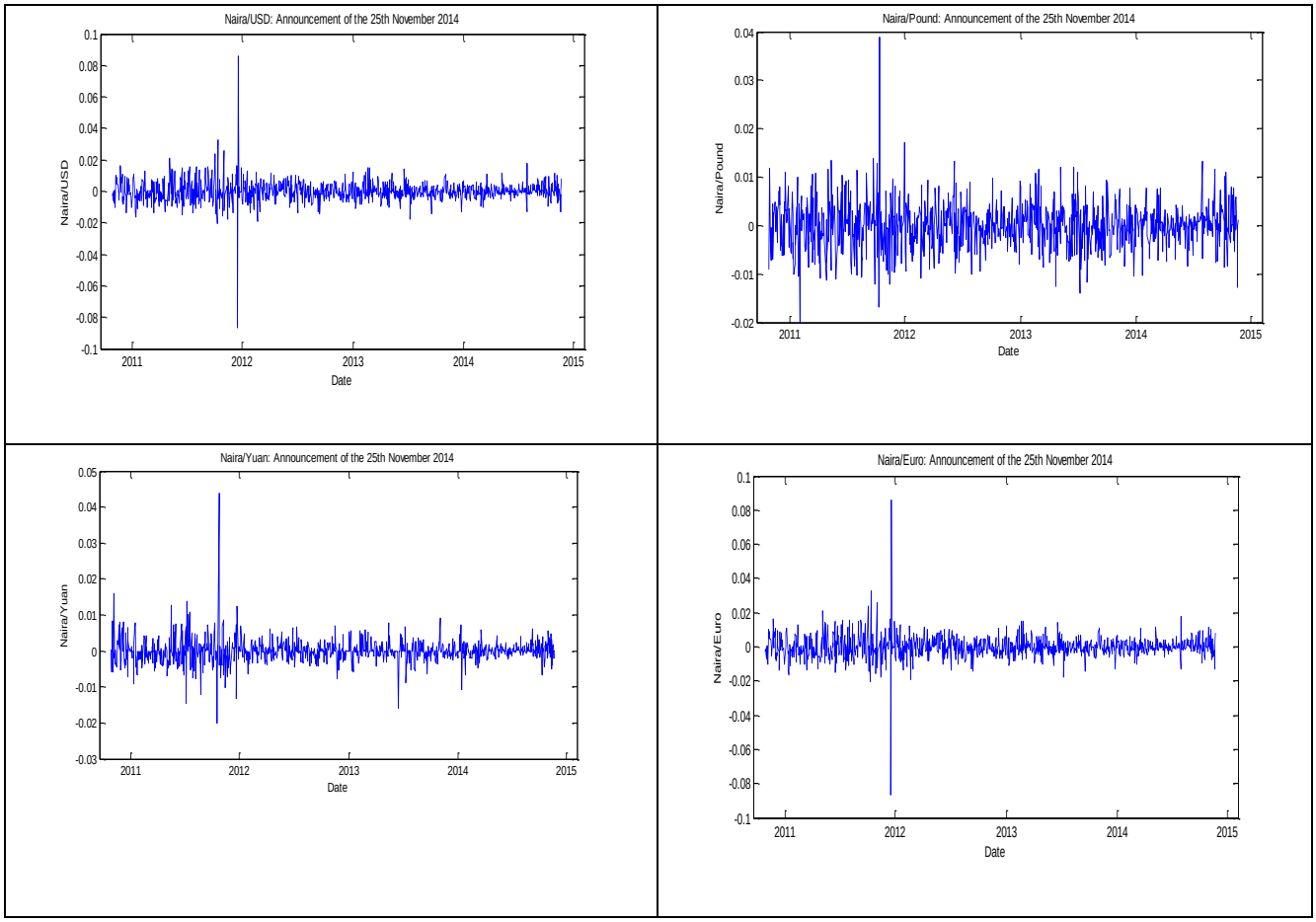
Figure 4 (lower left quadrant) shows the logarithmic daily returns of the Naira/Yuan exchange rate series with the returns fluctuating around a constant level, but exhibiting volatility clustering. The same characteristic was observed in the other 3 unreported series for 2 days after policy announcement of 25th November 2014.

Autocorrelation

Autocorrelation, "lagged correlation" or "serial correlation", is the linear dependence of a variable with itself at two points in time. For stationary processes, autocorrelation between any two observations only depends on the timelag between them. A well-known stylised fact is that exchange rates exhibit volatility clustering (that is, volatility shows positive autocorrelation) and the shocks to volatility can take some time to die out. We now investigate if there are autocorrelations in squared returns or "ARCH effects" in the daily returns on the four exchange rate series. Is there substantial evidence of ARCH effects based on the autocorrelations of the squared residuals of the daily returns on the four exchange rate series.

ARCH models are used to characterize and model time series. ARCH models assume that the variance of the current error term is related to the size of the previous periods' error terms, giving rise to volatility clustering. This phenomenon is widely observable in financial markets, where periods of low volatility are followed by periods of high volatility and vice versa. Figure 5 presents the logarithmic daily returns on the four exchange rate series for policy announcement of 25th November 2014.

Figure 5: Logarithmic daily returns of the four exchange rate series for 2 days after the 25th November 2014 announcement



The returns appear to fluctuate around a constant level, but exhibit volatility clustering. The bulges in the return plots are graphical evidence of time-varying volatility.

We therefore conducted both ARCH test of Engle (1988) and Ljung-Box Q-test on the squared residual series for the logarithmic daily returns on the four exchange rate series at lags 5, 10, 15 and 20. The null hypothesis is rejected for the two tests (h = 1) of the four exchange rate series. The p-value for all tests is 0. Thus, not all of the autocorrelations up to lag 5, 10, 15 or 20 are zero, indicating volatility clustering in the residual series.

To investigate autocorrelation for the pairs of exchange rate return series for 2 days after policy announcement of 25th November 2014, we conducted both

ARCH test of Engle (1988) and Ljung-Box Q-test on the squared residual series for the logarithmic daily returns on the four exchange rate series at lags 5, 10, 15 and 20. The null hypothesis is rejected for the two tests (h = 1) of the four exchange rate series. The p-value for all tests is 0. Thus, not all of the autocorrelations up to lag 5, 10, 15 or 20 are zero, indicating volatility clustering in the residual series.

These characteristics suggest that a good volatility model for the Naira vs other currencies return series of 25th November 2014 policy announcement and 2 days after are: i) serial correlation, ii) time-varying variance, iii) peakedness as well as iv) fat tails; should be captured .

3.2 Analysing Stylized Facts of Asset Returns of Foreign Exchange Return based the policy announcement of the 19th February 2015 as well as 2 days after the policy announcement of 19th February 2015

Tables 3a and 3b report descriptive statistics of foreign exchange return for policy announcement of the 19 february, 2015 and 2 days after, respectively.

Table 3a: Descriptive Statistics of Foreign Exchange Return for policy announcement of the 19 February, 2015

Return Series	**mean**	**median**	**min**	**max**	**Std (%)**	**mode**	**skewness**	**kurtosis**
Naira/USD	0	0	-0.0256	0.045	0.21	0	6.684	255.64
Naira/Yuan	0	0	-	0.044	0.34	0	1.321	36.895

			0.0263					
Naira/Euro	0	0	-0.0867	0.086	0.70	0	0.330	50.155
Naira/Pound	0	0	-0.0275	0.039	0.49	0	0.295	9.178

Table 3b: Descriptive Statistics of Foreign Exchange Return based on 2 days after the policy announcement of the 19 February, 2015

Return Series	**mean**	**median**	**min**	**max**	**Std (%)**	**mode**	**skewness**	**kurtosis**
Naira/USD	0	0	-0.170	0.045	0.58	0	-25.211	756.723
Naira/Yuan	0	0	-0.171	0.044	0.64	0	-18.779	510.251
Naira/Euro	0	0	-0.172	0.086	0.89	0	-7.051	159.880
Naira/Pound	0	0	-0.172	0.039	0.73	0	-12.961	309.948

From table 3, arithmetic mean and median as measures of central tendency, are very close to zero for both on and 2 days after the 19 February, 2015 policy announcement. Thus the standard assumption of the Random Walk model that the expected value of daily returns equals zero is met. In terms of daily standard deviation, the Naira/Euro had the highest value while Naira/USD had the lowest (0.33%) both on and 2 days after the 19 February, 2015 policy announcement.

The standard deviation is much higher for each foreign exchange rate 2 days after the 19 February, 2015 policy announcement than on the day of the announcement. This is expected as supported by empirical findings.

In terms of assessing the normality of logarithmic returns of the exchange rates, the results show that all four returns series show strong departure from normality, as the coefficients of skewness (value not equal to zero) and kurtosis (greater than 3) are statistically different from those of a normal distribution.

Formal tests of normality using the Anderson-Darling, Jarque-Bera and Kolmogorov-Smirnov Normality tests (not reported) strongly reject the null hypothesis of normality for the four foreign exchange return series based on and 2 days after the policy announcement of the **19th February 2015**.

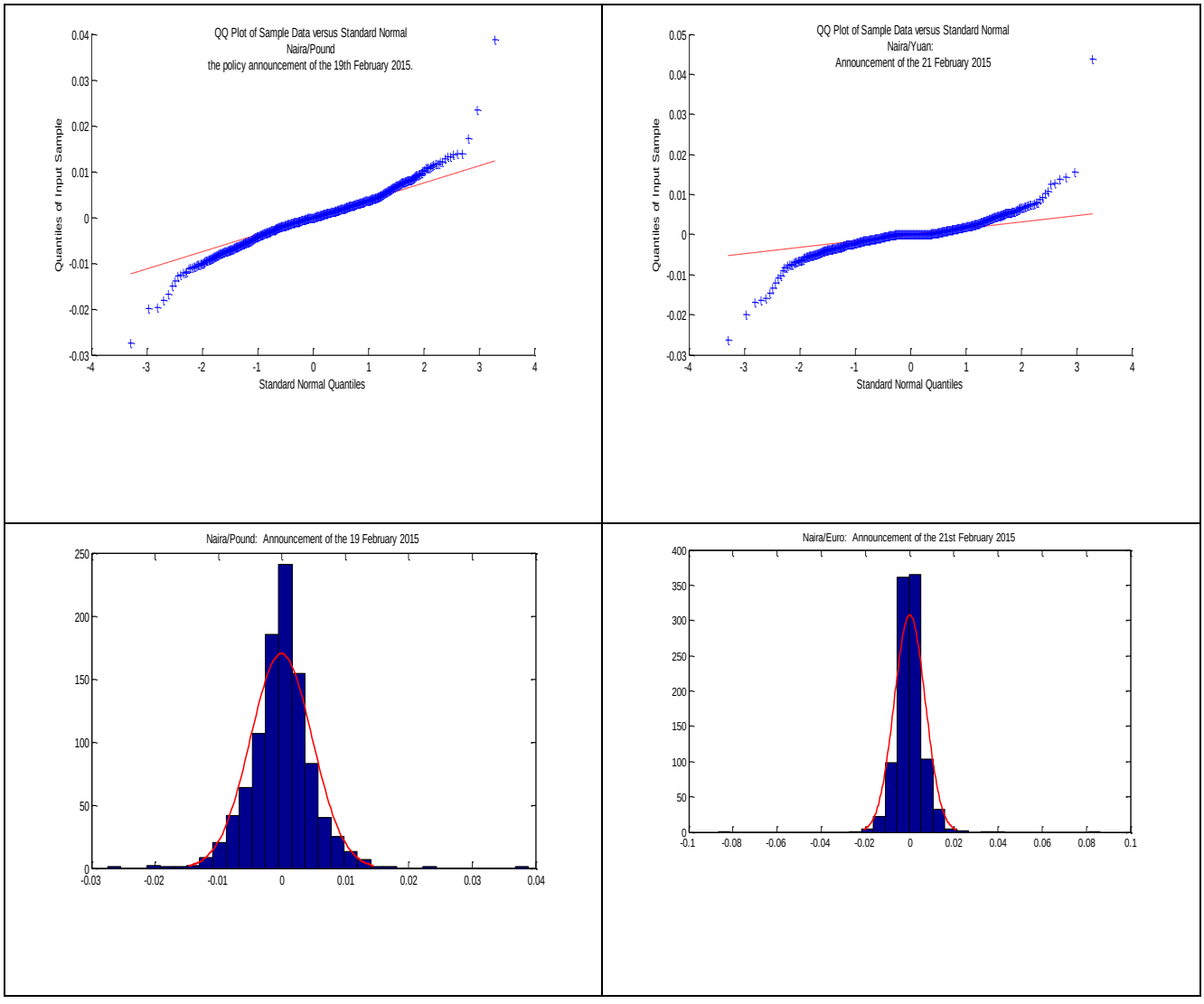
Quantile-Quantile and Histogram Plots

Figure 5 (upper row) shows the qqplot of the logarithmic daily returns on exchange rate series (the empirical distributions) against standard normal quantiles. The left shows the Naira/Pound exchange rate based on 19 February, 2015 policy announcement while the right qqplot shows the Naira/Yuan exchange rate based on 21 February, 2015 policy announcement. The qpplots have steeper slopes at their tails while the central mass of the empirical observations are approximately linear, this suggests that empirical distributions have heavier tails than the normal distribution.

The empirical distributions of the exchange rate superimposed on a histogram with normal density (lower row) shows that the exchange rates are all more peaked than the normal density around the mean. Therefore, the logarithmic daily returns on the exchange rate series exhibit fat tails (leptokurtic). . The left shows the Naira/Pound exchange rate based on 19 February, 2015 policy

announcement while the right histogram shows the Naira/Euro exchange rate based on 21 February, 2015 policy announcement.

Figure 5: qqplot and histogram of the logarithmic daily returns of the exchange rate series against standard normal quantiles (upper row) and fitted to a histogram (lower row)

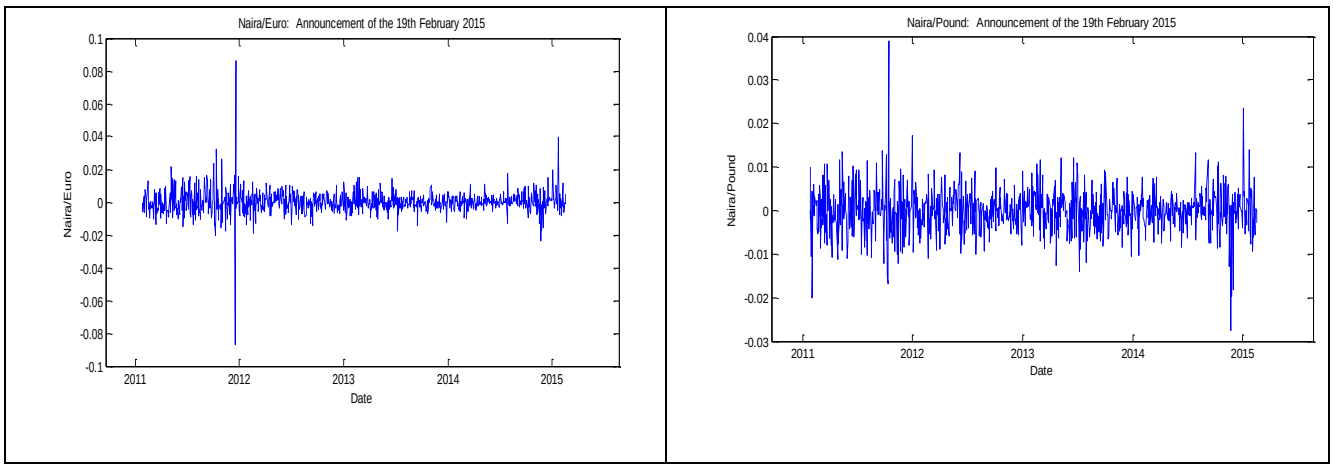


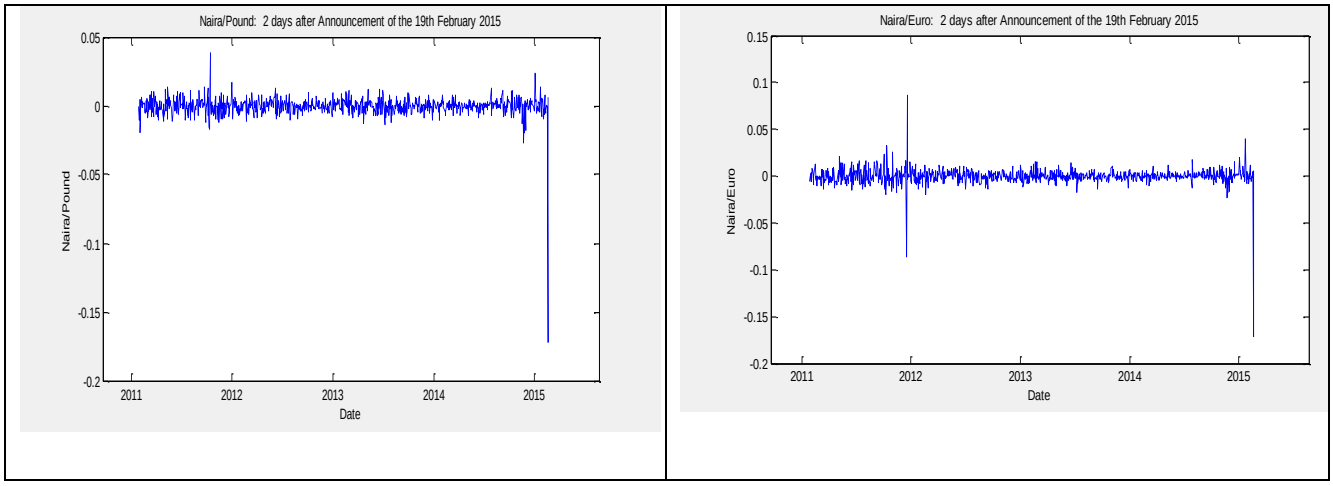
Autocorrelation

Figure 6 shows the logarithmic daily returns of exchange rate series with the returns fluctuating around a constant level, but exhibiting volatility clustering. The same characteristic was observed in the other unreported series. The top row shows the exchange rates based on 19 February, 2015 policy announcement while the right bottom shows exchange rates based on 21 February, 2015 policy announcement.

To investigate autocorrelation, we conducted both ARCH test of Engle (1988) and Ljung-Box Q-test on the squared residual series for the logarithmic daily returns on the four exchange rate series at lags 5, 10, 15 and 20. The null hypothesis is rejected for the two tests (h = 1) of the four exchange rate series. The p-value for all tests is 0. Thus, not all of the autocorrelations up to lag 5, 10, 15 or 20 are zero, indicating volatility clustering in the residual series.

Figure 6 shows the logarithmic daily returns of exchange rate series





These characteristics in Figure 6 and Table 4 suggest that a good model for the Naira vs other currencies return series should capture i) serial correlation, ii) time-varying variance, iii) peakedness as well as iv) fat tails.

3.3 Summary of Analysis of Stylized Facts of Asset Returns of Foreign Exchange Return Series and Lessons Learnt

Figure 7 shows a plot of the standard deviation of the logarithmic daily returns of the four exchange rate series on and 2 days after the 24 November 2014 policy announcement as well as on and 2 days after the 19 February, 2015 policy announcement. From the plot, the Naira/Euro has had the highest standard deviation value while the Naira/USD has had the lowest value of standard deviation. Furthermore, 2 days after the 19 February, 2015 policy announcement produced the highest value of standard deviation for each of the 4 exchange rates in comparison to the other periods used for the analysis.

Figure 7 shows a plot of the standard deviation of the pairs of the exchange rates

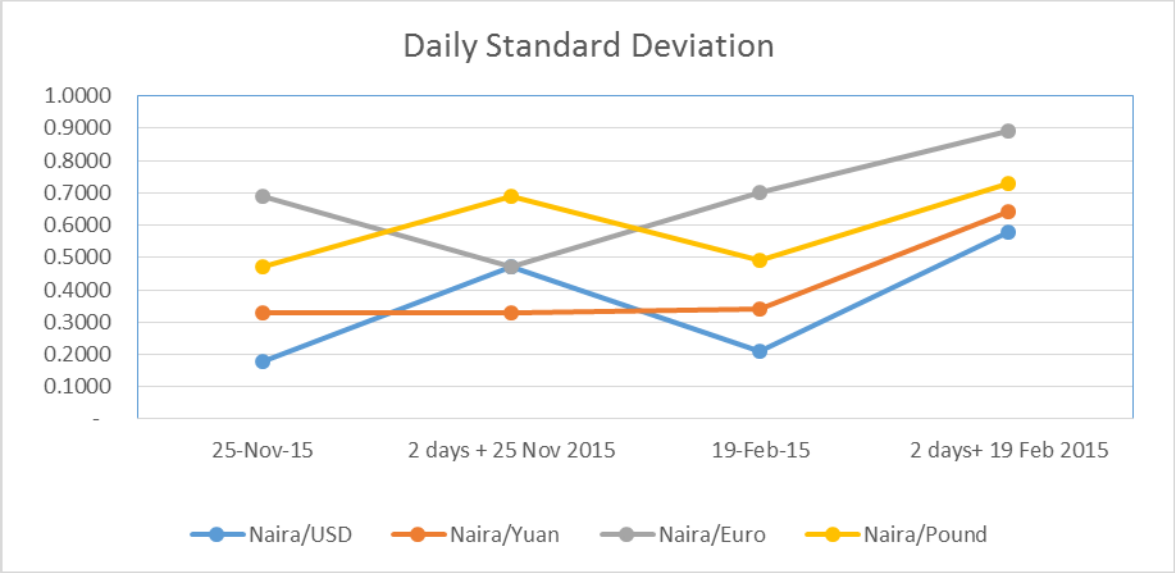
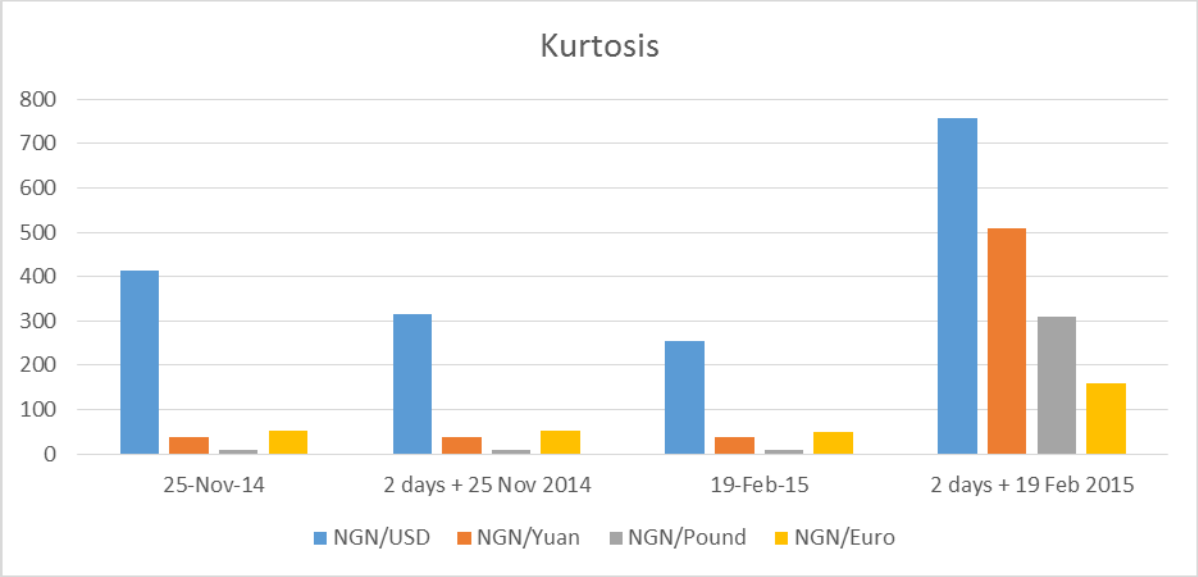


Figure 8 shows a plot of the kurtosis of the logarithmic daily returns of the four exchange rate series on and 2 days after the 24 November 2014 policy announcement as well as on and 2 days after the 19 February, 2015 policy announcement. The figure shows that the kurtosis of 2 days after the 19 February, 2015 policy announcement is the highest for each return series when compared to the kurtosis of other periods used for the analysis. The Naira/USD produced the highest kurtosis in 3 out of 4 analysis periods.

Figure 8 shows a plot of the kurtosis of the logarithmic daily returns



In terms of skewness, all exchange rates produced positive skewness except the data used for 2 days after the 19 February, 2015 policy announcement, where all the rates produced negative skewness. Furthermore, the period that produced the highest skewed values, in decreasing order, are 2 days after 19 February, 2015 policy announcement, on 25 November 2014 policy announcement, on 19 February, 2015 policy announcement and 2 days after November 2014 policy announcement.

Because of the existence of asymmetry of the return distributions observed, it is necessary to model left and right tails separately in order to capture their distinct characteristics. In the case there is evidence of positive (negative) skewness, which means that the right (left) tails are particularly extreme.

Several qq-plot where the tails have slopes different than the central mass is therefore suggestive of the empirical distribution having heavier, or thinner, tails than the reference standard normal distribution. None of the four series under four separate policy regimes studied here shows a normal distribution of returns. In addition, outliers are visible in the upper right and lower left corners of all the

plots. Fat tails mean that crashes and huge increases appear far more often than predicted by the normal law.

These characteristics suggest that a good model for describing/forecasting volatility and risk measures of the Naira vs other currencies return series should capture i) serial correlation, ii) time-varying variance, iii) peakedness as well as iv) fat tails.

3.4 Fitting of GARCH-based Models

In the previous section, we discovered that a good model for modelling volatility and risk measures of the Naira vs other currencies return series should capture i) serial correlation, ii) time-varying variance, iii) peakedness as well as iv) fat tails. We therefore fit ARCH(1), GARCH(1,1), GJR-GARCH(1,1), EGARCH(1,1), APARCH(1,1) and FIGARCH to the for the four foreign exchange return series based on the day of the announcement (**25th November 2014 and** 19 February, 2015) and two business days after. The exchange rates are the Naira/USD, Naira/Yuan, Naira/Pound and Naira/Euro exchange rates.

Tables 5 and 6 report model estimates of log-likelihood for the 4 return series based on the day of the announcement of 24 November 2014 two days after the announcement of 24 November 2014 Announcement, respectively. Similarly, Tables 7 and 8 show model estimates for the four pairs of exchange rate return series based on the day of the announcement of 19 February 2015 Announcement and two days after, respectively.

All estimates were computed using maximum likelihood assuming the innovations are conditionally normally distributed. For many applications, the natural logarithm of the likelihood function, called the log-likelihood, is useful as the measure of fit. The log-likelihood is maximized to determine optimal

values of the estimated coefficients, which are not reported until after the best fitting model is identified. Because we want to maximize the log-likelihood, the higher value signifies a better model fit.

Tables 5a and 6a show the ARCH log-likelihood estimates of the announcement of 24 November 2014 and two days after the Announcement for the four pairs of the Naira exchange rates. In both tables, the highest log-likelihood, as a measure of fit, is produced by the USD ARCH (5) model based on Skewed Student T error distribution. In all pairs of the exchange rate, ARCH (5) model with Normal errors returned a higher log-likelihood value than corresponding ARCH(1) model with Normal error distribution, implying better fit for the data. Moreover, the models with Student t and Skewed Student t distribution of residuals produced better fit for the exchange rate than those based on Normal distribution. These are the same findings obtained in the case of the announcement of 19 February 2015 and two days after the Announcement, as depicted in Tables 7a and 8a, respectively.

Tables 5b, 6b, 7b and 8b report the Naira/USD log-likelihood estimates for all GARCH models based on announcements of 24 Nov 2014 and two days after as well as 19 February 2015 and two days after, respectively. FIGARCH model with Student T error distribution produced the highest log-likelihood and hence the preferred model for the Naira/USD exchange rate based on the announcements of 24 Nov 2014 and two days after. In the case of two days after the 19 February 2015 announcement, FIGARCH model with skewed Student T error distribution produced the highest log-likelihood and hence the preferred model for the Naira/USD exchange. Based on announcements of 24 November 2014 and 19 February 2015 and their two days after, the two next best fitting models are the APARCH model with student t and APARCH with skewed student t errors. Moreover, all the GARCH models with normal error distribution gave lower values

of log-likelihood than their corresponding counterparts with student t and skewed student t distributions.

The log-likelihood estimates for all the Naira/Yuan return series using GARCH models based on announcements of 24 Nov 2014 and two days after as well as 19 February 2015 and two days after, are reported in Tables 5c, 6c, 7c and 8c, respectively.

For 24 Nov 2014 announcement, APARCH model with Student T error distribution produced the highest log-likelihood while for 26 Nov 2014 as well as 19 February2015 announcements and its two days after, APARCH model with Skewed Student t and Student t error distributions (both reported the same value) produced the highest log-likelihood. In the case of announcement of 24 Nov 2014, the next models with higher values of log-likelihood are APARCH with Student T error distribution and GJR-GARCH with Skewed Student T error distribution.

Tables 5d, 6d, 7d and 8d report the Naira/Pound log-likelihood estimates for all GARCH models based on announcements of 24 Nov 2014 and two days after as well as 19 February 2015 and two days after, respectively. In all the announcement dates, APARCH model with Skewed Student T error distribution produced the highest log-likelihood. The next best fitting model in most dates is EGARCH.

Similarly, Tables 5e, 6e, 7e and 8e report the Naira/Euro log-likelihood estimates for all GARCH models based on announcements of 24 Nov 2014 and two days after as well as 19 February 2015 and two days after, respectively. In the announcement dates, APARCH model with Skewed Student T error distribution is the preferred model when modelling Naira/Euro exchange rate. The next

preferred model is APARCH model with Student T error distribution in the case of 24 Nov 2014 and two days after and GJR-GARCH model with Skewed Student T error distribution for 19 February 2015 and two days after.

Generally, modelling volatility of the four pairs of the exchange rate based on the announcements, the ARCH models produced lowest log-likelihood values compared to the GARCH-based models. The GARCH models are therefore preferred. In the GARCH models, APARCH models with skewed student t distribution is preferred for modelling volatility in all currency pairs except in the case of Naira/USD that portrayed FIGARCH as the best model. Also, the Naira/USD exchange rate produced the highest log-likelihood values while the Naira/Euro exchange rate produced the lowest fit in terms of the log-likelihood values.

Furthermore, the result of the best fitting model for a particular pair of exchange rate obtained for the announcement of 24 Nov 2014 is the same as the result for the same pair for announcement of 26 Nov 2014. The same applies to 19 February 2015 and its two days after.

Table 9 shows the parameter estimates, p-values and log-likelihoods from the selected models for the Naira/USD, Naira/Yuan, Naira/Pound and Naira/Euro exchange rates based on the day of the announcement (**25th November 2014 and** 19 February, 2015) and two business days after.

The GARCH (1, 1) and other asymmetric GARCH models (EGARCH, GJR-GARCH and APARCH) clearly improve upon the ARCH models because they have a much higher log likelihood and no serial correlation. As seen in the table, the log-likelihood estimate of the IGARCH (1,1) model is not far away from those of the

GARCH(1,1) model, but there is a major difference between the two models. The unconditional variance of is not defined under the above IGARCH (1,1) model.

The asymmetric EGARCH, GJR-GARCH and APARCH, in all cases provide superior fit when compared to standard GARCH models. This suggests the presence of asymmetry, which is largely responsible for the superior fit since the pairs of the exchange rate asset return series have been found to exhibit a "leverage" effect. Specifically, in most cases, the APARCH (1,1) model had the highest log-likelihood than other corresponding asymmetric models.

Besides leptokurtic returns, the APARCH(1,1) model, as the best fitting GARCH model, captures other stylized facts in financial time series, like volatility clustering. The APARCH model, as the EGARCH and GJR-GARCH model, additionally captures asymmetry in return volatility. That is, volatility tends to increase more when returns are negative, as compared to positive returns of the same magnitude.

To investigate the stability of the estimates, we compare the log-likelihood of fitting the models to the return pairs of Naira/USD, Naira/Yuan, Naira/Pound and Naira/Euro on the day of the announcement **25th November 2014** and two business days after. The same analysis is carried out for the announcement of 19 February, 2015 and two business days after.

Recall that we also estimated a FIGARCH (1, d, 1) model to account for the potential presence of long-memory in volatility. FIGARCH model with Student T error distribution produced the highest log-likelihood and hence the preferred model for the Naira/USD exchange rate based on the announcements of 24 Nov 2014 and two days after. In the case of two days after the 19 February 2015 announcement, FIGARCH model with skewed Student T error distribution produced the highest log-likelihood and hence the preferred model for the

Naira/USD exchange. The Naira/USD exchange in this case accepted the additional flexibility of the FIGARCH model.

For the Naira/Yuan, the APARCH model, the log-likelihood on the announcements of 24 Nov 2014 and two days after are the same. In the Naira/Pound and Naira/Euro, the 24 Nov 2014 announcement period is much higher than the estimate of two days after the announcement. However, the 19 February 2015 announcement period is much higher than the estimate of two days after the announcement. This implies there is more in the Naira/Yuan, Naira/Pounds and Naira/Euro exchange rates before the 19 February 2015 announcement, which has been captured by the APARCH model.

In summary, our empirical results show that FIGARCH models with fat-tailed distributions are capable of capturing serial correlation, time-varying variance, long-memory, peakedness as well as fat tails for the Naira/USD. For the Naira/Yuan, Naira/Pound and Naira/Euro, the APARCH(1,1) model with student t or skewed student t error disrtibutions are able to capture i) serial correlation, ii) time-varying variance, iii) peakedness as well as iv) fat tails as discovered in the previous section.

4.0 SELECTING THE BEST VOLATILITY MODEL

This paper analyses the stylized facts of asset returns of the Naira/USD, Naira/Yuan, Naira/Pound and Naira/Euro exchange rates both on **25th November 2014 and** 19 February, 2015 announcement dates and two business days after. The paper also demonstrates empirical analysis of GARCH processes, compares different GARCH models, and explores the role of alternative distributional assumptions in the estimation of GARCH models using the conditional normal, the Student t and the Student skewed t.

The logarithmic daily returns of the four exchange rate series shows that the Naira/Euro had the highest standard deviation value while the Naira/USD had the lowest value of standard deviation. Furthermore, 2 days after the 19 February, 2015 policy announcement produced the highest value of standard deviation for each of the 4 exchange rates in comparison to the other periods used for the analysis.

This paper therefore also applies ARCH, symmetric GARCH and three asymmetric GARCH models (which are EGARCH, GJRGARCH and APARCH), unit-root GARCH models (IGARCH) and long memory in volatility, that is FIGARCH with variations in the distribution of the errors to be normal, student t and skewed student t that capture most stylized acts about exchange rate returns such as volatility clustering and leverage effect to the four pairs of Nigerian foreign exchange data. The question asked in this regard is 'Which volatility model best fits each of the four pairs of Nigerian foreign exchange data?'

Because of the existence of asymmetry of the return distributions observed, we find that it is necessary to model left and right tails separately in order to capture their distinct characteristics. In the case there is evidence of positive (negative) skewness, which means that the right (left) tails are particularly extreme.

The Nigerian exchange rate (Naira/USD, Naira/Pound, Naira/Euro and Naira/Yuan) exhibited the widely observed stylised facts of asset returns based on CBN policy announcements of the two dates. These characteristics suggest that a good model for describing/forecasting volatility and risk measures of the Naira vs other currencies return series should capture are: i) serial correlation, ii) time-varying variance, iii) peakedness as well as iv) fat tails.

The asymmetric EGARCH, GJR-GARCH and APARCH, in all cases provide superior fit when compared to standard GARCH models. This suggests the presence of asymmetry, which is largely responsible for the superior fit since the pairs of the exchange rate asset return series have been found to exhibit a "leverage" effect. That is, volatility tends to increase more when returns are negative, as compared to positive returns of the same magnitude. Specifically, in most cases, the APARCH (1,1) model had the highest log-likelihood than other corresponding asymmetric models.

4.1 FINDINGS AND POLICY IMPLICATIONS

FINDINGS

i. Volatility is very dynamic as it continuously changes over time. In this paper, we observe that the change in volatility is due to policy announcements by the CBN with respect to the exchange rates.

ii. A good model for describing/forecasting volatility and risk measures of the Naira vs other currencies return series should capture are: i) serial correlation, ii) time-varying variance, iii) peakedness as well as iv) fat tails. Furthermore, due to the existence of asymmetry of the return distributions observed, it is necessary to model left and right tails separately in order to capture their distinct characteristics. In the case there is evidence of positive (negative) skewness, which means that the right (left) tails are particularly extreme.

iii. We also find that FIGARCH models with fat-tailed distributions are capable of capturing serial correlation, time-varying variance, long-memory, peakedness as well as fat tails for the Naira/USD. For the Naira/Yuan, Naira/Pound and Naira/Euro, the APARCH (1,1) model with student t or skewed student t error distributions are able to capture serial correlation,

time-varying variance, peakedness as well as fat tails as discovered in the data.

iv. Generally, modelling volatility of the four pairs of the exchange rate based on the announcements, the ARCH models produced lowest log-likelihood values compared to the GARCH-based models. The GARCH models are therefore preferred. In the GARCH models, APARCH models with skewed student t distribution is preferred for modelling volatility in all currency pairs except in the case of Naira/USD that portrayed FIGARCH as the best model. Also, the Naira/USD exchange rate produced the highest log-likelihood values while the Naira/Euro exchange rate produced the lowest fit in terms of the log-likelihood values. Moreover, the models with Student t and Skewed Student t distribution of residuals produced better fit for the exchange rate than those based on Normal distribution.

POLICY IMPLICATIONS

i. The choice of the model for calculating value-at-risk based on volatility forecast should be as dictated by the stylised facts of the underlying data and according to the model's assumption in order to avoid model risk or inaccurate risk forecast.

ii. Accurate forecast of volatility by regulators is not only useful for estimating risk measures, it can also indicate the possible directions that banks will take in the future. As discussed by Gerlach et al (2006), shifts in volatility affect investors' willingness to hold risky assets and their prices. Banks' willingness and ability to extend credit can be influenced by the level of volatility in financial markets. A quick surge in volatility might deter major market participants from being involved in a price quotation system like Nigeria's FMDQ. This can in turn reduce liquidity and lead to low activity in the Forex market. Sudden changes in the level of financial market

volatility, when accurately forecasted, should be of concern to policymakers.

iii. Poon and Granger (2003) stated that Federal Reserve as well as Bank of England utilise the volatility estimates of bonds, stocks and other parameters in policy-making. CBN should also do the same and NDIC should assist the monetary authority in this regard through regular estimation and analysis of this risk forecast.

iv. For bank regulators, the choice of the wrong VaR estimate, which in most cases rely on the particular volatility model, can make a great deal of difference in the actual capital to be set aside by the bank. Similarly, the bank risk managers can set the wrong or inappropriate limit for trading based on the wrong choice of volatility model.

v. Modern financial regulations are increasingly dependent on statistical risk models. Similarly, financial institutions use the same models for both regulatory and economic capital decisions. Volatility models are among the most prominent statistical risk forecasting models and commonly used in computing value-at-risk and in derivatives pricing. However, in practice, as argued by Danielsson (2015), most risk modelling approaches can highly inaccurate. A simple reason for the inaccuracy can be narrowed down to the choice of the right model. No matter how simple or sophisticated the risk model is, it must be applied in the problem based on the stylised facts of the underlying data and according to the model's assumption.

Reference

Basel Committee on Banking Supervision (2013), "Fundamental review of the trading book: A revised market risk framework".

Basel Committee on Banking Supervision (2014), "Fundamental review of the trading book: outstanding issues".

Bollerslev, T. (1986), "Generalized Autoregressive Conditional Heteroskedasticity", *Journal of Econometrics*, 31, 307-327.

Bollerslev, T. and Wooldridge, J. M., (1992), "Quasi-Maximum Likelihood Estimation and Inference in Dynamic Models with Time-Varying Covariances", *Econometric Reviews*, 11(2), 143-172.

Bollerslev, T., Chou, R. Y., and Kroner, K. F. (1992), "Arch modeling in finance: A review of the theory and empirical evidence", Journal of Econometrics 52, 1-2 (1992), 5–59.

Brooks C., (2008), "Introductory Econometrics for Finance: Second Edıtıon", Cambrıdge Unıversıty Press

Campbell, J., Lo, A., and Mackinlay, C. (1997), The Econometrics of Financial Markets. Princeton University Press, Princeton, NJ, 1997.

Clewlow & Strickland, 2000, Energy Derivatives: Pricing and Risk Management, Lacima Group.

Danielsson, J and HS Shin (2003), *Endogenous risk. In Modern Risk Management — A History*. Risk Books.

Danielsson, J. (2008), "**Blame the models**", *Journal of Financial Stability*, 4 (4). 321-328. ISSN 1572-3089

Danielsson J. (2009) "The myth of the riskometer", VoxEU.org, 5 January.

Danielsson, J and Macrae, R. (2011), "The appropriate use of risk models: Part I", VoxEU.org, 16 June.

Danielsson J. (2015) "Why risk is hard to measure", VoxEU.org, 25 April 2015.

Danielsson J. (2015b) "What the Swiss FX shock says about risk models", VoxEU.org, 2015

Darrell D. (1998), "Black, Merton and Scholes- Their Central Contributions to Economics", Scandinavian Journal of Economics, 100(2), 411-424, 1998.

Ding, Z., Granger C.W., Engle R.F., (1993), "A Long Memory Property of Stock Market Returns and a New Model". Journal of Empirical Finance 1 (1993) 83-106.

Dowd, K. (2005) "Measuring Market Risk". Second edition. Chichester and New. York: John Wiley and Sons, Spring. Hardback.

Engle, R. F., (1982), "Autoregressive Conditional Heteroscedasticity with Estimates of the Variance of United Kingdom Inflation", *Econometrica*, 50(4), 987-1007.

Engle, R.F. and Bollerslev, T. (1986), "Modelling the persistence of conditional variances", Econometric reviews 5 (1), 1-50

Engle, R. F., (1990), "Discussion: Stock market volatility and the crash of '87, Review of Financial Studies" 3, 103–106. , and V. Ng, 1993, Measuring and testing the impact of news on volatility, Journal of Finance 48, 1749–1778.

Engle, R. F., and Ng, Victor, 1993, "Measuring and Testing the Impact of News on Volatility", *Journal of Finance*, 48, 1749-1778.

Engle R (1993) "statistical Models for Financial Volatility- Technical Note" Financial Analysts Journal (January-February 1993)

Engle, R. F., and Mezrich, Joseph, (1996), "GARCH for Groups, *RISK"*, 9(8), 36-40.

Engle, R. F., and Manganelli, S, (1999), "CAViaR: Conditional Autoregressive Value at Risk by Regression Quantiles", University of California, San Diego, Department of Economics Working Paper 99-20.

Engle, R. (2001), "GARCH 101: The Use of ARCH/GARCH models in Applied Econometrics", Journal of Economic Perspectives—Volume 15, Number 4, Fall 2001, Pages 157–168

Engle & Patton (2001), Robert F. E. and Andrew J. P. (2001), "What good is a volatility model?", 29 January, 2001, Department of Finance, NYU Stern School of Business, and Department of Economics, University of California, San Diego, obtained

Engle R (2002) "New Frontiers for ARCH Models**",** Journal of Applied Econometrics, **17**: 425–446 (2002).

Erdemlioglu, D., L., S., and. Neely, C.J. (2012), "Econometric Modeling of Exchange Rate Volatility and Jumps", Working Paper 2012-008, Federal Reserve Bank of St. Louis.

Gerlach, S., Ramaswamy, S. and Scatigna, M., (2006). "150 years of financial market volatility". BIS Quarterly Review, September.

Granger, C. W. J., Spear, S., and Ding, Z. (2000). "Stylized facts on the temporal and distributional properties of absolute returns": An update. Statistics and Finance: An Interface. Proceedings of the Hong Kong International Work shop on Statistics in Finance.

Figlewski (2004), Stephen Figlewski, "Forecasting Volatility", Monograph on Volatility, Final Draft, April 24, 2004, New York University Stern School of Business, www.stern.nyu.edu.

Fouque et al. (2000), Jean-Pierre Fouque, George Papanicolaou, K. Ronnie Sircar, "Derivatives in Financial Markets with Stochastic Volatility", Cambridge University Press, 2000.

Glosten, L. R., R. Jagannathan, and D. E. Runkle, 1993. On The Relation between The Expected Value and The Volatility of Nominal Excess Return on stocks. Journal of Finance 48: 1779-1801.

Hansen, PR and Lunde, A (2001), "A comparison of volatility models: Does anything beat a GARCH(1,1) ? ", Centre for Analytical Finance, University of Aarhus, Aarhus School of Business, Working Paper Series No. 84 March 2001

Jarrow, R.A. (1999), "In Honour of Nobel laureates Robert C. Merton and Myron S. Scholes: A Partial Differential Equation that changed the world", Journal of Economic Perspectives, vol. 13, No. 4, pp. 229-248.

Jarrow, R.A. (1998), "Volatility: New Estimation Techniques for Pricing Derivatives", Risk Books.

Nelson, D. B. (1990), "Conditional Heteroskedasticity in Asset Returns: A New Approach", Econometrica, 59(2), 347—370.

Persaud, A. (2008), "Why bank risk models failed", http://www.voxeu.org, accessed March 11, 2016.

Poon, S.H. and Granger, C.W., (2003). "Forecasting volatility in financial markets: A review". Journal of economic literature, 41(2), pp.478-539.

Sheppard, K. (2013), "Financial Econometrics Notes", University of Oxford, https://www.kevinsheppard.com/Category:MFE

Zakoian, J. M., (1994). "Threshold Heteroscedastic Models. Journal of Economic Dynamics and Control" 18: 931-955.

Appendix

Table 5a: ARCH log-likelihood (LL) Estimates of 24 Nov 2014 Announcement

	ARCH (1), Normal Errors	ARCH(5), Normal Errors	ARCH(5), Student t Errors	ARCH(5), Skewed ST
USD	298	365	2642	3318
Yuan	-303	-180	-35	-35
Pound	-668	-654	-617	-617
Euro	-968	-964	-824	-822

Table 5b: Naira/USD log-likelihood (LL) Estimates for all GARCH models of 24 Nov 2014

	Normal Errors	Student t Errors	Skewed ST
GARCH	1,260	2,471	3,185
EGARCH	1,152	2,741	
GJR-GARCH	1,324	2,484	3,185
APARCH	1,384	8,423	8,443
IGARCH	1,260	2,473	3,113
FIGARCH	1,260	8,532	3,113

Table 5c: Naira/Yuan LL Estimates for all GARCH models of 24 Nov 2014 Announcement

	Normal Errors	Student t Errors	Skewed ST
GARCH	-178	-23	-23
EGARCH	-166	-70	
GJR-GARCH	-170	-22	-21
APARCH	-166	-21	-20
IGARCH	-178	-23	-23
FIGARCH	-171	-23	-23

Table 5d: Naira/Pound LL Estimates for all GARCH models of 24 Nov 2014 Announcement

	Normal Errors	Student t Errors	Skewed ST
GARCH	-640	-608	-608
EGARCH	-623	-600	
GJR-GARCH	-628	-602	-602

APARCH	-626	-600	-599
IGARCH	-641	-609	-608
FIGARCH	-645	**-609**	-608

Table 5e: Naira/Euro LL Estimates for all GARCH models of 24 Nov 2014 Announcement

	Normal	Student t	Skewed ST
GARCH	-910	-804	-801
EGARCH	-902	-807	
GJR-GARCH	-908	-801	-799
APARCH	-906	-792	790
IGARCH	-910	-805	-802
FIGARCH	-909	**-806**	-803

Table 6a: ARCH log-likelihood (LL) Estimates of two days after the announcement of **24 November 2014**

	ARCH (1), Normal Errors	ARCH(5), Normal Errors	ARCH(5), Student t Errors	ARCH, Skewed ST
USD	206	320	2,410	3,106
Yuan	-	-	-	-

	305	183	37	37
Pound	-680	-619	-619	-618
Euro	-975	-972	-829	-827

Table 6b: Naira/USD log-likelihood (LL) Estimates for all GARCH models of two days after the announcement of **24 November 2014**

	Normal Errors	Student t Errors	Skewed ST
GARCH	1,209	2,264	3,009
EGARCH	1,047	2,711	
GJR-GARCH	1,276	2,267	2,978
APARCH	1,346	8,299	8,271
IGARCH	1,209	2,264	2,953
FIGARCH	1,209	8,591	2,953

Table 6c: Naira/Yuan LL Estimates for all GARCH models of two days after the announcement of **24 November 2014**

	Normal Errors	Student t Errors	Skewed ST
GARCH	-181	-26	-25
EGARCH	-169	-73	
GJR-GARCH	-175	-24	-24
APARCH	-171	-20	-20
IGARCH	-181	-26	-25
FIGARCH	-175	-24	-24

Table 6d: Naira/Pound LL Estimates for all GARCH models of two days after the announcement of **24 November 2014**

	Normal Errors	Student t Errors	Skewed ST
GARCH	-650	-613	-612
EGARCH	-638	-607	
GJR-GARCH	-643	-612	-611
APARCH	-636	-605	-604
IGARCH	-653	-615	-614
FIGARCH	-613	-614	-651

Table 6e: Naira/Euro LL Estimates for all GARCH models of two days after the announcement of **24 November 2014**

	Normal Errors	Student t Errors	Skewed ST
GARCH	-917	-812	-810
EGARCH	-908	-813	
GJR-GARCH	-915	-812	-809
APARCH	-912	-800	-798
IGARCH	-917	-813	-811
FIGARCH	-917	-813	-811

<u>19 February 2015</u>

Table 7a: ARCH log-likelihood (LL) Estimates of **19 February 2015** Announcement

	ARCH (1), Normal Errors	ARCH(5), Normal Errors	ARCH(5), Student t Errors	ARCH, Skewed ST
USD	145	310	2,318	3,079
Yuan	-323	-215	-20	-20
Pound	-	-	- 618	-

	697	669		618
Euro	- 988	- 984	- 819	- 817

Table 7b: Naira/USD log-likelihood (LL) Estimates for all GARCH models of **19 February 2015** Announcement

	Normal Errors	Student t Errors	Skewed ST
GARCH	794	2,190	3,003
EGARCH	839	2,740	
GJR-GARCH	835	2,214	2,986
APARCH	1,105	8,774	9,099
IGARCH	794	2,190	2,953
FIGARCH	799	9,953	7,965

Table 7c: Naira/Yuan LL Estimates for all GARCH models of 19 February **2015** announcement

	Normal Errors	Student t Errors	Skewed ST
GARCH	-208	-7	-7
EGARCH	-201	-80	
GJR-GARCH	-205	-3	-3
APARCH	-204	-2	-2
IGARCH	-208	-7	-7
FIGARCH	-205	-4	-3

Table 7d: Naira/Pound LL Estimates for all GARCH models of 19 February 2015 announcement

	Normal Errors	Student t Errors	Skewed ST
GARCH	-668	-616	-615
EGARCH	-691	-641	
GJR-GARCH	-660	-613	-613
APARCH	-656	-614	-608
IGARCH	-669	-617	-617
FIGARCH	-667	**-615**	-614

Table 7e: Naira/Euro LL Estimates for all GARCH models of 19 February 2015 announcement

	Normal Errors	Student t Errors	Skewed ST
GARCH	-932.0225	-801.5961	-798.9906
EGARCH	-919.3107	-811.2554	
GJR-GARCH	-931.4421	-800.4942	-798.1158
APARCH	-929.6136	-793.4606	-791.0954
IGARCH	-932.0238	-804.0744	-801.3749
FIGARCH	-931.3422	**-806.0238**	-803.3709

Table 7g: Parameter Estimates based on 'Normal' distribution of errors of Naira/USD

	GARCH	**GJR-GARCH**	**APARCH**
AIC	-1.436	-1.51774	-1.515
Q(20)	17.37	0.100	17.2646
$Q^2(20)$	0.268	0.164	0.164

Table 7h: Parameter Estimates based on 'Student t' distribution of errors of Naira/USD

	GARCH	GJR-GARCH	APARCH
AIC	-20.186	-17.58	-14.617
Q(20)	0.2367	25.42	0.0282
$Q^2(20)$	0.0838	0.232	0.02141

Table 7i: Parameter Estimates based on 'Skewed Student t' distribution of errors of Naira/USD

	GARCH	GJR-GARCH	APARCH
AIC	-22.802	-19.89	-13.63
Q(20)	116.74	0.041	0.0275
$Q^2(20)$	11.447	0.0415	0.021

21 Feb 2015: Tables 8 reports model estimates for the 4 return series based on two days after the announcement of **19 February 2015.**

Table 8a: ARCH log-likelihood (LL) Estimates of two days after **19 February 2015** Announcement

	ARCH (1), Normal Errors	ARCH(5), Normal Errors	ARCH(5), Student t Errors	ARCH, Skewed ST

USD	-868	-115	1,620	2,467
Yuan	-651	-554	-36	-36
Pound	-1,044	-927	-637	-637
Euro	-1,228	-1,182	-838	-837

Table 8b: Naira/USD log-likelihood (LL) Estimates for all GARCH models of two days after **19 February 2015** Announcement

	Normal Errors	Student t Errors	Skewed ST
GARCH	1,064	1,534	2,445
EGARCH	1,088	2,691	
GJR-GARCH	1,118	1,536	2,414
APARCH	1,174	7,078	7,899
IGARCH	1,064	1,526	2,412
FIGARCH	1,064	6,799	

			8,730

Table 8c: Naira/Yuan LL Estimates for all GARCH models of two days after 19 February **2015 announcement**

	Normal Errors	Student t Errors	Skewed ST
GARCH	-260	-44	-44
EGARCH	-575	-119	
GJR-GARCH	-260	-43	-43
APARCH	-248	-12	-12
IGARCH	-261	-47	-47
FIGARCH	-261	-47	-47

Table 8d: Naira/Pound LL Estimates for all GARCH models of two days after the 19 February 2015 announcement

	Normal Errors	Student t Errors	Skewed ST
GARCH	-709	-639	-639
EGARCH	-951	-664	
GJR-GARCH	-707	-638	-637
APARCH	-708	-626	-625

IGARCH	-731	-650	-650
FIGARCH	-731	-650	-650

Table 8e: Naira/Euro LL Estimates for all GARCH models of two days after 19 February 2015 announcement

	Normal Errors	Student t Errors	Skewed ST
GARCH	- 967	- 838	- 837
EGARCH	- 1,099	- 840	
GJR-GARCH	- 957	- 837	- 837
APARCH	- 953	- 806	- 804
IGARCH	- 968	- 843	- 840
FIGARCH	- 968	- 843	- 840

Application of Ethical Approach to Accounting Thought in Financial Reporting By Nigerian Banks

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Abstract

Globally, there have been increased cases of unethical financial reporting. However, ethical financial reporting is critical to user's decision making, the growth of capital markets and the dignity of the accounting profession. Adegbie & Adeniji (2010) and Imeokparia (2013) reported serious and diverse unethical challenges in the Nigerian banking industry after the 2004 reforms. This paper explores this claim by assessing the application of the ethical approach to accounting thought in financial reporting in the Nigerian banking industry over the period 2004 to 2012. Based on eleven developed themes, one hundred and thirty-five financial reports were observed. Descriptive statistics, application index and ANOVA statistics was utilized to analyse the data. The computed mean application index of 92.2 percent and the results of the ANOVA statistics among

the banks do not provide sufficient evidence to suggest that there is any serious ethical challenge in the industry as far as financial reporting is concerned. The paper concluded that though no serious unethical financial reporting tendencies might exist in the industry, and therefore there is the need to sustain and improve on the ethical tempo. This can be achieved through greater monitoring and enforcement of ethical regulatory code in the industry by the regulators.

Keywords: Ethics, Accounting Thought, Ethical Approach, Financial Reporting, Ethical Financial Reporting, Unethical Financial Reporting.

1.0 Introduction

Corporate management, particularly managing directors have responsibility to prepare and publish financial reports for the consumption of interested parties upon certification by external auditors. This task is to be ethically carried out by adopting the provisions and requirements of accounting standards, statutory regulatory frameworks and professional guidelines. Unfortunately, corporate board of directors and external auditors alike are culpably found guilty of unethical financial reporting. The accounting scandals involving Cadbury Nigeria Plc and Enron and Andresen in the United States illustrate this fact.

The users of financial reports are concerned about the quality of the reports and in particular, require the information disclosed to be truthful for their decision-making (Enderle, 2004). Ethics is fundamental to the relevance of financial reporting information for user's decision making. Gowthorpe & Amat (2005) cited in Abubakar (2011) maintained that ethical violation in financial reporting is not only an unfair practice to users but also jeopardise the very objective of the financial reports. According to Afolabi (2013) relevance of financial reports is the provision of information regarding the financial position, performance and

changes in financial position which is useful to users in making management and investment decisions.

Enderle (2004) stated that the Enron and Andersen scandal particularly raise searchlight on the ethics of financial reporting. Enderle further posits that the ethics of financial reporting is now an important problem of the financial sector. In Nigeria, Imeokparia (2013) reported that the financial services business especially the 2004 consolidation reform in the banking industry brought the issue of ethical conduct to the front burner position. This however does not suggest that ethical violation only persist in the financial sector. Afolabi (2013) pointed out cases of noncompliance with ethics and accounting standards in the Nigerian manufacturing sector.

The ethical approach is one of the approaches to accounting thoughts that has influence on financial reporting practice. Other approaches to accounting thoughts include the legal, economic, tax, behavioural and structural approaches (Henriksen & Breda, 2001; Hamid, 2009; Dandago & Ormin, 2011). The ethical approach to accounting thought is concerned with the issues of truth, fairness, equity and justice in financial reporting. This approach like the others guide financial reporting practice where there is no accounting standard on issue for treating an accounting item or a choice is allowed between alternative methods in accounts (Hamid, 2009; Dandago & Ormin, 2011). In either of these situations, the ethical approach require preparers of financial reports to report in a manner or choose that method which does not only impair users decision making but equitably consider their interest in the information disclosed.

Ethical financial reporting is dependent on distinct but interrelated factors of preparers and certifiers behaviour and regulatory framework underpinnings (Enderle, 2004; Abubakar, 2011; Akenbor & Ibanichuka, 2012). This is because if the regulatory framework does not provide the right environment to guide financial reporting function, financial reports are likely to be unethically

produced. Corporate director's honesty, transparency and adherence to stipulated laws and standards will influence the quality of financial reports. Similarly, certifiers such as external auditor's adherence to professional ethics will guarantee financial reporting quality.

Though, several studies have been conducted on these distinct but interrelated factors influencing ethical financial reporting and financial reporting quality in Nigeria (Amadi, 2005; Oladoyin, Elumilade & Ashaolu, 2005; Muhammad, 2009; Adegbie & Adeniji, 2010; Abubakar, 2011; Adeyemi & Fagbemi, 2011; Ogbonna & Ebimobowei, 2012 and Imeokparia, 2013) to mention but a few; this current study was prompted by Mautz & Gray (1970) and Gomes, Carnegie, Napier, Parker & West (2011) advocacy for more empirical study into accounting thoughts in context and in particular, the findings of Adegbie & Adeniji (2010) and Imeokparia (2013) that there exists diverse ethical challenges in the post-consolidation (2004) era in Nigerian banks. Furthermore, the focus of these previous studies was not primarily to determine the level to which the financial reports of the concerned companies were ethically prepared and most of the studies were but opinion research whereby data was collected using questionnaire. Adegbie & Adeniji (2010) pointed out that within the banking industry, financial reports prepared by accountants, certified by auditors and for which directors are responsible is the ideal basis for assessing ethical financial reporting.

This paper therefore using financial reports, adopts the ethical approach to accounting thought framework to assess the ethical content of financial reports of Nigerian banks. Specifically, it sought to assess the extent to which Nigerian banks apply the ethical approach to accounting thought in financial reporting and to determine the level of variation (if any) in the application of the approach among the banks. Accordingly, it was hypothesized that (i) Nigerian banks do no significantly apply the ethical approach in financial reporting, and (ii) there is no

significant difference in the application of the ethical approach in financial reporting among Nigerian banks.

This paper contributes to the debate on ethics and financial reporting quality. It empirically provides evidence on the ethical content of Nigerian bank's financial reports. This insight is useful to users in determining the degree of reliance to repose in banks financial reports while making investment and other decisions and to regulators in taking appropriate measures to strengthen ethical compliance in the industry, hence improve financial reporting quality.

2.0 Conceptual Framework

Accounting thoughts are construed as accounting ideas or rules, which constitute accounting theory that guide accounting practice (Muhammad, 2009). It is about accounting ideas which form sound reasoning and provides basis for practice in the accounting domain. Abubakar (2011) view ethics as a system of moral principles which is the basis for appropriate conduct.

The ethical approach to accounting thought is a framework to accounting practice (financial reporting), which advocates truthfulness, fairness, equity and justice (Dandago & Ormin, 2011). Guided by this accounting thought, whether or not there is an accounting standard that specify the treatment of an item in the accounts or in a situation where choice is to be made between alternative methods such as in depreciation of assets, a firm financial reporting and the alternative method adopted must not end in misleading financial reports. Hamid (2009) opined that the ethical approach to accounting thought is concerned with the question of whether or not there is a solution to an accounting problem than is the provision of GAAPs and pronouncement by accounting bodies. This shows that with or without authoritative accounting rules, the ethical approach provides a useful basis for financial reporting that does not jeopardise user's interests.

Enderle (2004) explained truthful financial reporting to encompass the correctness, accuracy, comprehensiveness, objectivity and understandability of reported numbers and the factual representation of the processes and state of affairs of an entity in the financial reports. Fairness is the quality of financial reports been unbiased and impartial to any of the user groups. Equity and justice emphasize equitable consideration of the interest of all user groups in situations where judgment is to be exercised on an item to be reported in the financial reports.

Afolabi (2013) described financial report as formal and comprehensive statement that provides detail about the financial activities of an organization. Therefore, financial reporting could be seen as the process of preparing and communicating on the financial activities of an organization to those who have interest in it. Financial reporting as a process is to be ethically carried out.

Ethical financial reporting can be distinguished from unethical financial reporting in that the former is underscored by truthfulness, fairness, equity, justice, transparency and observance of accounting standards and rules whereas the latter is deliberate manipulation or misrepresentation of accounting numbers that accrues some form of benefit, directly or indirectly, to preparers to the detriment of some or all users of the information disclosed. Unethical financial reporting is often associated with concepts such as creative accounting, income smoothing, earnings management, earnings smoothing or financial engineering. The bottom line is that, these practices do not represent true and fair view of financial affairs; whether or not perpetuated under the guise of flexible accounting standards and regulations, hence are ethical issues in financial reporting.

2.1 Ethics and Financial Reporting

The world over, there are national accounting standards, legal and professional regulations on financial reporting. In Nigeria; accounting standards issue by the

NASB (now Nigeria Financial Reporting Council, NFRC), statutory regulations such as those issued by the SEC, CBN, NSE, and professional code of conducts by accounting bodies especially those by ICAN and ANAN provide the framework for ethical financial reporting. According to Afolabi (2013), the reason why national standards, corporate governance, professional ethics and code of ethics are issued to guide financial reporting is to prevent fraud and scandals which might hinder effective decision making by users. In other words, the essential of ethics in financial reporting is provision of qualitative information for user's decision making purposes.

Notwithstanding these standards and rules, like elsewhere, Nigerian firms have been severally criticized for engaging in unethical financial reporting practices (Muhammad, 2003; Bello, 2009; Adegbie & Adeniji, 2010; Otusanya & Lauwo, 2010; Afolabi, 2013; Imeokparia, 2013). Unethical financial reporting in the country has been attributed to abuses and self-interest of managing directors (Osazevbaru, 2012), external auditors (Amadi, 2005; Abubakar, 2011; Ogbonna & Ebimobowei, 2012; Musa, Success & Iyaji, 2014) and regulatory flexibility or lapses (Enderle, 2004; Akenbor & Ibanichuka, 2012; Imeokparia, 2013). Indeed, the unethical behaviour of external auditors and corporate management has attracted wide interest by professional accounting bodies, business leaders and researchers (Gaffikin, 2007).

The regulatory quality has been blamed for the increase wave of scandals in financial reporting. For example, the Enron and Andersen scandal was associated with regulatory lapses. Enderle (2004), argued that the then existing regulatory framework did not provide sufficient guidance for complex accounting matters hence served as fertile ground for the Enron scandal.

From the external auditor's point of view, Nigerian auditors have been seen to act unethically in several respects (Abubakar, 2003; Ebbah, 2003; Amadi, 2005; Ogbonna & Ebimobowei, 2012). Specifically, Muhammad (2003) observed with

dismay that the professional ethics of accounting has almost completely been thrown to the wind in the country. Abubakar (2011) indicates that audit firms in Nigeria involve in unethical practices both in securing and discharging audit assignment. He was emphatic that the manner in which auditors in the country pursue audit assignment impairs their independence.

To corroborate, Otusanya & Lauwo (2010) analysis of the role of auditors in the Nigerian banking crisis revealed that not only did auditors approach their audit with less than the expected professionalism and diligence; they were culpably involved in scandals that led to the collapse of some of the banks. They lament that major accounting firms are becoming more and more willing to increase their profits by indulging in anti-social practices that show scant regard for social norms and even legal rules and regulation. Otusanya & Lauwa (2010) suggest self-interest and profit motives are responsible for the relegation of ethical codes of conduct to the background by auditors in the country. In addition, the mechanism for the effective enforcement of sanction might also be lacking. The unethical conduct of auditors is not restricted to Nigeria. Idigbe (2007) pointed out that auditors have not done their work as they are supposed to; else, the high wave of accounting scandals witnessed across the globe would not have occurred. According to Lufitig & Quellete (2009) as cited in Ogbonna & Ebimobowei (2011), the recent collapse of corporations such as Enron, Tyco International, WorldCom, and Global Crossing among others are a result of unethical practices by accountants.

Corporate managers like auditors are found to act unethically. According to Ogbonna & Ebimobowei (2011), financial reporting requires a great deal of ethical observance by the directors whose responsibility it is to prepare financial reports and external auditors who attest to the credibility of the reports. The practice of unscrupulous company directors making capital appear like profit and distributing it in form of dividends to a group of shareholders out of capital paid

by another group of shareholders is regarded unethical just like income smoothing. Indeed, the former practice necessitated the inclusion of the clause that "dividend must be paid out of profit" under company legislation in countries like the United States (US). A similar unethical practice in US was prohibited by the Clayton Act of 1914. This Act prohibited merger and acquisition deals where such will result to reduced competition and create monopoly in an industry. There are similar clauses in the Company and Allied Matters Act (CAMA) 2004 as amended in Nigeria. These literatures indicate the reporting of the affairs of businesses in the country and elsewhere to be short of the true and fair view criteria. This practice clearly violates the ethical approach to accounting information production.

These unethical practices have far reaching consequences on financial reporting, the accounting discipline and the economy at large. Okafor (2006) stated that the main objective of ethics in financial reporting is to ensure that reporting entities comply with codes that facilitate public confidence in their services (Afolabi, 2013). Faboyede, Mukoro, Oyewo & Obigbemi (2014) noted that recent dubious manipulation and misrepresentation of accounting numbers in financial reports have seriously undermined the worth and relevance of the reports and rendered it unproductive. Egwuonwa (1997) cited in Adegbie & Adeniji (2010) maintained that trust and confidence in financial reporting is all about ethics of financial reporting. The unethical behaviour of corporate directors and examiners of financial reports therefore has a fundamental consequence of loss of public confidence and reliance on the reports. The spiral effect is demeaning of the accounting profession and the development of capital markets.

In the mist of high unethical behavior especially as it relates to external auditors, Abubakar (2011) recommends that a change be instituted in the mentality of auditors by making them believe that adherence to ethics is meant to improve their professional conduct and not to make them loss their job. This

recommendation is challenged by this research because it supposes that auditors in the country do not appreciate or know their professional duties and rights as it relates to the security of their appointment as auditors. These issues are made clear by Sections 360 and 362 of CAMA 2004 as amended. It is also in an effort to curtail unethical practices which results to misleading financial information that following the Enron scandal, the Sarbanes-Oxley Act of 2002 was passed in America. The Act requires principal executives and financial officers of public companies to certify the veracity of information disclosed in financial reports (El-Gazzar, Fornaro & Jacob, 2006). This measure among others adopted to prevent corporate management from deception and misleading the investing public is yet to yield the desired results since financial reporting scandals continue to persist around the globe (America inclusive).

Perhaps, it is on this premise that Enderle (2004) came to a conclusion that a synthesis of government and regulatory bodies (the macro players) ability to set up rules and enforce them, and the proper application and interpretation of the set rules by provider's, certifiers and user's organizations (the meso players) as well as the behaviour of persons involved in financial reporting (the micro players) is imperative to ensure ethics in financial reporting.

2.2 Theoretical Framework

This paper is underpinned by the agency, stakeholder's and compliance theories. The agency theory draws on the agent-principal relationship within the corporate world of business (Sharma, 2013). Shareholders who are regarded as the principal entrust the management of their businesses into the hands of the agent (managers). This relationship behoves on the managers as agents not only to be accountable to the shareholders (Barde, 2009b; Sharma, 2013; Samaila, 2014) but also act in their best interest. Accountability to shareholders is ensured through financial reporting while to act in the best interest of shareholders require managers been guided by ethics in all dealing including financial

reporting. However, a conflict of interest arises in the agency-principal relationship whereby mangers as agents may tend to uphold their interest above that of shareholders. By placing their interest above that of their principal, managers act unethically by making accounting choices that are detrimental to shareholders. The accounting decisions and choices made pursuant to personal interests results to unethical financial reporting. The agency theory is criticized for its narrow view of financial reporting.

Barde (2009) maintained that the stakeholder's theory view the firm as a social person and as such is expected to be responsible and accountable to all stakeholders including the shareholders, government, creditors, employees, financial analyst, community and the general public. Put differently, the theory states that financial reporting should provide information that is relevant and useful for the decision needs of all user groups. To meet this condition, financial reporting will not only have to be true and fair but also ethically prepared.

This paper was anchored on the stakeholder's theory. Hence, it is maintained that financial reporting should be ethically performed so that all the user groups are not presented with false accounting information that misleads their decision-making.

3.0 Methodology

This paper assesses the application of the ethical approach to accounting thought in financial reporting by Nigerian banks during the period 2004 to 2013. The base year 2004 was selected with recourse to the 2004 reform by the regulatory authority-Central Bank of Nigeria that consolidated the sector. The consolidation of the sector may have significant impact on the activities of banks including their financial reporting practice. Data was collected up to 2013 because as at the time of the research, financial statements from where data was extracted were available only up to that year. Using a filter whereby a bank

must be quoted on the Nigerian Stock Exchange, be a Nigerian based bank and have complete data, 15 banks out of the 21 quoted banks as at 31st December, 2011 were selected for the study. The sampled banks include Access Bank, Diamond Bank, Eco Bank, Fidelity Bank, First Bank, First City Monument Bank, Guaranty Trust Bank, Skye Bank, Stanbic-IBTC Bank, Sterling Bank, Union Bank, United Bank for Africa, Unity Bank, Wema Bank, and Zenith Bank. For the purpose of the study these banks were designated Bank 1, Bank 2 …Bank 15 with Bank 1 being Access Bank, Bank 2 Diamond Bank … and Bank 15 Zenith Bank respectively.

The application of the ethical approach in financial reporting was determined with recourse to eleven themes (see appendix I) developed from the related literatures of Enderle (2004), Bello (2009), Adegbie & Adeniji (2010), Otusanya & Lauwo (2010), Adeyemi & Fagbemi (2011), Afolabi (2013), and Imeokparia (2013). Data was extracted from annual accounts and reports of the sampled banks through a check of the reflection of the themes. Consistent with the application (compliance) studies of Barde (2009a), 1 is assign where there is full application of a theme, 0.5 for partial application and 0 for non-application. The data was analysed using descriptive statistics (mean, maximum, minimum and standard deviation), application index and ANOVA statistics. The application index grading criteria by Kantudu (2005) whereby a score of 70-100% = Strongly Applied (SA), 50-69% = Semi-Strongly Applied (SSA), 40-59% = Weakly Applied (WA), 20-39% = Very Weakly Applied (VWA), and 0-19% = Not Applied (NA) was adopted.

4.0 Results and Discussion

4.1 Level of Application of the Ethical Approach in Financial Reporting

Table 1 presents the computed application indices of the ethical approach in financial reporting by Nigerian banks. The table summarises bank-by-bank and

combined annual level of application of the ethical approach to accounting thought in financial reporting.

Table 1: Banks Level of Application of the Ethical Approach in Financial Reporting

Year	Banks																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Mean App. Index	Max	Min
2004	86.4	86.4	86.4	95.5	86.4	86.4	90.9	86.4	95.5	86.4	86.4	90.9	100.0	86.4	86.4	89.1	100.0	86.4
2005	86.4	95.5	86.4	86.4	90.9	86.4	100.0	86.4	95.5	86.4	95.5	90.9	100.0	86.4	86.4	90.6	100.0	86.4
2006	86.4	95.5	86.4	86.4	100.0	86.4	90.9	86.4	95.5	86.4	95.5	100.0	100.0	77.3	100.0	91.5	100.0	77.3
2007	86.4	95.5	86.4	86.4	100.0	95.5	90.9	86.4	95.5	86.4	86.4	100.0	100.0	95.5	95.5	92.4	100.0	86.4
2008	86.4	95.5	77.3	95.5	100.0	86.4	86.4	86.4	95.5	86.4	100.0	100.0	77.3	95.5	90.9	90.6	100.0	77.3
2009	100.0	100.0	95.5	95.5	100.0	100.0	100.0	86.4	86.4	86.4	100.0	95.5	95.5	95.5	100.0	95.8	100.0	86.4
2010	90.9	100.0	86.4	95.5	100.0	90.9	95.5	86.4	86.4	86.4	100.0	100.0	100.0	86.4	100.0	93.6	100.0	86.4
2011	90.9	100.0	86.4	95.5	90.9	90.9	95.5	95.5	86.4	95.5	100.0	90.9	100.0	86.4	100.0	93.6	100.0	86.4
2012	95.5	90.9	86.4	100.0	100.0	90.9	100.0	86.4	86.4	95.5	90.9	90.9	100.0	86.4	90.9	92.7	100.0	86.4
Mean App. Index	89.9	95.5	86.4	92.9	96.5	90.4	94.4	87.4	91.4	88.4	94.9	95.5	97.0	88.4	94.4	**92.2**		
Max	100.0	100.0	95.5	100.0	100.0	100.0	100.0	95.5	95.5	95.5	100.0	100.0	100.0	95.5	100.0	98.5		

Min	86.4	86.4	77.3	86.4	86.4	86.4	86.4	86.4	86.4	86.4	86.4	90.9	77.3	77.3	86.4	84.8		
Std Dev	5.0	4.5	4.5	5.1	5.5	4.8	5.0	3.0	4.8	4.0	5.8	4.5	7.5	6.1	5.9	5.1		
Remark	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA		

Note: This table summarizes the extent of application of the 11 themes of the ethical approach to accounting thought in financial reporting by sampled banks during the period 2004-2012. The computed values are expressed in percentage and are regarded as application index. The application index is derived by dividing the number of themes applied by a bank by the total number of themes applicable (i.e 11). A 3-point scoring system was adopted; 1 = fully applied, 0.5 = partially applied and 0 = not applied. Accordingly, full application of the approaches in financial reporting in any year by any bank or by all banks will result to an application index of 100 percent. A value of < 19 = "Not Applied", 20-39 = "Very Weakly Applied", 40-59 = "Weakly Applied", 50-69 = "Semi-Strongly Applied", and 70-100 = "Strongly Applied". The table is generated from Annual Reports and Accounts using Microsoft Excel 2010.

The bank-by-bank analysis reveals that all the banks strongly applied the ethical approach to accounting thought in financial reporting as none of the mean application indices falls below 70 percent. Specifically, Bank 1 recorded mean application index of 89.9 percent, Bank 2 of 95.5 percent, Bank 3 of 86.4 percent, Bank 4 of 92.9 percent and Bank 5 of 96.5. Also, Banks 6, 7, 8, 9 and 10 mean application indices are 90.4, 94.4, 87.4, 91.4, and 88.4 percents respectively. While that of Banks 11, 12, 13, 14, and 15 are 94.9, 95.5, 97.0, 88.4, and 94.4 percents respectively.

A closed consideration of the mean indices shows that Banks 2 and 12 have same level of application of the approach of 95.5 percent and Banks 7 and 15 of 94.4 percent. This likely show that the banks have same attitude to ethics as far as ethics in financial reporting is concerned. In fact, the variation in the maximum and minimum application indices in the case of Banks 2 and 12 and standard deviation in the case of Banks 7 and 15 are evidence that these banks have no common code of ethics regulating their financial reporting; hence their same level of application can best be attributed to attitude. Indeed, apart from the industrial ethical code contain in statutory guidelines, organizations often have their code of ethics.

Table 1 also shows that except for Banks 9, 10 and 14 whose maximum application never exceeded 95.5 percent, all the other banks in one year or the other achieved 100 percent application. Similarly, except for Banks 3, 13 and 14 whose minimum in any year is 77.3 percent, most of the banks recorded a minimum of 86.4 percent with Bank 12 minimum being 90.9 percent. The computed standard deviations of most of the banks shows significant variation in the level of application of the approach in financial reporting; the highest dispersed being Bank 13 with 7.5 and the least Bank 8 with 3.0. These parameters clearly shows the attitude of the banks towards ethical financial reporting is not the same and that mere regulation on the subject of ethics in financial reporting may not achieve the same level of ethical financial reporting in the industry. The mean ranking shows that Bank 13 which application level is

most dispersed was more ethical in its financial reporting and Bank 10 and 14 the least ethical. This is indicated by the mean application index of 97 percent for Bank 13 and 88.4 percent for Bank 10 and Bank 14.

The combined analysis in Table 1 shows strongly applied level of the ethical approach in financial reporting in each of the years. The mean application index by 2004 of 89.1 percent rose steadily to climax 95.8 percent by 2009 and then decline to a low of 92.7 percent by 2012. It is also obvious that in each of the years, the maximum application of 100 percent was recorded and the minimum application not falling beyond 77.3 percent. A look at the fluctuation in the annual level of application reveals it was dispersed as the least standard deviation is 4.5.

By and large, Table 1 indicates that the overall level of application of the ethical approach in financial reporting by Nigerian banks during the study period was 92.2 percent with maximum of 98.5 percent and minimum of 84.8 percent. The standard deviation of 5.1 shows elements of dispersion in the level of application of the approach by the banks. It is also instructive that the mean highest level of application of 95.8 percent occurred in 2009 with the least of 89.1 in 2004.

While the least application in 2004 which rose to a climax of 95.8 percent in 2009 may be indication of greater searchlight on ethics by the regulatory authorities especially the CBN after the consolidation reforms in the industry, the 2009 highest level which implies that banks were more ethical in financial reporting in that year does not provide evidence that financial reporting can reveal certain internal irregularities and challenges as the CBN special audit report in the year indicted most of the banks of being turbulent with Non-Performing Loans. This is because though the report indicted nine out of the twenty-five that emerged from the reforms were turbulent; it was not indication that no cases of NPLs were found in other banks. In fact, Opanachi (2011) documented that banks were involved in reckless lending due to the huge capital at their disposal.

Notwithstanding, the overall mean application of 92.2 percent is substantial evidence to conclude that Nigerian banks significantly apply the ethical approach to accounting thought in financial reporting. In other words, Nigerian banks are significantly ethical in their financial reporting.

The test of difference in the application of the ethical approach to accounting thought in financial reporting among banks as reported in Table 2 shows that there is no significant difference in the application of the approach as all the p-values with the exception of Bank 5 exceeds the 0.05 significance level. A further consideration of the mean squares indicates that Bank 5 recorded the highest level of variation in application of the approach (with between groups sum of 155.410) while Bank 3 has least variation (with between groups sum of 0.000).

Table 2: Summary Results of ANOVA Statistics

Bank	Sum of Squares	Mean Square	F	Sig.
Bank 1	16.488	8.244	0.275	0.769
Bank 2	92.708	46.354	3.862	0.084
Bank 3	0.000	0.000	0.000	1.000
Bank 4	30.340	15.170	0.504	0.628
Bank 5	155.410	77.705	5.630	0.042
Bank 6	28.781	14.390	0.560	0.598
Bank 7	79.202	39.601	2.013	0.214
Bank 8	11.501	5.751	0.556	0.601
Bank 9	59.807	29.904	1.444	0.308
Bank 10	46.006	23.003	1.667	0.266
Bank 11	85.092	42.546	1.417	0.313
Bank 12	88.327	44.164	3.428	0.102
Bank 13	102.756	51.378	0.879	0.462
Bank 14	46.006	23.003	0.556	0.601

Bank 15	83.355	41.677	1.277	0.345

Note: This table summarizes the results of the ANOVA tests of difference in level of application of the ethical approach to accounting thoughts in financial reporting by quoted Nigerian banks. The table shows the sum of squares, mean square, F-statistics and p-value for each of the sampled banks. The ANOVA was run at 0.05 level of significance. The table is developed from Table 1 using SPSS 21.

The high (92.2 percent) level of application of the ethical approach in financial reporting as revealed by this study does not overwhelmingly support the findings of Adegbie & Adeniji (2010) and Imeokparia (2013) that there are serious ethical challenges in Nigerian banks in the post-consolidation period. Nevertheless, Adegbie & Adeniji (2010) and Imeokparia (2013) findings cannot be completely dismissed because they show the challenge as diverse which implies this challenge is not only restricted to financial reporting but may incorporate other aspects of banking operations such as marketing, lending among others that are not obvious from financial reports. This means that further research is required into all aspects of banking ethics to convincingly substantiate their finding.

However, the less than 100 percent ethical financial reporting in the Nigerian banking industry has much to be desired hence Adegbie & Adeniji (2010) submission of their being ethical concerns in the banks. This means that some measures especially regulatory wise are necessary for a 100 percent ethical reporting in the industry. Adegbie & Adeniji (2010) and Imeokparia (2013) pointed out weak regulatory supervision as an important challenge to ethical financial reporting in the Nigerian banking industry. Enderle (2004) also argued that it is not proper for preparers and examiners to be accused of wrong doing in financial reporting when the regulatory rules are deficient, misleading and encourages unethical behaviour. Therefore, regulatory bodies have a crucial role in tackling the problem of unethical financial reporting. In fact, the insignificant

difference in the application of the ethical approach in financial reporting by the banks is an indication that the mechanism for ethical financial reporting exists in the industry, thus greater surveillance remains a condition to forester it.

The results also have implication on corporate governance in banks. Faboyede, Mukoro, Oyewo and Obigbie (2014) and Adegbie & Adeniji (2010) show that corporate governance has significant effect on ethical practices of firm's financial reporting. In particular, audit committee's diligent discharge of its oversight function over board of directors and external auditors thereby preventing circumvention of ethical regulatory guidelines cannot be overemphasized in ensuring ethical financial reporting in the industry.

5.0 Conclusions and Recommendation

The application of ethics in financial reporting is to discourage falsification and misrepresentation in financial reporting by company directors whose duty it is to prepare the reports and accountants in practice who express opinion on the reports. Ethical financial reporting is critical to user's effective decision making in banks and all other types of businesses. The development and issuance of ethical codes on financial reporting practice by the regulatory authorities and professional accounting bodies is to ensure that reported numbers are credible and truthful for user's decision purposes. Ethically guided, companies' financial reports are meaningful and relevant for decision making by all interest groups. The increase in cases of firms reporting good state of health and going bankrupt overnight calls for greater attention to the ethics of financial reporting by firm management, regulatory authorities and the professional accounting bodies.

While this study do not overwhelmingly establish the notion that there were serious ethical challenges in the Nigerian banking industry as claimed by Adegbie & Adeniji (2010) and Imeokparia (2013). However, there is the need to maintain and improve the tempo of ethics in financial reporting in the industry. The intensification of monitoring and enforcement of ethical codes in financial

reporting by the regulatory bodies is paramount. This is because the degree of confidence and reliance reposed on the financial reports published in the industry is bound to witness decline if ethical reporting is not fostered especially following the global financial meltdown, increase cases of corporate scandals around the globe and regulatory reports of high NPLs in the industry.

The main shortcoming of this study is that in assessing ethical financial reporting in the industry, much reliance was placed on the report of external auditors whereas many studies as documented in this paper have criticised the manner in which external auditors approach and perform their audit assignments in Nigeria. The implication is that low ethical adherence of the banks external auditors will have negative effect on the reported results.

References

Abubakar, S. (2011). Ethical considerations and the independence of auditors in Nigeria. Retrieved from http://www.abu.edu.ng/publications/2011-03-30-211959_1156.docx Accessed [30/07/2012].

Abubakar, U. (2003). Ethical accounting standards and accountants' performance. In K.I. Dandago & A.I. Tanko (Eds.), *Background issues to ethics in accounting* (pp. 58-74). Kano: AIT Computer Services.

Adegbie, F.F. & Adeniji, A.A. (2010). An empirical perspective of corporate governance and financial reporting in the Nigerian banking industry. *Journal of Banking 4(1)* 1-24.

Adeyemi, S.B & Fagbemi, T.O. (2011). The perception of ethics in auditing profession in Nigeria. *Journal of Accounting and Taxation 5 (7)* 146-157.

Afolabi, M.O. (2013). Effect of financial reporting on investment decision making of manufacturing firms in Nigeria. *European Journal of Humanities and Social Sciences 22(1)* 1126-1142.

Akenbor, C.O. & Ibanichuka, E.A.L. (2012). Creative accounting practices in Nigerian banks. *African Review Research 6(3)* 23-41.

Amadi, N.C. (2005). Ethical observance of integrity in small firms of accountancy practice. In K.I. Dandago & K.T. Hamid (Eds.), *Honesty and integrity* (pp. 171-181). Kano: Gidan Dabino Publishers.

Barde, I. M. (2009a). Nigerian oil marketing companies and compliance with the requirements of Statement of Accounting Standard (SAS) 2. In K.I. Dandago (Eds.), *Contemporary issues in accounting, auditing and taxation* (pp. 104-125). Kano: Triumph Publishing Company Limited.

_____ (2009b). *An evaluation of accounting information disclosure in the Nigerian oil marketing industry*. PhD Thesis Bayero University Kano, Nigeria.

Bello, A.B. (2009). Ethical considerations in accounting. In K.I. Dandago (Eds.), *Advanced accounting theory and practice* (pp.125-138). London: Adonis and Abbey Publishers ltd.

Dandago, K.I. & Ormin, K. (2011). An Evaluation of the Approaches to Accounting Thoughts: What Impact Do They Have on Financial Reporting? Paper presented at the first Accounting and Finance Research Association (AFRA) international conference 20-24th November, Abuja- Nigeria.

Ebbah, P.E. (2003). Global view of independence in audit practice. In K.I. Dandago & A.I. Tanko (Eds.), *Background issues to ethics in accounting* (pp. 45-56). Kano: AIT Computer Services.

El-Gazzar, S.M., Fornaro, J.M., & Jacob, R.A. (2006). An examination of the determinants and contents of corporate voluntary disclosure of management's responsibilities for financial reporting. *Faculty Working Papers* 56, Retrieved from http://digitalcommons.pace.edu/lubinfaculty_working_papers/56 Accessed [30/07/2012].

Enderle, G. (2004). The ethics of financial reporting, the global reporting initiative, and the balance concept of the firm. In Brenkert, G.G. (Ed). *Corporate Integrity & Accountability* (pp.87-99). Sage Publications, Inc

Faboyede, O.S., Mukoro, O.D., Oyewo, B. & Obigbemi, I. (2014). Corporate governance for sustainable development and the challenge of creative accounting. Working paper.

Gaffikin, M. (2007). Accounting theory and practice: The ethical dimension. *Accounting and Finance Working Paper* 07/04.

Gomes, D., Carnegie, G.D., Napier, C.J., Parker, L.D., & West, B (2011). Does accounting history matter?. *Accounting History*, *16* (4), 389-402.

Hamid, K.T. (2009). Approaches to accounting thoughts. In K.I. Dandago (Ed.), *Advanced accounting theory and practice* (pp. 139-150). London: Adonis and Abbey Publishers ltd.

Henriksen, S.E. & Breda, M.V. (2001). *Accounting Theory*, 5th edition, Singapore: McGraw-Hill Book Company.

Idigbe, A. (2007). A review of CAMA 1990: Issues in corporate governance audit committee and auditor independence. Paper Presented at the *Nigerian Accounting Standards Board 4th Annual Corporate Financial Reporting Submit and Dinner*, Lagos 14th November.

Imeokparia, L. (2013). Corporate governance and financial reporting in the Nigerian banking sector: An empirical study. *Asian Economic and Financial Review 3*(8) 1083-1095.

Kantudu, A.S. (2005). The impact of auditors reputation on compliance with accounting standards on employee retirement benefits by listed firms in Nigeria. *Journal of Social and Management Studies, 10*, 71-90.

Markarian, G., & Gill-de-Albornoz, B. (2010). Income smoothing and idiosyncratic volatility. http://www.slideshare.net/MRicky/income-smoothing-and-idiosyncratic-volatility Accessed: 11/04/2012].

Mautz, R.K., & Gray, J. (1970). Some thoughts on research needs in accounting. *The Journal of Accountancy*, September, 54-62.

Muhammad, M. L. (2003). Issues and dimensions of professional ethics of accounting in Nigeria. In K.I. Dandago & A.I. Tanko (Eds.), *Background issues to ethics in accounting* (pp.75-89). Kano: AIT Computer Services.

_____ (2009). History of accounting thought. In K.I. Dandago (Ed.), *Advanced accounting theory and practice* (pp. 93-107), London: Adonis & abbey Publishers Ltd.

Musa, S.J., Success, E.B. & Iyaji, D. (2014). The role of auditors in the recent Nigerian banking crisis. *International Journal of Academic Research in Business and Social Sciences 4(3)* 231-251.

Myers, L. & Skinner, D. (2002). Earnings momentum and earnings management. *Working Paper*, University of Michigan.

Ogbonna, G.N., & Ebimobowei, A. (2011). Ethical compliance by the accountant on the quality of financial reporting and performance of quoted companies in Nigeria. *Asian Journal of Business Management, 3*(3), 152-160.

_____ (2012). Effect of ethical accounting standards on the quality of financial reports of banks in Nigeria. *Current Research Journal of Social Sciences 4(1)* 69-78.

Okpanachi, J. (2011). Comparative analysis of the impact of merger and acquisition on financial efficiency of banks in Nigeria. *Journal of Accounting and Taxation 3(1)* 1-7.

Oladoyin, A.M., Elumilade, D.O. & Ashaolu, T.O. (2005). Transparency, accountability and ethical violations in financial institutions in Nigeria. *Journal of Social Science 11(1)* 21-28.

Osazevbaru, H.O. (2012). Creative accounting and firm's market value in Nigeria. *Kuwait Chapter of Arabian Journal of Business and Management Review 2(3)* 38-50.

Otusanya, J.O., & Lauwo, S. (2010). The role of auditors in the Nigerian banking crisis. *Accountancy, Business and Public Interest*, *9*, 159-204.

Samaila, I.A. (2014). *Corporate governance and financial reporting quality in the Nigerian oil marketing industry*. PhD Thesis Bayero University, Kano, Nigeria.

Sharma, N. (2013). Theoretical framework for corporate disclosure research. *Asian Journal of Finance & Accounting*, *5*(1) 183-196.

Appendix I: Ethical Approach to Accounting Thoughts Themes

S/n	**Theme**	**Detail**	**Component of Financial Report Check**	**Req. No.**
1	Income Smoothing	If practiced, then, not ethical	*Standard deviation of profits	r_1
2	Dividend	Should be paid out of profit. If paid out of capital; that is, in any year which a loss is incured, then not ethical	Profit After Tax	r_2
3	Fairness, equity and justice	Financial reports that accommodate the interest of all users	Notes to Accounts	r_3
4	Truthfulness	Correct and non-misleading financial reports	Unqualified auditor's report	r_4
5	Compliance with requirements	Accounts should be prepared following the requirements of CAMA and other relevant statutes	Auditors Report	r_5
6	Publication of Accounts	Accounts are to be published timely within a period of not more than four months from end of financial year	Auditors Report	r_6
7	Directors	The interest of each director	Directors Report	r_7

	interest	of the company in terms of shareholding should be declared		
8	Directors and external auditors	Directors and external auditor(s) should discharge their responsibilities with utmost propriety and ethically	Audit Committee Report	r_8
9	Provision for losses	Company should make adequate provision for losses such as Non-Performing Loans (NPLs) in accordance with the prudential guidelines for licensed banks	Auditors Report	r_9
10	Contraventions	Company should act ethically in accordance to the dictates of relevant laws	Auditors Report	r_{10}
11	Sustainability and Social Responsibility	Company should be socially and environmentally responsible to the community within which it operates	Corporate Social Responsibility Report	r_{11}

*Income smoothing is determined by the level of dispersion of profits over the study period, measured by standard deviation of profit after tax. Insignificant dispersion signals probability of income smoothing (Myers & Skinner, 2002 and Markarian & Gill-de-Albornoz, 2010). Standard deviation of less than 1 is insignificant, signaling income smoothing while standard deviation of 1 and above is significant, therefore indicates absence of income smoothing.