NDIC QUARTERLY

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Respect & Fairness

Discipline

Professionalism and Team work

Passion

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REVIEW OF DEVELOPMENTS IN THE THIRD AND FOURTH QUARTERS OF 2017

BY

RESEARCH, POLICY & INTERNATIONAL RELATIONS

1.0 INTRODUCTION

The finance and banking sector recorded a number of developments during the third and fourth quarters of 2017. Some of these developments were the outcome of the CBN Monetary Policy Committee (MPC) meetings as the dynamics of the financial sector and the trends of the indicators relied so much on the MPC meetings and other global financial trends.

2.0 CBN Monetary Policy Committee Meeting

The CBN MPC met thrice during the period, on the 24th to 25th July 2017, 25th to 26th September 2017 and 20th to 21st November 2017. The meetings reviewed the macroeconomic conditions and exogenous global challenges confronting the Nigerian economy with a view to proffering policy directions for the financial sector. The Committee, through a thoughtful consideration and analysis of the challenges threatening the domestic economy coupled with the volatility in global economic environment, decided to retain the MPR at 14%, CRR at 22.5% and the liquidity ratio at 30% throughout the two quarters to curtail the inflationary pressure in the economy.

3.0 Global Economic Developments

The global economic developments are of interest to banks and policy makers. That is because there are linkages between domestic trends in economic activities and the economic and financial world, which invariably determines the level of stability of businesses. A number of factors such as loose monetary conditions, supportive fiscal policies in some advanced economies, higher commodity prices and rising aggregate demand contributed to the growth trajectory during the period.

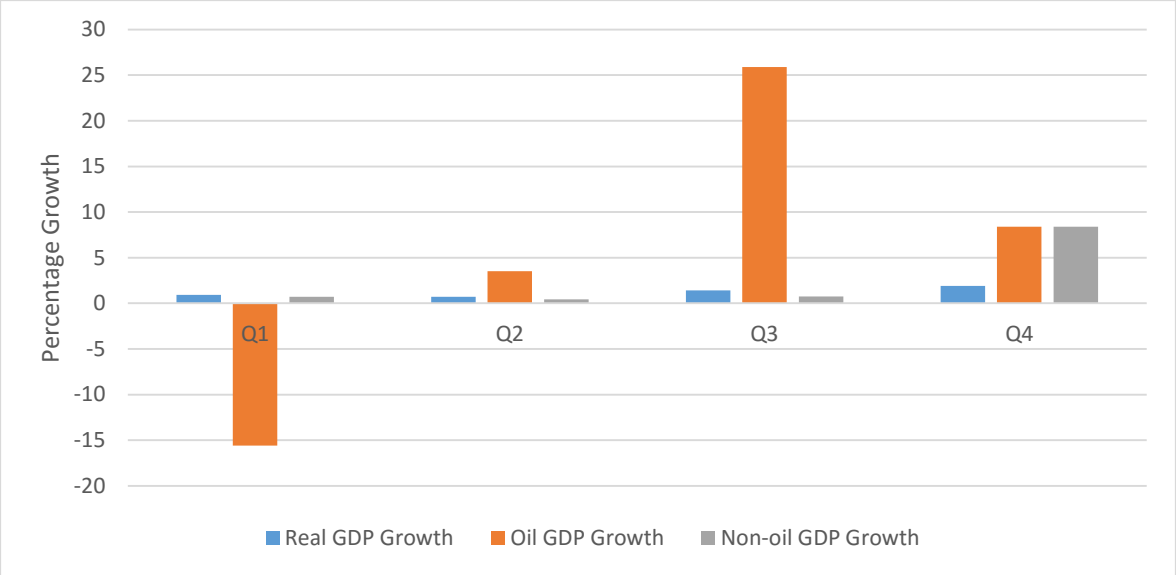
4.0 Developments in the Domestic Economy

4.1 Gross Domestic Product (GDP)

Nigerian economy had firmed up months after it officially came out of recession in Q2, 2017. According to the National Bureau of Statistics (NBS) real Gross Domestic Product (GDP) grew by 1.92% in Q4 of 2017, from 1.40% and 0.72% in the Q3 and Q2, respectively. Chart 1 presents GDP growth for the oil and non-oil sectors as well as the

overall economy. It is evident from the chart that the oil sector grew by 25.89% in Q3 2017 from the 3.53% growth recorded in Q2 2017. However, in Q4 2017 the oil sector grew by 8.38% representing a decline in growth from the 25.89% recorded in Q3 2017 and higher than the 3.53% recorded in Q2 2017. On the other hand, the non-oil sector contracted by -0.76% in Q3 2017 from the expansionary growth path of 0.45% recorded in Q2 2017. But in Q4 2017, the non-oil sector recovered with a positive growth of 1.45% from the contraction recorded in Q3 2017.

Chart 1: Real GDP Growth



Source: Data from NBS

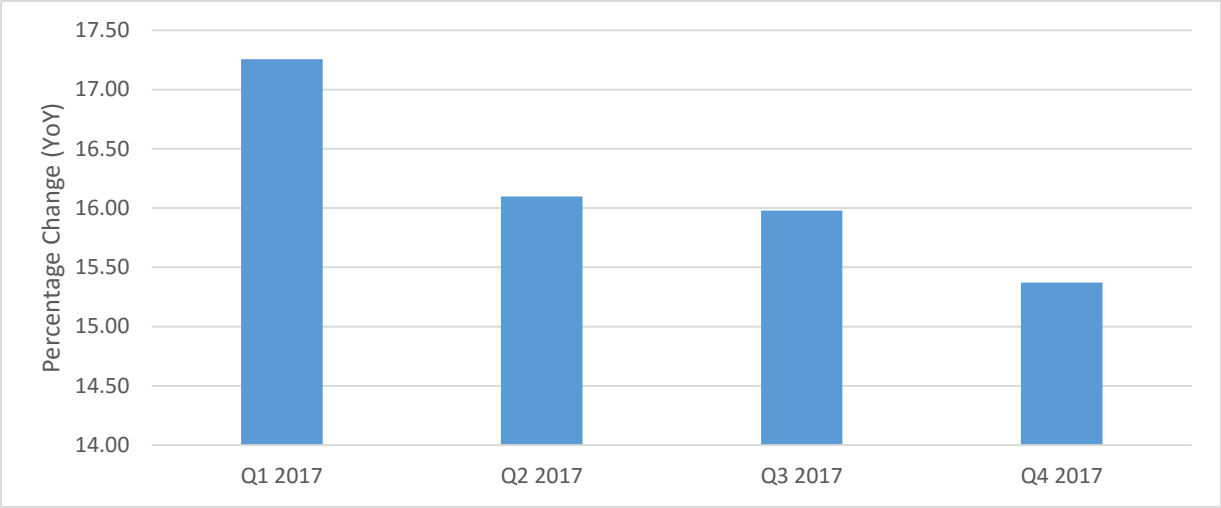
The overall economy however maintained its recovery in Q3 2017 with a real GDP growth of 1.40% from the 0.72% growth recorded in Q2 2017, as at end of Q4 2017, the economy expanded by 1.92% representing about 37% increase from the value in Q3 2017. According to the NBS, 2017 recorded a real annual GDP growth rate of 0.83%. The growth in the nation's economy was a result of relative rise in crude oil price and production, stability in the foreign exchange market, moderate reduction in inflation rate and improvement in the nation's foreign reserve. That propelled renewed confidence in the economy.

4.2 Inflation

Changes in the Consumer Price Index (CPI) measures inflation rate and Chart 2 presents inflation rate for Nigeria from June to December, 2017. From the chart, inflation rate as at end of Q2 2017, recorded a 16.10% inflation which fell by 0.05 percent points to

16.05% at the start of Q3 2017 in July. The rate declined further by 0.04 and 0.03 percent points to 16.01% and 15.98% in August and September, 2017, respectively. Consequently, inflation declined by 0.09 percent points between end of Q2 with a value of 16.10% to 16.01% at end of Q3 2017. A further decline was recorded in October at the start of the last quarter in 2017 with an Inflation rate of 15.91% representing a 0.07% point lower from the previous month. In November and December 2017, inflation receded by 0.01 and 0.53 percent points to 15.90% and 15.37%, respectively. Therefore, inflation rate receded by 0.61 percent points from the 15.98% recorded at the end of Q3 2017 to 15.37% at the end of Q4 2017.

CHART 2: Inflation Rate



Source: Data from NBS

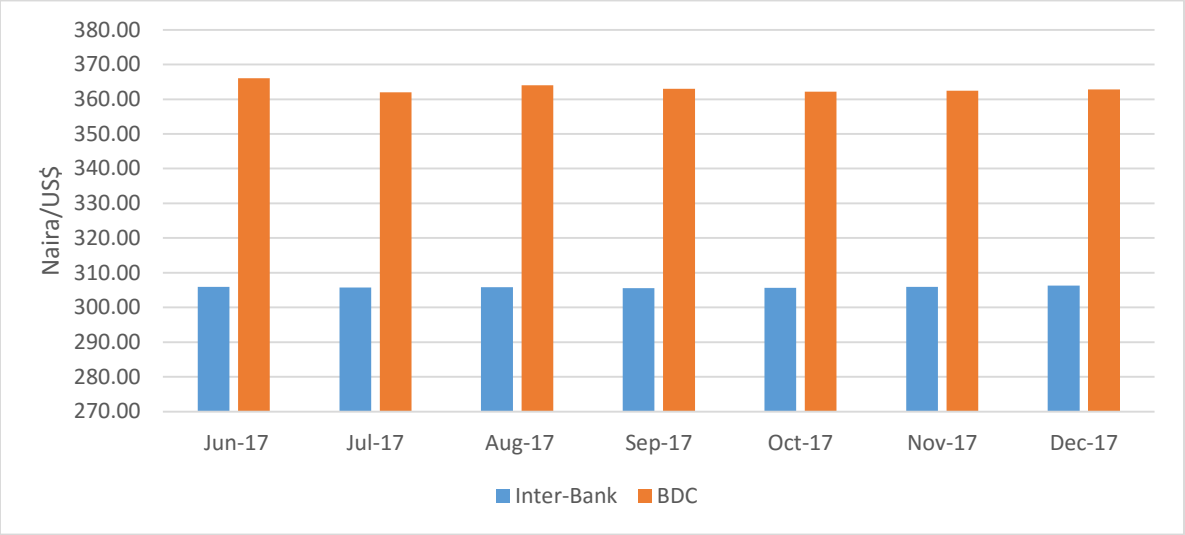
The consistent decline in inflation rate could be attributed to the contractionary monetary policy stance of the CBN, increase in agricultural products as well as the relative stability and improvement in the foreign exchange market arising from the introduction of the Investors and Exporters (I&E) Foreign exchange window, amongst others.

4.3 Exchange Rate

From the second half of 2017, the country achieved relative stability in the Foreign Exchange Market due to the introduction of I&E window by the CBN, rising price of crude oil amongst others.

Chart 3 presents the trend of Naira/USD interbank Market. The interbank exchange rate as at end Q2 2017 was ₦305.90 to 1USD as against the ₦366 to the 1USD at the BDC market, representing about N60.10 premium. However, the interbank rate fell slightly by 20kobo to N305.70 to the 1USD as at July 2017 while the BDC rate fell by ₦2.00 to N362 to the 1USD in same month, bridging the premium from ₦60.10 to ₦56.30.

CHART 3: Exchange Rate Movement



Source: Data from CBN

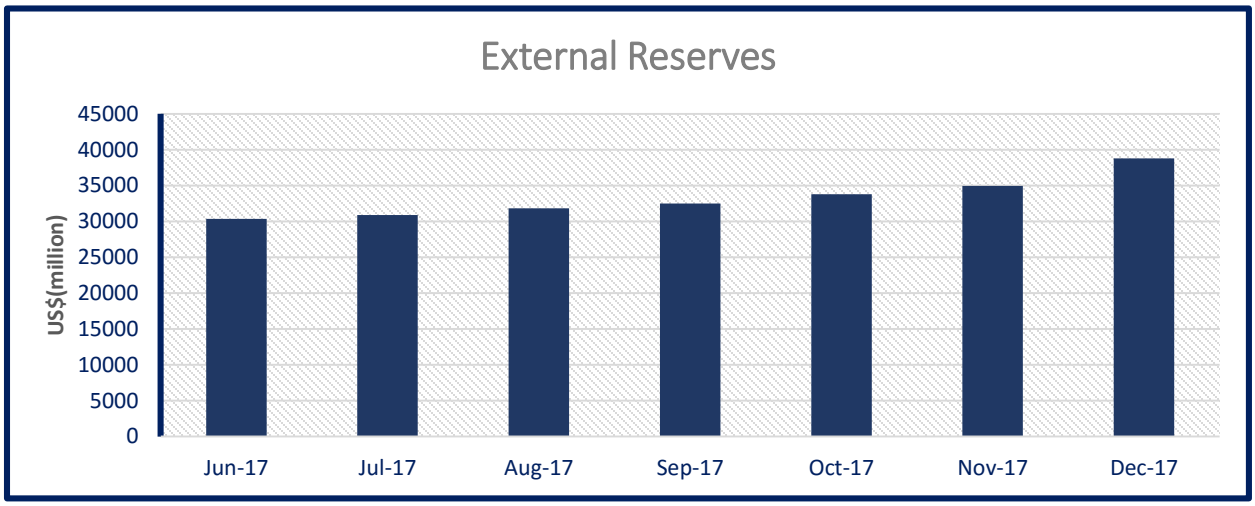
In August 2017 the interbank rate increased by 15kobo to ₦305.85 as against the BDC rate that increased by ₦2.00 to ₦364 to the USD and by implication representing an increase of the premium by ₦1.85 to ₦58.15. However, at the end of Q3 2017, the interbank rate increased slightly to ₦305.90 to the USD, which was the same rate it was at end of Q2 2017. The rate was lower by 10kobo in October 2017 to ₦305.80 to USD but increased by 10kobo to ₦305.90 to the USD in November and ₦306 in December, 2017. It is an indication that the interbank Naira to the USD rate increased by 10kobo from ₦305.90 at end Q3 2017 to ₦306 at end Q4 2017.

4.4 External Reserves

Chart 4 presents the trend of Nigeria's external reserves from June 2017 to December 2017. The statistics show that, the external reserves position has been on an upward trend as it increased from USD30.3 billion at the end of Q2 2017 to USD30.9 billion in July 2017 representing a 1.98% increase. The external reserves position also rose to

US$31.8 billion in August 2017 and as at end of Q3 2017 maintained the same upward trend to US$32.5 billion indicating about 7.26% increase from the value in Q2 2017. In October 2017, the external reserves increased slightly to US$33.8 billion and further increased to US$34.9 and US$38.8 billion in November and December respectively. By implication, Nigeria's external reserves increased by 19.39% from the value as at end Q3 2017 to US$38.8 billion it recorded at the end of Q4 2017. The progress could be attributed to the foreign exchange supply from the success of the Eurobond issued by the Federal Government, increased foreign inflow through the CBN I&E window and increasing foreign exchange earnings alluded to rising oil prices.

CHART 4: External Reserves Position

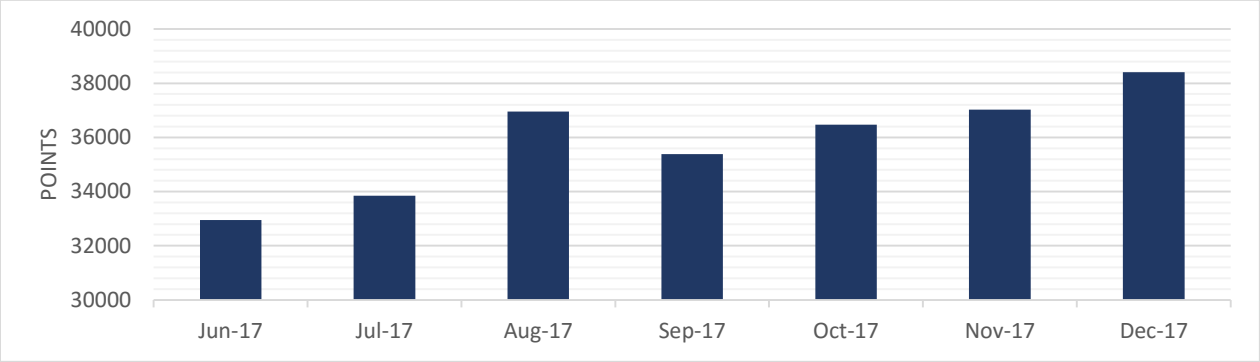


Source: Data from CBN

4.5 Money and Financial Market Development

The total market capitalization of the Nigerian Stock Exchange (NSE) stood at ₦13.54 trillion as at Q4 2017, a rise from the ₦12.20 trillion in Q3 2017 and ₦11.39trillion in Q2 2017. The NSE ended 2017 with the All-Share Index (ASI) closing at 38,404.53 at Q4 from 35,378.89 and 32,951.67 at Q3 and Q2 2017, respectively, as shown in Chart 5. The improved performance of the capital market could be attributed to the gradual economic recovery, increase in foreign portfolio investment and rise in external reserves, as well as the improvement in the ease of doing business (EOD) index in Nigeria, amongst others.

CHART 5: NSE All Share Index



4.6 Money Market Interest Rate

The CBN maintained a contractionary policy stance throughout the year 2017 as the Monetary Policy Rate (MPR), Cash Reserve Ratio (CRR) and Liquidity Ratio (LR) were maintained at 14%, 22.50% and 30%, respectively, to contain inflation.

Meanwhile, the interbank call rate as at Q2 2017 was 13.46, it was 20.44 at Q3 and 9.49 as at Q4 2017.

5.0 CBN CIRCULARS

During the period under review, the CBN issued a number of circulars and guidelines for the operations of Insured Deposit-taking Financial Institutions. Highlights of some of these circulars are presented as follows:

5.1 Introduction of Two New Instruments – "Funding for Liquidity Facility" and "Intra – Day Facility" for Non – Interest Banks

In a bid to aid liquidity management and deepen the financial system, the CBN in a circular dated 23rd August, 2017 and referenced FMD/DIR/CIR/GEN/009, introduced two new financial instruments, namely: "Funding for Liquidity Facility (FfLF)" and "Intra – Day Facility (IDF)" for access by Non-Interest Financial Institutions (NIFIs) licensed by it.

5.2 Further Guidance to Banks and Discount Houses on the Implementation of IFRS 9 in Nigeria

Further to the guidance notes on the implementation of IFRS 9 (financial Instruments) in the Nigerian banking sector issued by the CBN on 20th December, 2016, the CBN in a circular dated 6th September, 2017 and referenced BSD/DIR/GEN/LAB/10/032 requested banks to assess the financial impact of the implementation of IFRS 9 on their operations. The assessment reports should detail comprehensively the expected impact on total provisions, capital and reserves as well as capital adequacy.

5.3 Review of Daily Mobile Money Wallet Transaction and Balance Limit and Bank verification Numbers (BVN) Requirement for Mobile Money Wallet Holders

In line with the initiative of the CBN to enhance access to financial services through Mobile Money Services, the CBN in a circular dated 7th September, 2017 and referenced BPS/DIR/GEN/CIR/04/007, reviewed the daily transaction limit and balance limit on mobile money wallets to afford users of Mobile Money services more flexibility. The revised limits on transaction and balances are as follows: **KYC Level 1** – Daily cumulative transaction limit was fixed at N50,000 with cumulative balance of N300,000. **KYC Level 2** – Daily cumulative transaction limit was N200,000 with cumulative balance limit of N500,000. **KYC Level 3** – Daily Cumulative transaction limit was N5 million with unlimited cumulative balance limit.

5.4 Repatriation of Export Proceeds (oil and non-oil)

The CBN, in the circular referenced TED/FEM/FPC/GEN/01/013 and dated 26th October, 2017 reminded exporters of the breach of the extant regulation with the failure to repatriate their export proceeds (oil and non-oil) within the stipulated 90 days. Non-compliant exporters are to be barred from accessing all banking services including the foreign exchange market.

FINANCIAL CONDITION AND PERFORMANCE OF DEPOSIT MONEY BANKS IN THE THIRD AND FOURTH QUARTERS OF 2017

BY
RESEARCH, POLICY & INTERNATIONAL RELATIONS
AND
INSURANCE & SURVEILLANCE DEPARTMENTS

1.0 INTRODUCTION

During the two quarters under review, the Nigerian economy recorded positive GDP growth rate of 1.40% in Q3 having exited recession in the Q2, 2017 and for the 3rd consecutive quarter, the GDP further grew by 1.92% in Q4 2017. The improvement was as a result of interventions of the Central Bank of Nigeria (CBN) and other regulators. The developments included the introduction of the Investors and Exporter's (I&E) Forex Exchange window by the CBN, increased crude oil production and oil price appreciation, decline in inflation rate, increased foreign exchange reserves position, amongst others.

Notwithstanding these developments, the Deposit Money Banks (DMBs) operating environment in the two quarters faced challenges such as insecurity, high inflation rate, high operating expense, bad loans and increased incidences of frauds and forgeries among others. Despite these challenges, the banking industry in Q3 and Q4, 2017 recorded mixed performance in most of the financial indices.

In Q3 2017, total industry Assets recorded a marginal increase of 0.32% from ₦30.70 trillion as at Q2 2017 to ₦31.10 trillion in Q3 2017 and further increased by 4.63% to ₦32.54 trillion in Q4 2017. Total Deposits from Customers decreased by 0.19% from ₦17.96 trillion in Q2 2017 to ₦17.93 trillion in Q3 2017 but increased by 8.08% to ₦19.38 trillion in Q4 2017. The banking industry Capital to Risk-Weighted Assets Ratio (CAR) declined from 11.51% in Q2 2017 to 10.56% in Q3 2017 and 10.23% in Q4 2017.

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 Banks; and Section Four is Conclusion.

2.0 STRUCTURE OF ASSETS AND LIABILITIES

The total industry Assets recorded a marginal increase of 0.32% rising from ₦30.70 trillion in Q2 2017 to ₦31.10 trillion in Q3 2017. Total Assets further increased by 4.63% to ₦32.542 trillion in Q4 2017. The increment could be attributed to increase in Assets Classified as Held for Sales & Discounted Operations, Loans and Advances to Banks, Financial Assets Held for Trading, and Assets Pledged as Collateral.

On the Liabilities side, total Deposits from Customers decreased by 0.19% from ₦17.96 trillion in Q2 2017 to ₦17.93 trillion in Q3 2017 but increased by 8.08% to ₦19.38 trillion in Q4 2017. The structure of the industry's Total Assets and Liabilities for Q3 and Q4 2017 are presented in Table 1 and Charts 1.1 and 1.2.

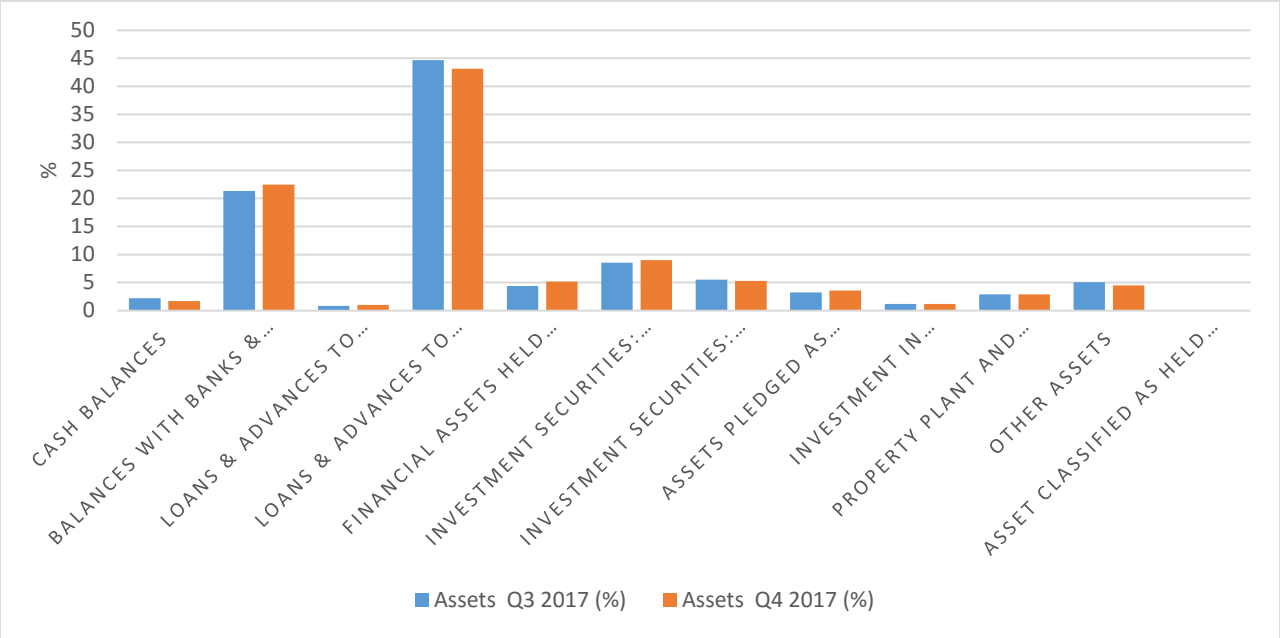
TABLE 1: Structure of Banks' Assets and Liabilities for Q3 and Q4 2017

Assets		
	Q3 2017 (%)	Q4 2017 (%)
Cash Balances	2.20	1.70
Balances with Banks & Central Bank	21.32	22.47
Loans & Advances to Banks	0.86	1.04
Loans & Advances to Customers	44.66	43.14
Financial Assets Held for Trading	4.41	5.16
Investment Securities: Available for Sale	8.53	9.02
Investment Securities: Held to Maturity	5.54	5.32
Assets Pledged as Collateral	3.26	3.6
Investment in Subsidiaries & Associates	1.21	1.16
Property Plant and Equipment's	2.92	2.87
Other Assets	5.06	4.47
Asset Classified as Held for Sale & Discounted Operations	0.02	0.05
Total	100	100

Liabilities		
	Q3 2017 (%)	Q4 2017 (%)
Deposit from Banks	5.12	3.52
Deposit from Customers	57.65	59.54
Financial Liabilities Held for Trading	0.09	0.07
Borrowings	8.84	8.88
Debt Instrument	4.12	4.11
Other Liabilities	13.46	13.29
Shareholders' Fund	10.72	10.59
Total	100	100

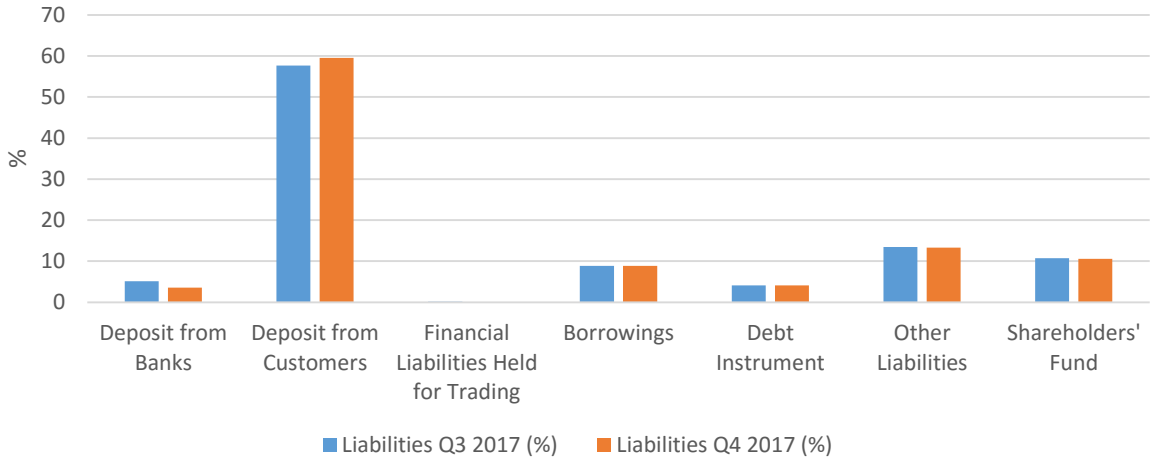
Source: NDIC

CHART 1.1: Structure of DMBs Assets for Q3 and Q4 2017



Source: NDIC

CHART 1.2: Structure of DMBs Liabilities for Q3 and Q4 2017



Source: NDIC

As can be seen from the table and charts, on the Assets' side, Loans & Advances to Customers had the highest component of 43.14% in Q4 and 44.66% in Q3, 2017. That represents a decrease of 3.40%. Balances with Banks & Central Bank had the second highest component with 22.47% and 21.32% in Q4 and Q3, 2017, respectively.

Furthermore, Investment Securities: Available For Sale accounted for 9.02% and 8.53%, Investment Securities: Held to Maturity accounted for 5.32% and 5.54% and Loans and Advances to Banks accounted for 1.04% and 0.86% for Q4 and Q3, 2017, respectively. On the Liabilities side, Total Deposits from Customers had the highest component with 59.54% in Q4 and 57.65% in Q3, 2017. Shareholders' Funds accounted for 10.59% in Q4 and 10.72% in Q3, 2017. Other Liabilities accounted for 13.29% and 13.46% for Q4 and Q3, 2017, respectively. Financial Liabilities Held for Trading had the lowest component of 0.07% in Q4 2017 and 0.09% in Q3 2017.

3.0 FINANCIAL CONDITION OF DMBs

3.1 Capital Adequacy

The banking industry CAR declined from 11.51% in Q2 2017 to 10.56% in Q3 2017 and to 10.23% in Q4 2017. The decrease was attributable to further erosion of the industry total qualifying Capital by ₦0.23 trillion or 9.18% from ₦2.50 trillion to ₦2.27 trillion for Q2 and Q3 2017, respectively.

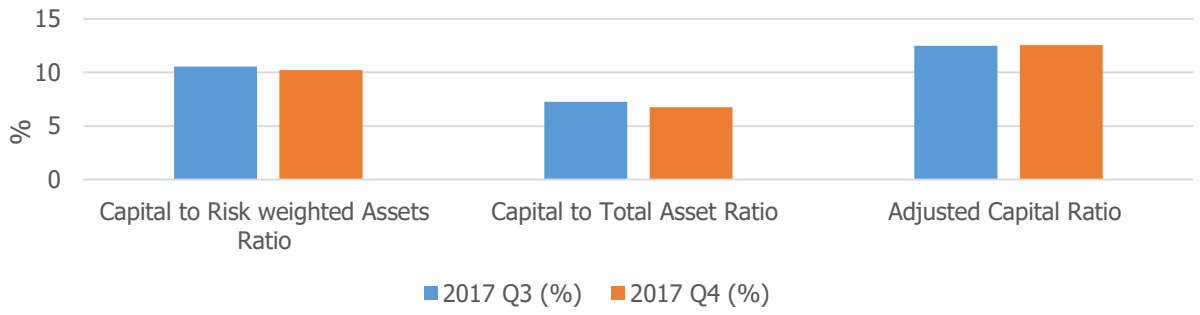
The increasing levels of required provisions for credit losses, operating losses, and declining profits due to economic downturn, amongst other factors, could have precipitated the erosion of the industry capital base. Table 2 and Chart 2 depict the CAR position of the industry for Q3 and Q4, 2017.

TABLE 2: DMBs Capital Adequacy Position for Q3 and Q4 2017

Capital Adequacy Indicator	**2017**	
	Q3 (%)	**Q4 (%)**
Capital to Risk weighted Assets Ratio	10.56	10.23
Capital to Total Asset Ratio	7.28	6.77
Adjusted Capital Ratio	12.49	12.55

Source: NDIC

CHART 2: DMBs Capital Adequacy for Q3and Q4 2017



Source: NDIC

3.2 Asset Quality

Total Credit, which represented the bulk of the Earning Assets, increased slightly by 0.66% from ₦15.87 trillion in Q2 2017 to ₦15.98 trillion in Q3 2017. Out of the industry Total Credits (TCs) of ₦15.98 trillion, Impaired Credits amounted to ₦2.43 trillion, representing 15.18% of TCs. That was an increase over the Impaired Credit Ratio of 12.73% recorded in Q2 2017.

However, in Q4 2017, Total Credit decreased slightly by 0.40% from ₦15.976 trillion in Q3 2017 to ₦15.913 trillion in Q4 2017. Out of the TCs of ₦15.913 trillion in Q4 2017, Impaired Credits amounted to ₦2.361 trillion, representing 14.84% of Total Credits. That was an improvement over the Impaired Credit Ratio of 15.18% recorded in Q3 2017.

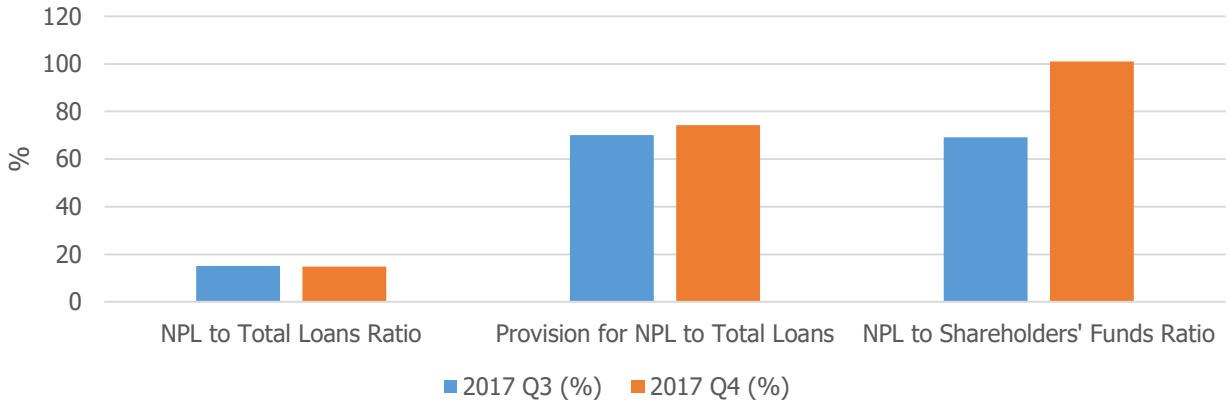
During the periods, the Impaired Credit ratio of 15.18% in Q3, and 14.84% in Q4 both exceeded the maximum threshold of 5% prescribed by the CBN. The Q3 and Q4, 2017 Asset Quality indicators are shown in Table 3 and Chart 3.

TABLE 3: DMBs Asset Quality Indicators in Q3 and Q4 2017

Details	2017	
	Q3 (%)	Q4 (%)
NPL to Total Loans Ratio	15.18	14.84
Provision for NPL to Total Loans	70.08	74.21
NPL to Shareholders' Funds Ratio	69.21	100.96

Source: NDIC

CHART 3: DMBs Asset Quality indicators in Q3 and Q4 2017



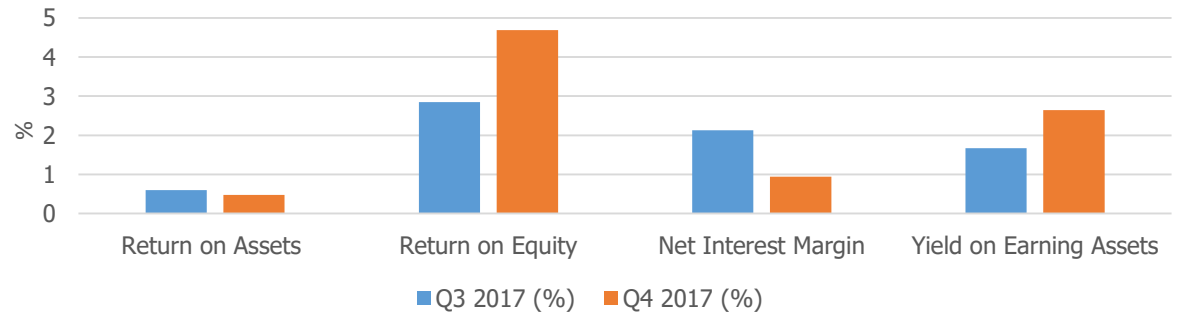
Source: NDIC

3.3 Earnings and Profitability

In Q3 2017, the banking industry recorded a Profit Before Tax (PBT) of ₦156.73 billion against a Profit Before Tax of ₦183.66 billion recorded in Q2 2017. That represented a decrease of 14.67% which could be attributed to: a substantial decline in Trading Income from ₦117.30 billion in Q2 2017 to ₦91.35 billion in Q3 2017, and an increase of 7.75% in Operating Expenses from ₦398.25 billion in Q2 to ₦429.12 billion in Q3 2017.

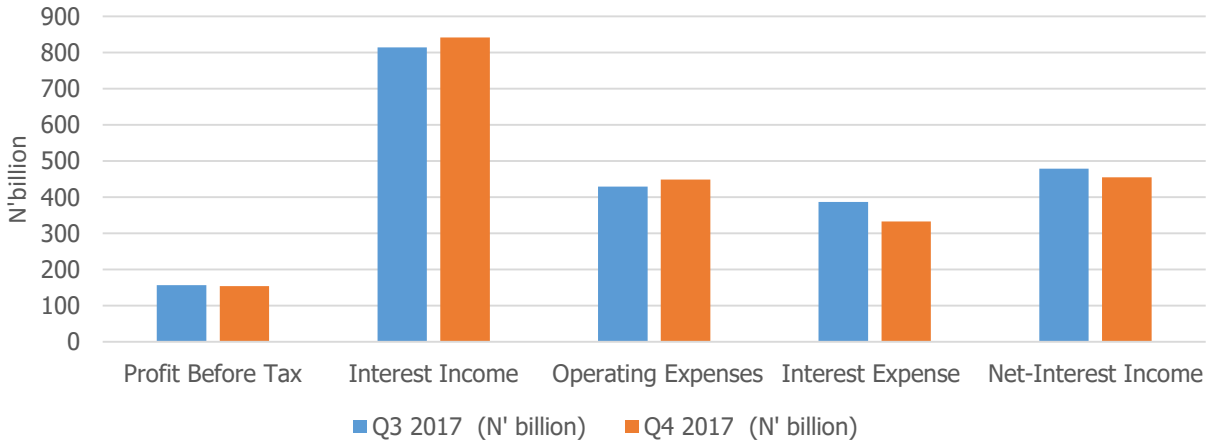
In Q4 2017, the industry recorded a Profit Before Tax of ₦154.08 billion against a profit of ₦156.73 billion recorded in Q3 2017, representing a decrease of 1.69%. In the quarter under review, Return on Assets (ROA) decreased from 0.60% in Q3 to 0.48% in Q4 2017 while Return on Equity (ROE) increased from 2.85% to 4.69% in the quarter under review. The Q1 and Q2, 2017 Earnings and Profitability indicators are shown in Table 4 and Charts 4.1 and 4.2.

CHART 4.1: DMBs Earning and Profitability ratios for Q3 and Q4



Source: NDIC

CHART 4.2: Earning and Profitability for Q3 and Q4



Source: NDIC

TABLE 4: DMBs Earnings and Profitability Indicators in Q3 and Q4 2017.

Parameters	Q3 2017	Q4 2017
Return on Assets (%)	0.60	0.48
Return on Equity (%)	2.85	4.69
Net Interest Margin	2.13	0.94
Yield on Earning Assets (%)	1.67	2.64
Profit Before Tax (N' billion)	156.73	154.08
Interest Income (N' billion)	814.37	841.60
Operating Expenses (N' billion)	429.11	449.02
Interest Expense (N' billion)	386.58	332.69
Net-Interest Income (N' billion)	478.74	455.01

Source: NDIC

3.4 Liquidity Profile

In Q3 2017, Average Liquidity Ratio (ALR) of the industry decreased significantly from 65.85% in Q2 2017 to 48.54% in Q3 2017. Similarly, the ALR of the industry decreased significantly from 48.54% in Q3 to 45.56% in Q4 2017. The Net Credit to Deposit Ratio, which measures banks' level of lending activities, decreased to acceptable position of below 80% from 91.90% in Q3, 2017 to 72.30 % in Q4 2017, as shown in Table 5 and Chart 5.

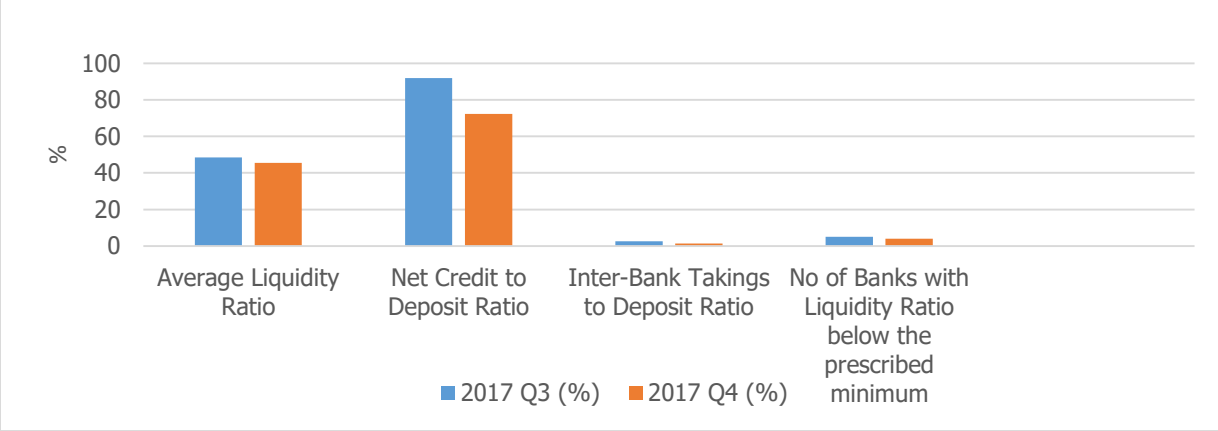
During the quarters under review, all the DMBs met the minimum liquidity ratios of 30% for Commercial Banks and 20% for Merchant Banks except 5 in Q3 and 4 in Q4 2017, respectively.

TABLE 5: Liquidity Profile of DMBs for Q3 and Q4 2017.

Parameters	2017	
	Q3 (%)	Q4 (%)
Average Liquidity Ratio	48.54	45.56
Net Credit to Deposit Ratio	91.90	72.30
Inter-Bank Takings to Deposit Ratio	2.52	1.35
No of Banks with Liquidity Ratio below the prescribed minimum	5	4

Source: NDIC

CHART 5: DMBs Liquidity Profile for Q3 and Q4



Source: NDIC

4. CONCLUSION

The DMBs had a mixed performance during the two quarters under review. The Net Credit to Deposits Ratio decreased to acceptable position of below 80%. Total Deposits from Customers, Capital to Risk Weighted Assets Ratio, and PBT all decreased, while the Industry Total Assets appreciated during the two Quarters.

MOBILE MONEY AND MONETARY POLICY IN NIGERIA.

Samuel Orekoya (Ph.D)

1.0 INTRODUCTION

The use of mobile payment technology is becoming increasingly significant in the modern world. In an attempt to explain this financial innovation, Jenkins (2008) broadly classified it into three categories viz: *mobile transfer* (also referred to as person to person transfer, is the transfer of money from one user to another usually without any value added), *mobile payment* (the transfer of money between users accompanied by value added services) and *mobile financial transaction* (this includes accessing financial related services like insurance and macro-finance among others). However, mobile money, as it is often referred to globally, is simply a regulated payment service that can be performed via any mobile device such that, even without a bank account, users can have access to their money anywhere and at any time. It accord subscribers the privilege of converting real money into electronic money (e-money) and credited into mobile devices so that financial transactions can be conducted through a mobile phone. This reduces dependency on cash and commutes a much broader range of financial services to the unbanked population. (Phillips Consulting, 2013).

The advent of mobile money has been applauded to have brought with it a lot of benefits in terms of facilitating transactions and motivating financial inclusion. Munyegera and Matsumoto (2014) considered mobile banking as a recent innovation in the financial sector that is expected to bridge the financial service access gap, thus allowing for socio-economic improvement especially among the financially excluded rural communities in many developing countries. They advocated that it allows users to make deposits, transfer fund as well as purchase a wide range of goods and services using their mobile phones. In supporting this, Jack and Suri (2014) pointed out that mobile money can facilitate quicker recovery from economic shocks such as job loss or illness to the primary wage earner. That is, it could facilitate easy access to grants or any other intervention from governments or corporate bodies. Aker, et al (2011) is of the opinion that mobile money can enable more efficient receipt of monetary transfer from non-government organizations (NGOs) after disasters while Mas (2010) identified it as a veritable potential to lay foundation for access to formal savings, credits and insurance opportunities to those who currently lack access.

Masha (2016) reported that the number of registered mobile account grew to reach 279 million globally at the end of December 2014 and in three-quarters of the markets where mobile money is available, agents outlets outnumbered bank branches. As at December 2014, Sub-Saharan Africa recorded the highest level of mobile money penetration above any region with 23 per cent of mobile connections in the sub-region linked with a mobile money account while Africa as a region accounted for 53 per cent of global mobile money services (Mansa, 2016). In Nigeria, the total transaction value of mobile money has been

growing from 159 billion naira in 2015 to 527 billion naira and 555 billion naira in 2016 and 2017 respectively (NIBSS, 2015, 2016 and 2017). This indicates the level of growth and acceptance of mobile money technology in Nigeria.

Despite being identified to possess some benefits, a few questions still trails the advent of mobile money. Some of which are: does the increasing use of mobile money impact the conduct of monetary policy?, does it weaken the effectiveness of monetary policy?, does the innovation inhibit the attainment of monetary target? In the wake of answering these questions, there have been some arguments. Kamukama and Tumwine (2012) presented that the adoption and increasing use of mobile payments may disadvantaged commercial banks by weakening their liquidity positions and was supported by the assertion of the Governor of the Bank of Uganda at a conference in 2015. In the Governor's opinion, "*if more radical mobile banking business models are eventually developed in which mobile money becomes a substitute for demand deposits in banks, the ability of central banks to control interest rate could be undermined. This is because central banks control short-term interest rates by varying the liquidity available for commercial banks to meet their reserve requirements. But if mobile money eventually leads to a diminution of the role which commercial banks play in the financial system, the interest rate transmission mechanism, which relies on movements in short term inter-bank rate being transmitted along the yield curve to all other interest rates in the economy will be weakened, which in turn will weaken the transmission mechanism of monetary policy"* (Tumusiime-Mutebile, 2015).

In contrast to this, the empirical works of Mbutor and Uba (2013) and Balasuhramanian and Drake (2015) suggest that mobile money contributes to growth and improves the conduct of monetary policy. This conflicting and inconclusive argument calls for more empirical investigation particularly in Nigeria where little or no empirical work has been conducted despite the fact that mobile money transaction is fast gaining ground in the country. It is against this backdrop that this study seeks to empirically examine the effectiveness of monetary policy in the advent of mobile money transaction in Nigeria.

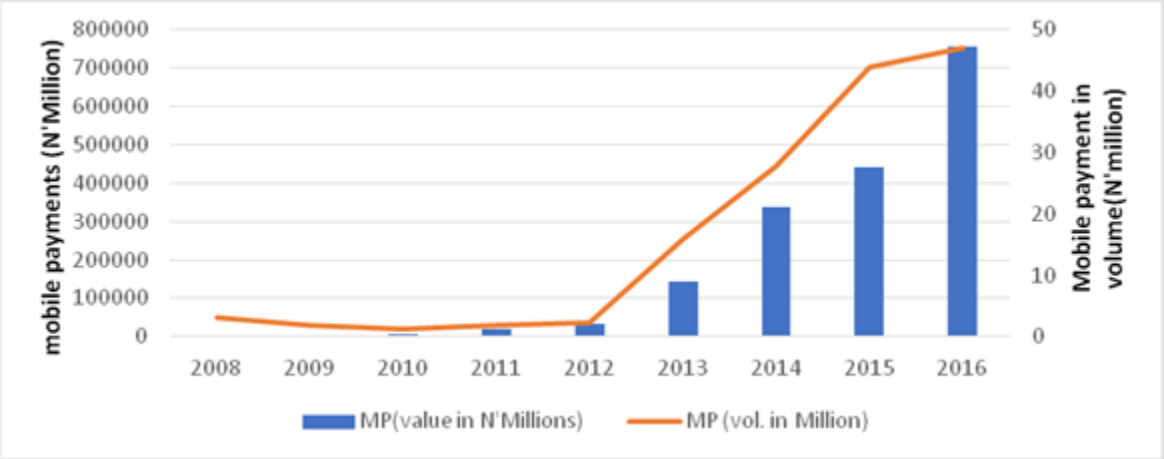
Following the brief introduction above, Section 2 provides the trends and regulations of mobile money in Nigeria while Section 3 reviews theoretical and empirical literature on financial innovation and development. Section 4 provides the methodology for the study while data sources and description are presented in Section 6. Empirical results occupy Section 5 with the study's conclusion and recommendation in Section 7.

2.0 TRENDS AND REGULATIONS OF MOBILE MONEY IN NIGERIA

2.1 Trends of mobile money in Nigeria

The Mobile Money Transfer programme was jointly launched by the GSM Association (GSMA) and Western Union in October 2007. There are now more than 120 mobile money projects being undertaken in about 70 emerging economy (Yakub, et al, 2013). Since then, mobile money transaction has been on the rise particularly in Nigeria. In 2008, the country recorded a volume of 3.2 million of mobile payment with a corresponding value

of 700 million Naira which rose in volume to 15.8 million by 2013 with a corresponding value of 142.8 billion in Naira. Recently in 2016, a total volume of 47 million with a corresponding value of 756.89 billion naira was recorded corresponding to a 108, 127 per cent increase from 2008 (CBN, 2017 and NBS, 2016). This trend is demonstrated in Figure 1.



Source: Authors computation from CBN (2017) and NBS (2016)

2.2 Regulations of Mobile Money in Nigeria

In 2011, the Central Bank of Nigeria (CBN) granted operating licenses to twenty one (21) mobile money operators (MMOs) to provide mobile money services in the country. Out of these, six (6) are bank-led {Guaranty Trust Bank (GTBank), Stanbic IBTC, Ecobank, Fortis MFB, Zenith Bank (eazymoney) and Firstmonie} while fifteen (15) others are non-bank-led {Pagatech, Paycom, eTranzact, Afripay, FETS (Funds and Electronic Transfer Solutions), Eartholeum, M-Kudi, Virtual Terminal Network (VTN), Parkway Projects, Teasymobile, Interswitch, Monitize, Pay with capture, Zoto app and CeLLulant}. Though the modes of operation and specific services vary among the different MMOs, there some functions generally performed by all of them. These include: receipt and transfer of money, cash deposits and withdrawals, balance enquiries, purchase of airtimes and payment of bills among others.

In accordance with the powers conferred on the Central Bank of Nigeria (CBN) in Section 47(2) of the CBN Act 2007, "to promote and facilitate the development of efficient and effective system for the settlement of transactions, including the development of electronic payment systems" and pursuant to its mandate of promoting a sound financial system in Nigeria, the CBN issued the guidelines for Mobile Money Services in Nigeria in April 2015 (CBN, 2016). The guidelines cover: the models of operation, agency networks, business rules, roles and responsibilities of participants, nominee/settlement account, transaction security standard, infrastructures, risk managements, technologies, know your customer and customer due diligence requirements, certainty of mobile transaction, customers protection measures, cessation of mobile payments service, statutory returns, remedial measures and sanctions.

As identified in the Act, the objectives of the rules are to ensure a structured and orderly development of mobile money services in Nigeria, with clear definition of various participants and their expected roles and responsibilities, specification of the minimum technical and business requirements for the various participants. This is to promote safety and effectiveness of mobile money services and thereby enhance user confidence in the services.

To further bolster the confidence reposed in mobile payment system by the customers and ensure its continuity, the agency responsible for insuring depositors fund (Nigerian Deposit Insurance Corporation, NDIC) has provided a guarantee to subscribers' for funds deposited with mobile money operators up to the maximum coverage level of ₦500,000. Vide the NDIC's guidelines on mobile payment system released by the corporation, it defines the pass-through deposit insurance scheme as "the protection provided by the NDIC to mobile money subscribers, where the corporation insures funds that are deposited by a mobile money operator in the deposit money banks" (NDIC, 2016). In this sense, mobile money operators are assumed to be acting as custodian of funds on behalf of their subscribers who are the actual owners of funds deposited in the deposit money banks. Insuring subscribers' funds with mobile money operators in Nigeria will not only engender financial system's stability but also promote financial inclusion.

3.0 LITERATURE REVIEW

3.1 The financial development theory

The theory of financial development centres on cost minimization in the financial system and improvements in the degree and quality of financial intermediation in the system and its role in the development of an economy. This theory can be particularly traced to Bagehot (1873) who asserted that a large and well organized capital markets in England facilitates resources allocation towards a more productive investment. Scholars like Schumpeter (1911); Hicks (1969) and Goldsmith (1969) among others have all critically examined the role of financial development in an economy. Schumpeter (1911) earlier examined the role of a country's banking system for economic development in mobilizing savings and encouraging productive investment, and later in 1939 establishes that the relationship between credit creation by banks and innovation is fundamental to the understanding of the capitalist engine. In identifying the importance of financial market in the process of industrial revolution, Hicks (1969) observed that the development of financial system facilitates the application of new technologies and innovations, while Goldsmith (1969) found evidence of a positive link between financial development and economic growth using data from 35 countries for a comparative study over the periods of 1860-1963. This aligns with the report of Levine (2005) and Pasali (2013) that the degree of financial intermediation is not only positively correlated with growth and developments, it is believed to causally impact growth. Although, traditional growth model of Solow and Swan (1956) did not factor in the role of finance in their models, evidences have shown that financial development is an important factor to the growth of a nation.

3.2 Analytical Framework

3.2.1 Mobile money and demand for money

The demand for money explains the desire to hold money in liquid form instead of holding it in some other forms of investment. While there have been arguments about factors that influences the demand for money, the classical holds out that money is held only for transactionary motive, and thus, income is the only determinant of money demand. The Keynesian notes that money is held not only for transactionary motive, but also for speculative motive and precautionary motives, therefore, money demand is determined not only by income but also interest rate. The monetarist on the counter-revolution asserts that it is only permanent income that determines the demand for money in the long run as interest rate have little and insignificant impact. But what then is the impact of mobile money on money demand? Perhaps, this could best be answered if we know the impact of mobile money on income and interest rate since these are empirically proven determinant of money demand and their direction of influence have already been established in the literatures. Mawejje and Lakuma (2017) are of the opinion that there are two competing views of the likely impact of mobile money and money demand. The first view is that the financially excluded may accumulate their savings in the form of non-financial assets such as land, livestock, and jewelry (Mehrotra and Yetman, 2015). This may present the household the opportunity to substitute non-financial assets with mobile money, thus increasing the demand for money. That is, with mobile money which facilitates financial inclusion, household might choose to converts their assets or keep their future savings in liquid form with the bank since it is easily accessible and can easily make transactions with it. On the other hand, Ndiranju and Nyamongo (2015) contend that financial innovations may reduce the demand for money due to improvement in transaction efficiency. That is, the desire to hold money in liquid form may decline if such innovation is proven efficient, because it will reduce transaction cost, the stress and risk of moving around with heavy cash among others. This is supported by Mawejje and Lakuma (2017) findings that mobile money reduces money supply by 1% in their empirical investigation for Kenya. From this view, it can be concluded that whether mobile money reduces or increases money demand depends on its level of efficiency and the trust of the people in the system.

3.2.2 Mobile money and money supply

Money supply is identified to be the total money stock in circulation plus demand deposit in the narrow version of it. Mobile money on the other hand facilitates transaction through mobile payment and banking without necessarily involving the use of cash. This indicates that mobile money could be a substitute for cash because it facilitates transactions as cash would. The implication is that, if mobile money is proven more efficient than cash transaction and acceptable by the people, then most transactions are likely to be consummated through this means. This would increase the velocity of money because transactions can be conducted without delay, at reduced cost and low risk relatively to cash transaction. That is, with the same quantity of money in the system, more transactions can be conducted with it and therefore, more volume money in circulation.

3.2.3 Mobile money and velocity of money

The velocity of money measures the number of times a unit of currency circulates around the economy. As presented in the equation of exchange by Fisher (1912);

MV=PT ……. (1)

where M = Money supply, V= Velocity of money, P= Price level and T= level of transactions.

PT can be taken as the total nominal national income and MV the total volume of money in circulation, thus, Velocity is given as;

$V = \frac{P \times T}{M}$ ……. (2)

From equation (2), velocity is determined by the level of money supply and the volume of transaction. Reduction in money supply increases velocity of money from equation 2 above, if and only if, the volume of transaction is constant or increases and vice versa, while increase in national income increases velocity of money if and only if money supply is constant or reduces. Therefore, if mobile money reduces money supply and improves economic transactions, then, it improves the velocity of money and vice visa if otherwise. Batista and Vicenta (2013) noted that the velocity of money is limited by how fast cash can be physically transported, by foot or by bus in most circumstances.

3.2.4 Mobile money, price level and economic growth

The influence of mobile money on economic growth and price level depends on whether or not money is neutral. Mobile money will improve velocity of money if it facilitates more transactions, and increase in velocity of money would improve the volume of money in circulation (MV). Looking at this from the theoretical angle, the classical believes that money is neutral and its increase in the economy will result to a proportional increase in price level without any effect on economic activities. The Keynesian argued that there are slacks in the economy in the short-run (i.e. the economy operates below full-employment or potential capacity, leading to a perfectly elastic aggregate supply curve). Therefore, increase in money supply will account for increase in national productivity with no effect on price. However, the monetarist are of the opinion that in the short run, increase in money supply will lead to both increase in price and output while in the long run, increase in money supply have no influence on output. With this, the effect of mobile money on price and output depends on whether the economy is in the short or long run or the economy is at full employment or there are slacks in the economy. If there are slacks in the economy, then mobile money would facilitate growth in national output but will be inflationary if otherwise.

3.3 Empirical Reviews

There are growing bodies of literature centred on financial innovation and its possible effect on the conduct of monetary policy. Mobile money is one of the strategies for financial innovation and inclusion. Although, not much of empirical works have been

conducted on mobile money and the conduct of monetary policy, below are the related studies and findings.

Mbiti and Weil (2011) investigated the impact of M-Pesa (mobile money) in Kenya by analyzing data from two waves of individual data on financial access using Fixed Effects Instrumental Variable (FE-IV). The study found increase in the use of M-Pesa to lower the tendency of people to use informal savings mechanism but raised the probability of their being banked. It also found the velocity M-Pesa to be high. They therefore suggested that mobile money improves individual well-being by promoting banking and increasing transfers. Using Dynamic Stochastic General Equilibrium (DSGE) framework with two sectors (the rural and the urban producer household) to investigate Mobile money and monetary policy in East African countries, Adam and walker (2015) reported that mobile money should increase macroeconomic stability and help to minimize the incompleteness of the market. Flowing form their findings, they advocated for policy support to encourage the use of mobile money in East African countries and even beyond.

Mbutor and Uba (2013) while investigating the impact of financial inclusion on monetary policy in Nigeria between 1980 and 2012, adopted unrestricted cointegration and Ordinary Least Square (OLS) techniques reported that growing financial inclusion would improve the effectiveness of monetary policy and that country with higher degree of financial inclusion tends to achieve higher economic growth. Recent empirical work by Mawejje and Lakuma (2017) to examine the macroeconomic effects of mobile money in Uganda using both vector error correction mechanism (VECM) (to examine the effect of mobile money on money demand) and Structural Vector Autoregressive Model (SVAR) (to examine the effectiveness of monetary policy on mobile money) reported that mobile money reduces demand for money in the long run. They also reported that mobile money balances are sensitive to monetary policy shocks and thus have the potential to improve the conduct of monetary policy.

However, contrary to previous findings, Kamukama and Tumwine's (2012) who adopted correlation matrix and multiple regression model to unravel the liquidity threat of mobile money to commercial banks in Uganda showed that mobile money was negatively related to the liquidity position of commercial banks. The study also reported that mobile money service accounts for 36.7% of liquidity variance in Ugandan commercial banks and that this may present a serious problem to the effectiveness of monetary policy in the country. Given the unclear impact of mobile money on monetary policy and the inconclusive debate of its effect on the conduct of monetary policy, this study therefore seeks to fill the gap by empirically examining the influence of mobile money on the conduct of monetary policy in Nigeria.

4.0 METHODOLOGY

To investigate the impact of financial innovation (mobile money) on the conduct of monetary policy in Nigeria, the study adopts the Structural Vector Autoregressive (SVAR)

Model because of its theoretical underpinning and ability to account for contemporaneous effect in the model.
Kim and Roubini (2000) identified that SVAR approach allows for contemporaneous feedback between variables while imposing the minimal structural restriction on the model. The generalized structural VAR model is represented in equation (3);

$AY_t = \sum_{i=1}^{p} B_i Y_{t-1} + \varepsilon_t$ ..... (3)

where Y represents the vector containing the seven endogenous variables, A represents a square matrix of coefficients to be estimated, ε represents a vector of serially uncorrelated, and mutually orthogonal structural disturbances, p represents the number of lags.

The structural equation represented by the above system must be identified for the purpose of policy analysis and must be given economic interpretation. The fundamental problem is that the model in not directly observable therefore cannot be directly estimated to derive the true values of the coefficient vector (Bongani, 2014). The reduced form of the model, which is obtained by multiplying both sides by, A^{-1} is specified as follows in equation (4);

$Y_t = A^{-1} \sum_{i=1}^{p} B_i Y_{t-1} + e_t$..... (4)

where e_t is a vector of serially uncorrelated, but not necessarily orthogonal, reduced form disturbances. In this regard, the relationship between the reduced form VAR residuals (e_t) and structural shocks (ε_t) is as expressed in equation (5) :

$e_t = A_0 \varepsilon_t$..... (5)

Based on the Cholesky decomposition of the reduced form VAR, for this study, we impose n(n-1)/2 constraints that defines matrix A_0 as a lower triangular matrix. The lower triangularity of A_0 implies a recursive scheme (because structural shocks are identified through reduced form VAR residuals) among variables (the Wald chain scheme) that has clear economic implications and has to be empirically tested as any other relationship. Identification scheme of the matrix A_0 implies that particular contemporaneous interactions between some exogenous shocks and some endogenous variables are restricted reflecting causal chain of interaction transmission. Therefore the Wald causal chain is incorporated via a strategic ordering of the variables in a way that mirrors economic theory. Thus, the variables are ordered as follows on the assumption that: mobile money (MM) balances are affected by own innovations; money supply (proxy with broad money, M2) is affected by mobile money, price level (consumer price index, CPI) is influenced by mobile money and money supply, Treasury bill rates (TBR) are influenced by the price level, money supply and mobile money, Private sector credit (PSC) is affected by TB rates, price level, money supply and mobile money while aggregate output (real gross domestic product, RGDP) is influenced by all the endogenous variables in the model. The matrix form of the SVAR model is expressed in equation (6);

$$\begin{bmatrix} e^{MM_t} \\ e^{M2_t} \\ e^{CPI_t} \\ e^{TBR_t} \\ e^{PSC_t} \\ e^{RGDP_t} \end{bmatrix} = \begin{bmatrix} 1 & 0 & 0 & 0 & 0 & 0 \\ a_{21} & 1 & 0 & 0 & 0 & 0 \\ a_{31} & a_{32} & 1 & 0 & 0 & 0 \\ a_{41} & a_{42} & a_{43} & 1 & 0 & 0 \\ a_{51} & a_{52} & a_{53} & a_{54} & 1 & 0 \\ a_{61} & a_{62} & a_{63} & a_{64} & a_{65} & 1 \end{bmatrix} * \begin{pmatrix} \varepsilon^{MM_t} \\ \varepsilon^{M2_t} \\ \varepsilon^{CPI_t} \\ \varepsilon^{TBR_t} \\ \varepsilon^{PSC_t} \\ \varepsilon^{RGDP_t} \end{pmatrix} \quad \ldots\ldots\ldots\ldots\ldots \quad (6)$$

The left hand side of the equation consists of the vector of residuals in the reduced form, and the right hand side is the squared matrix (A_0) of coefficients associated with lagged variables and structural shocks through column vector (ε).

5.0 DATA SOURCES AND DESCRIPTION

The study used monthly data spanning from 2008M1 to 2016M12. The start-off date marks the era when mobile money was introduced in Nigeria while the cut-off period correspond to when data are available on all variables of interest. The data used were collected from National Bureau of Statistics (NBS, 2016) publications and the Central bank of Nigeria (CBN, 2017) annual publications and bulletin. Aside from Treasury bill rate (TBR), the study used the natural logarithm of mobile money payments (LMM), Money supply (LM2), Consumer price index (LCPI), Private sector credit (LPSC) and Real Gross domestic product (RGDP). Monthly data on mobile money between 2015 and 2016 were obtained from CBN while the rest from 2008 to 2014 (annual) and the RGDP data (quarterly) were interpolated to monthly data using E-views.

Both Treasury bill rates (TBR) and broad money supply (M2), which measures the volume of money in circulation, enters the model as monetary policy control instruments. Mobile payment (LMP) which proxy mobile money is the amount of transactions conducted via mobile technology. Private sector credit (PSC) represents banks loans and advances to the private sector and it comes into the model as an intermediate target of monetary policy. Both the consumer price index (CPI), which is the average price level per basket of consumer goods and the real gross domestic product (RGDP), which aggregates the economic activities, enters the model as a monetary policy goal.

6.0 EMPIRICAL RESULTS

6.1 Stationarity Test

Using both the Augmented Dickey Fuller (ADF) and Phillips-Perron (PP) tests for stationarity test, all the variables, except M2, are found stationary at first difference. Given the observed nature of the series with some variables stationary at levels I(0) and others at first difference I(1), as seen in Table 1, the study adopts the Toda and Yamamoto (1995) estimation approach which is adjudged suitable for VAR estimation (Amiri and Ventelou, 2012).

Table 1: Stationarity Test

ADF				PP		
Variable	Levels	1st difference	2nd difference	levels	1st difference	Decision
LCPI	-2.029	-7.827***		-2.249***	-7.869***	I(1)
LM2	-4.088***			-4.196***		I(0)
LMM	-2.932	-2.669	-10.572***	-2.91779	-13.917***	1(1)
LPSC	-2.051	-11.575***		-2.09527	-11.573***	I(1)
LRGDP	-1.616	-9.791***		-1.66014	-9.793***	I(1)
TBR	-2.862	-8.096***		-2.0685	-7.987***	I(1)

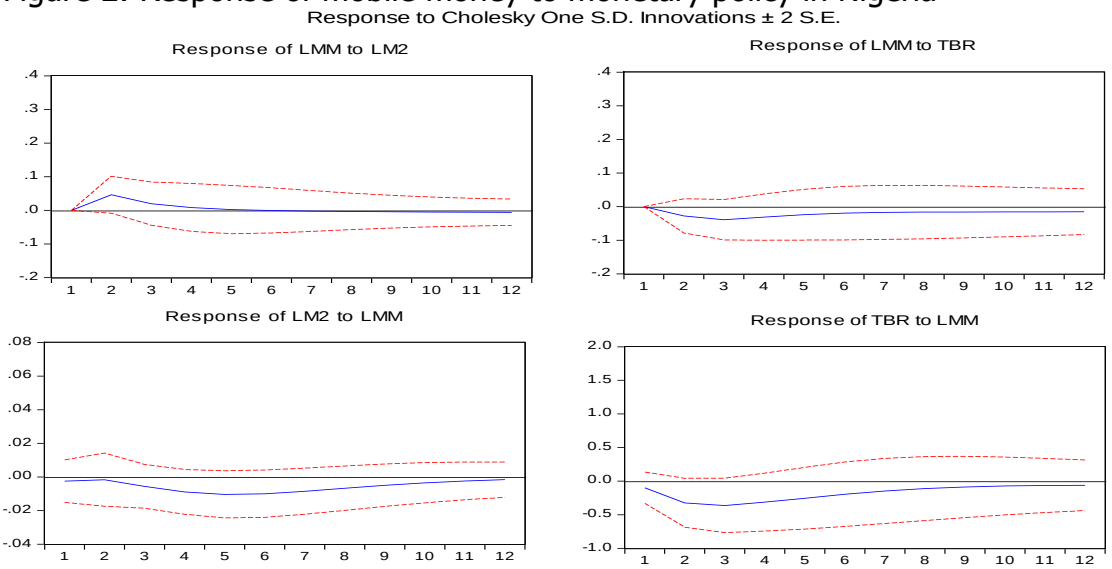
***, **,* represent 1%, 5% and 10% significance level.

6.2 Impulse Response

To test the impact of mobile money technology on the conduct of monetary policy in the country, the study evaluates the impulse response of mobile money to shocks emanating from money supply and 364days Treasury bill rate both being monetary instruments.

Figure 2 shows that mobile money is responsive to monetary policy in Nigeria. It responds positively to positive shock in money supply until the second and third months declining thereafter and remaining insignificant throughout the rest of the period. Mobile money responds negatively to shocks in Treasury bills. It reveals that a shock in Treasury bill rate results to a decrease in mobile money. Money supply also respond to mobile money but negatively just like Treasury bill.

Figure 2: Response of mobile money to monetary policy in Nigeria



6.3 Variance Decomposition

The forecast error variance decomposition (FEVD) explains the percentage of variance in the equation that is captured by the explanatory variables and its determinants. It shows the impact of shocks in the endogenous variables on the exogenous variable. Table 2 presents the first month in each quarter of the 12-month horizon into the future.

Table 2: Variance Decomposition[1]

DEPENDENT VARIABLES	Month	LMM	LM2	LCPI	TBR	LPSC	LRGDP
Mobile Money	1	100.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	4	93.4453	1.3849	1.2346	1.7794	1.8369	0.3190
	7	88.9129	1.1148	4.6029	1.9802	2.1963	1.1929
	10	83.2702	1.0212	9.3314	2.0790	2.4049	1.8933
Money Supply	1	0.1477	99.8523	0.0000	0.0000	0.0000	0.0000
	4	1.5766	88.1758	0.4126	6.9110	1.5361	1.3878
	7	4.2214	70.9839	2.8432	17.8598	2.2747	1.8170
	10	4.7412	66.4676	5.8383	18.8895	2.1629	1.9004
Treasury Bill Rates	1	0.6728	0.2123	0.0000	99.1150	0.0000	0.0000
	4	5.5019	0.1846	1.8273	91.5713	0.7923	0.1226
	7	6.0422	0.5219	4.0270	87.7594	0.9865	0.6630
	10	5.9854	0.5444	5.5685	84.4404	1.8270	1.6343

Own shock wholly accounts for variation in mobile money in the first month as shown in Table 2. Own shock decrease further from 93.45% to 88.91% between the fourth and seventh month with other variables each marginally accounting for less than 2% in the fourth month. Only price level innovation provides an appreciable explanation (4.50%) in the fourth month for shocks to money supply while other variables accounts for an average of 2% each during the same period. While explanation from own shock decreased further in the tenth month to 83.27%, only price level (9.33%) offers significant explanation to innovations in mobile money. The two instruments of monetary policy, broad money and TB rates, provide no significant explanation for variation in mobile money. Though this finding shows that mobile money have no significant effect on monetary policy, same cannot be inferred for price level and private sector credit.

From the money supply section in Table 2, money supply responds largely to own shocks with all other variables accounting for less than 1% of the innovation. TB rates account for almost 7% variations in the fourth month aside own shock of (88.17%). However, from the seventh month, TB rates explanation of 17.86% is only second to own shock (70.98%) with mobile money marginally accounting for 4.22% and all others accounting

[1] Exchange rate was among the initial variables considered but was dropped because it was found to be statistically insignificant here.

for about 2% each. In the tenth month when own shock decreased further to 66.47% and TB rates account for 18.89%, price level explains 5.84% of the innovations in money supply confirming that inflation is linked to money supply. Mobile money accounts for 4.74% while private sector credit (2.16%) and output (1.9%) offers little explanation. Thus, innovations in money supply appear not to significantly impact mobile money technology.

Table 2 shows that variations in TB rates are not significantly affected by other macroeconomic variables in the first month as own innovation accounts for 99.85% in the variation. However, in the fourth month when own shock accounts for 91.57%, mobile money explains 5.50% of innovation while the remaining variables accounted for 3% of variations in TB rates. Between the seventh and tenth month, while own shock explanations decreased from 87.76% to 84.44% and mobile money explanation from 6.04% to 5.99% in the same period, price level explanation for the innovation rose from 4.02% to 5.57% for the same period. This implies that mobile money, and even price level, responds more to shocks from TB rates than from money supply.

7.0 SUMMARY, CONCLUSION AND RECOMMENDATION

Mobile money is a financial innovation that poses numerous benefits to the society. Despite these perceived benefits, skeptics are concerned whether these innovations will weaken the operation and effectiveness of monetary policy consequently the stability of financial sector as well as other macroeconomic variables. This paper examines the effect of mobile money on the conduct of monetary policy in Nigeria from 2008M1 to 2016M12. Specifically, it examines the responsiveness of mobile money and some macroeconomic variables to shocks from monetary instruments proxy with moneys supply and 364days Treasury bill rates.

Structural vector autoregressive model (SVAR) was adopted to test for the short term responses of mobile money to shocks from monetary policy. Though mobile money has no significant effect on monetary policy, the result shows that same cannot be said on price level. This implies that financial innovations such as mobile money technology impacts on the economy's price level. The study also found that monetary policy shocks emanating from TB rates impacts more on mobile money than from money supply. The implication is that economic agents consider the yields/returns on risk-free investment such as Treasury bill when making their consumption and investment decisions.

From these findings, the study recommends further enlightenment and education for the use of mobile money by the monetary authority in Nigeria as it could be a veritable tool to deepen financial inclusion especially to those excluded in the rural area and towards achieving a desired expansionary monetary policy. Given its marginal impacts on price level, the study also recommends the sustenance of the existing daily transaction limits by the monetary authority both for security and stability purposes. Also, stakeholders such as the Nigerian Communications Commission and other operators have vital role to play in the propagation of mobile money in Nigeria.

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The Effects of Oil Price Volatility on Selected Banking Stock Prices in Nigeria

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1. Introduction

The stock market has been viewed as a market where most elements that feed into the development of a nation's economy operate. In Nigeria, the Nigerian Stock Exchange (NSE), which is one of the fastest growing stock markets in Africa and among the emerging stock markets in the world, has recorded phenomenal growth. As at 2002,of the eight sub-Saharan markets analyzed, only Nigeria, South Africa and Zimbabwe were considered 'frontier markets' and are thus, included in the IFC Global Composite Index (Magnusson and Wydick, 2002).Moreover, the recent global financial crisis led to a downward movement of stock prices and also posed a great threat to an emerging economy like Nigeria.

Nigeria's financial sector has witnessed major transformations in recent years. In the past decade, the banking sector has gone through major consolidation, which resulted in the reduction in the number of banks from 89 to 24 and significantly increased bank capitalization. Because of consolidation, financial intermediation levels increased significantly: the number of bank branches almost doubled to about 5,800 in 2011, (Sanusi, 2011; CBN, 2012) and banks engaged in a range of new activities, including the financing of infrastructure and oil projects, activities that were previously beyond their capacity. In addition, Nigerian banks have extended into considerable cross-border activities with subsidiaries and branches in the Economic Community of West African States (ECOWAS) region, Southern Africa, Central Africa, Europe and North America (NSE, 2015).

However, the banking reform efforts were threatened by the global financial crisis, which posed devastating challenges. While the initial effects were contained due to low levels of exposure to complex financial instruments, the large swings in oil prices, combined with the resulting depreciation of the naira and drop in investor confidence led to growing pressures. Market speculation about the quality of some bank balance sheets was evident in the breakdown of the naira interbank market as well as perceptions that some banks were using the Central Bank discount window as an ongoing source of funding. In addition, some banks had high exposure to importers of fuel products, who had high foreign currency obligations owing to the high fuel prices in 2008 and were subsequently hit by falling oil prices and devaluations of naira.

There are a number of different factors that affect financial markets, however many researchers believe there is a direct relationship between oil price and Stock market performance (see Salisu and Oloko, 2015; Babatunde, et al, 2013, Fowowe 2013). From the foregoing, this study contributes to the existing literature in the following ways. Is reckoning with the existing literature that aggregate stock market indices may mask the individual characteristics of the activity sectors in relation to oil price? To the best of our

knowledge, there are no existing studies on Nigeria that examined the effect of oil price on banking stock performance. Therefore, this study examines the relationship between oil price fluctuations and banking stock prices using disaggregate data on the banking sector which is by far the dominant in the Nigerian securities market in terms of market capitalization and trading volume. This is the unique gap that this study fills.
The paper is organized into six sections. Following the introductory section is section 2 which discusses the findings of selected previous works on the relationship between oil price and stock markets. The theoretical framework, empirical methodology and data issues are treated in Section 3. Section 4 presents the empirical results and discussion of findings. Section 5 provides concluding remarks and policy implications.

2. Review of Literature

Bjornland (2009) and Jimenez-Rodriguez and Sanchez (2005) offer some arguments on the linkage between the oil prices and stock markets performance. In their view, an oil price increase is expected to have a positive effect in an oil-exporting country as the country's income would increase. The consequence of the income increase is expected to be a rise in expenditure and investments, which in turn creates greater productivity and lower unemployment. Stock markets tend to respond positively to this sequence of events. Several other researchers have found similar positive and significant effects (Adam et al (2014) and Fariz et al.(2016) for Indonesia; Salisu and Oloko (2015), and Vo (2011) for US; Uwubanmwe and Omorokunwa (2015), Akinlo (2014), Okany (2014), Gil-Alana and Yaya (2014), Chaudary et al (2014), Ogiri et al (2013), Asaolu and Ilo (2012), and Tajudeen and Terfa (2010) for Nigeria; Wajdi et al (2014) for Tunisia; Hussin et al (2012) for Malaysia; Narayan and Narayan (2009) for Vietnam; and Amin and Amin (2014)).

Elyasiani et al (2011) find that oil price fluctuations constitute a systematic asset price risk at the industry level as nine of the thirteen sectors analyzed showed statistically significant relationships between oil-futures return distribution and industry excess return. Also, Papapetrou (2001) found that oil price is an important factor in explaining the stock price movements in Greece with positive oil price shocks depressing real stock returns. Fariz et. al. (2016), in a sectoral study for Indonesia showed that the strength and the sensitivity of this association vary across sectors, and the effects are positive for all sectors. They found strong significance of asymmetric reactions for Agriculture and Consumer Goods sectors stock returns due to changes in crude oil prices.

Some authors however have found a negative relationship between oil market and stock markets. For instance, investigating the relationship between oil prices and returns on the Nigerian Stock Exchange, Fowowe (2013) reported a negative but insignificant effect of oil prices on stock returns in Nigeria. Such negative and statistically insignificant relationship has also been confirmed in Kang et al (2014) for US; Effiong (2014) for Nigeria; Al-Qudah (2014) for Jordan; Fatima and Bashir (2014) for China and Pakistan.

Adebiyi et al (2012) in a study for Nigeria found an immediate and significant negative real stock returns response to oil price volatility in Nigeria.

Beyond the foregoing there is equally, a categorization of the oil price-stock returns relationship that is predicated on methodological disparities. Hence, the results of empirical studies on the effect of oil prices on stock markets have also yielded divergent views, resulting in three main positions. Among the first group of studies, it is believed that the direction of the impact of oil prices on stock markets is determined based on the data frequency, sector and country/region being investigated. For instance, Faff and Brailsford (1999) find significant positive Sensitivity of stock prices to oil price fluctuation and diversified resources industries, while they also find A negative relationship in the Paper and Packaging, and Transport industries. Thus, according to the results of Okoro (2014), Antonakakis et al (2014), Wang et al (2013), Gencer and Demiralay (2013), Mollick and Assefa (2013), Babatunde et. al. (2012), Adaramola (2012), Balcilar and Ozdemir (2012), Cretiet. al. (2012b), Musihet. al. (2010), the co-movements between oil and stock markets can be either positive or negative.

Kilian and Park (2009) find that the response of aggregate US real stock returns may differ greatly depending on whether the increase in the price of crude oil is driven by demand or supply shocks. Basher and Sadorsky (2006) find strong evidence that oil price risk impacts stock price returns in emerging markets although the exact relationship depends somewhat on the data frequency being used. For daily and monthly data, oil price increases have a positive impact on stock market returns in emerging markets. For weekly and monthly data, oil price decreases have positive and significant impacts on emerging market returns.

Among the second group, Park and Ratti (2008), Narayan and Narayan (2009), and Imarhiagbe (2010), show that oil price does influence stock markets. While finding a positive effect, Babatunde et al (2012), Fatima and Basher (2014), Cunado and Gracia (2014), Jouini and Harrathi (2014), Reboredo and Rivera-Castro (2014), Ding et al. (2016), Reboredo and Ugolini (2016), and Bampinas and Panagiotidis (2017), Salisu and Isah (2017), among others, propose asymmetries in the relationship.

However, for the third group Maghyereh (2004) studied the relationship between oil prices changes and stock returns in 22 emerging markets, working within a VAR model framework from 1998 to 2004, without finding any significant evidence that oil prices had an impact on stock returns in these countries. Cong et al. (2008) applied multivariate vector autoregression methodology to analyze the interactive relationship between oil price shocks and Chinese stock market activity. The authors found evidence that oil price shocks had no significant effect on stock returns except for the manufacturing index and some oil companies. Again, Fowowe (2017) finds weak interdependence for returns and volatilities between the South African and Nigerian stock and oil markets. Guliman (2015) and Aydogan and Berk (2015) find no relationship at all or find inconclusive evidence of any correlation between stock market and oil prices.

Furthermore, different studies have employed different methodological approaches such as vector autoregressive (VAR)model, vector error-correction model (VECM), univariate and multivariate GARCH-type models including the BEKK(Baba, Engle, Kraft and Kroner over parameterization), CCC (Constant Conditional Correlation) and DCC (Dynamic Conditional Correlation)with different country or regional case studies. For instance, Fowowe (2013) applies the GARCH-Jump models to investigate the relationship between All Share Index and crude oil prices (Brent and WTI) in Nigeria. Agren (2006) uses an asymmetric version of the BEKK–GARCH(1,1) for stock markets in five major developed countries (Japan, Norway, Sweden, the U.K., and the US); Malik and Hammoudeh (2007) use the same model for US and Gulf equity markets. Malik and Ewing (2009) similarly employ bivariate BEKK–GARCH(1,1) for five US sector indices. Overall, their empirical results seem to support the existence of significant transmission of shocks from world crude oil prices to the different stock markets. Similar conclusions are reached in the studies by Jouini and Harrathi (2014),Wadji et al (2014),Arouri et al. (2011), Arouri et al. (2012), Wang et al. (2013) and Salisu and Oloko (2015).

On the whole, the empirical findings from the various studies indicate that the relationship between oil price and stock market depends the choice of econometric method adopted, measurement of variables and the peculiar features of the country under consideration. Compared to the previous literature, our investigation builds on the recently developed VAR-GARCH model, and moves from the market-level and sector-level analyses to an individual bank-level analysis by taking the stock prices of six (6) banks in the *Banking* sector in Nigeria.. Following the work of Gupta (2016), Soyemi et. al. (2017) examined the impact of oil price shocks on energy sector-firms for Nigeria. Our study deviates from this by investigating the effects of oil price changes on selected firms in the *Banking* sector in Nigeria due to the overwhelming share of this sector in the NSE. This paper adds to the literature since, to the best of our knowledge, it is a pioneer attempt on Nigeria in this direction.

3. Theoretical Framework, Methodology and Data issues

3.1. Theoretical framework

The Arbitrage Pricing Theory (APT) and Capital Asset Pricing Model (CAPM) remain the major theoretical models used to validate the effect of shocks and other risks on stock market returns (Salisu and Isah, 2017). Specifically, APT assumes that asset returns are generated with the following linear equation:

$$r_i = \delta_i + \phi_i \zeta + \mu_i \tag{1}$$

where r_i denotes the return on asset *i*, the unconditional expected return is denoted by δ, ζ is a vector of different risk factors, ϕ_i is a vector measuring the influence that each risk factor has on the return on asset *i*, and μ_i an error term for the residual effect of the returns.

Nevertheless, in the framework of our study, the effect of oil price shock is secluded among other risk factors. Given the above reason, we present a reduced version of the above APT as follows:

$$r_i = \delta_i + \phi_i oilp + \mu_i \quad (2)$$

where r_i is as defined previously while $oilp$ represents oil price shock which indicates expected risk from an unexpected change in oil price. Meanwhile, oil price shock may be expected to have different effects on stock returns of companies (for disaggregate stock returns) as well as countries (for aggregate stock returns), depending on the anticipated effect of the shock on the future cash flow of the potential company or country (Huang et al., 2017).

3.2. Methodology

This study adopted bivariate VAR-GARCH model to investigate the effect of oil price volatility on stock prices of six Banking sector firms listed on the NSE.As earlier noted, the choice of the newly developed VAR-GARCH model is to capture the probable interactions in the conditional returns as well as correlations between stock price returns and oil price returns is emphasized by its simplicity in dealing with both cross-market spillover effects and statistical complications. In addition, with the increasing integration of markets, the use of this model becomes relevant particularly in measuring the extent of integration as well as inter-linkages in these markets. A number of computational merits of VAR-GARCH model have been provided in Arouri et al. (2011a).

The VAR-GARCH model essentially incorporates the multivariate CCC–GARCH model of Bollerslev (1990) as a special case where correlations between system shocks are assumed to be constant to simplify the estimation and inference procedure (see Arouri et al., 2011a). In addition, it allows for the possibility of interdependencies between/among markets. Since we are dealing with two variables namely; banking stock prices (SPR) and oil price (OPR)), we adopt the bivariate form of this model. The conditional mean equation for a modified bivariate VAR(1)-GARCH(1,1) model can be specified as:

$$R_t = \varphi + \prod R_{t-1} + \xi_t \quad (3)$$

$$\xi_t = \sum_t \nu_t \quad (4)$$

Where:

$R_t = \left(SPR_t, OPR_t\right)'$ represents the returns on stock prices and oil price at time t; φ is a (2 X 1) vector of constants of the form $\varphi = \begin{pmatrix} \varphi^{SPR} \\ \varphi^{OPR} \end{pmatrix}$; $\prod$ is a (2 X 2) matrix of the coefficients

of the form $\prod = \begin{pmatrix} \Pi_{11} & \Pi_{12} \\ \Pi_{21} & \Pi_{22} \end{pmatrix}; \xi_t = \left(\xi_t^{SPR}, \quad \xi_t^{OPR}\right)'$ is a vector of disturbance terms for the mean equations of SPR and OPR respectively; $\nu_t = \left(\nu_t^{SPR}, \quad \nu_t^{OPR}\right)'$ is a vector of independently and identically distributed errors; $\sum_t = diag\left(\sqrt{h_t^{SPR}}, \sqrt{h_t^{OPR}}\right) with\ h_t^{SPR}\ and\ h_t^{OPR}$ being the conditional variances of SPR and OPR respectively.

The volatility spillover effects are computed from the conditional variances specified in Equations (5) and (6):

$$h_t^{SPR} = \mu_0^{SPR} + \mu_1^{SPR}\left(h_{t-1}^{SPR}\right) + \zeta_1^{SPR}\left(\xi_{t-1}^{SPR}\right)^2 + \mu_2^{SPR}\left(h_{t-1}^{OPR}\right) + \zeta_2^{SPR}\left(\xi_{t-1}^{OPR}\right)^2 \tag{5}$$

$$h_t^{OPR} = \mu_0^{OPR} + \mu_1^{OPR}\left(h_{t-1}^{OPR}\right) + \zeta_1^{OPR}\left(\xi_{t-1}^{OPR}\right)^2 + \mu_2^{OPR}\left(h_{t-1}^{SPR}\right) + \zeta_2^{OPR}\left(\xi_{t-1}^{SPR}\right) \tag{6}$$

Both equations show that conditional variance of each market does not only depend on its immediate past values and innovations but also on those of the other market. The equations also show how volatility is transmitted over time and across the two markets under investigation. The cross valuesof error terms, $\left(\xi_{t\text{-}1}^{OPR}\right)^2$ and $\left(\xi_{t\text{-}1}^{SPR}\right)^2$, represent the return innovations in the oil market and to the corresponding stock rate at time $(t-1)$, and thus capture the direct effects of shocks transmission. The transfer of risk between the two markets is accounted for by the lagged conditional volatilities, h_{t-1}^{OPR} and h_{t-1}^{SPR}.

To guarantee stationarity, the roots of the equation $|I_2 - AL - BL| = 0$ must be outside the unit circle where the expressions $(I_2 - AL)$ and BL satisfy some other identifiability conditions as proposed by Jeantheau (1998). L is a lag polynomial, I_2 is a (2×2) identity matrix, and A and B are defined as:

$$A = \begin{pmatrix} \alpha_{s1}^2 & \alpha_{s2}^2 \\ \alpha_{o2}^2 & \alpha_{o1}^2 \end{pmatrix} \text{and } B = \begin{pmatrix} \beta_{s1}^2 & \beta_{s2}^2 \\ \beta_{o2}^2 & \beta_{o1}^2 \end{pmatrix}$$

The conditional covariance can be expressed as:

$$h_t^{SPR_{OPR}} = \rho^{SO}\sqrt{h_t^{SPR}}\sqrt{h_t^{OPR}} \tag{7}$$

Where ρ^{SO} is the conditional constant correlation. The structural and statistical properties of the model have been well documented in Ling and McAleer (2003). These properties cover the necessary and sufficient conditions for stationary and ergodicity, sufficient conditions for the existence of moments of ξ_t, and sufficient conditions for consistency

and asymptotic normality of the Quasi-Maximum Likelihood Estimator in the absence of normality of ν_t.

3.3. Data and data issues

The study employs daily observations on crude oil price (Brent) and the closing prices of the individual banks listed on the NSE. Both series span from January 01, 2000 to December31, 2015. Daily frequency is used because it affords an opportunity to capture the intensity of the dynamics of the relationship between the key variables. Crude oil price expressed in USD per barrel for Brent spot prices is used to represent the international crude oil market given that this serves as pricing benchmark for two thirds of the world's internationally traded crude oil supplies (see Alloui et al., 2013; Maghyereh,2004).

Data on crude oil prices was extracted from the US Energy Information Administration (EIA) database, OPEC database, IMF, and Bloomberg. The data for the banking stock prices are obtained from the NSE database and CashCraft Assets Management. Daily returns on the two variables were computed by taking the difference in the logarithm of two successive prices as follows:

It is imperative to note that while preparing the data for analyses, we encountered the problem of non-synchronous trading days. In order to deal with this issue, we carefully traced and removed the asynchronous trading days using Brent (oil market) trading days as the gauge. At the end of this exercise, we had 3633 usable observations. Finally, it is noteworthy that due to the potential sensitivity of the subject under scrutiny we have ascribed the pseudonyms Bank I, Bank II, Bank III, Bank IV, Bank V and Bank VI to the six banks in our sample[2].

4. Empirical results and Discussion

4.1. Descriptive Statistics of Stock Market and Crude Oil Prices

In this section, we examine the statistical properties of the returns series and confirm relevant stylized facts about financial time series variables. In essence, we present descriptive statistics and conduct appropriate tests for serial correlation and time-varying autoregressive conditional heteroskedasticity i.e. ARCH effects. Table 1 shows the descriptive statistics augmented with the results for serial correlation using Ljung–Box Q-statistics test and for ARCH effects using ARCH–LM test by Engle (1982). Also included is the result for unconditional correlation between Brent returns and banks' stock returns.

Average daily returns on stock prices are negative for Bank II, Bank IV, Bank V, and Bank VI and *Brent* are positive over our sample period. The stock price of Bank II realized the worst performance (-0.044), followed by Bank IV, Bank V and Bank VI. Conversely, *Brent*,

[2]We are grateful to the journal's Editorial Team for pointing out this useful direction.

Bank I and Bank III experienced positive average returns, with Bank III having the highest average stock price return.
From Table 1 also, all the returns series show wide margins between minimum and maximum values, which suggests the presence of large variance. Meanwhile, as indicated by the standard deviation statistic, Bank II stock appears to be the most volatile of the return series followed by Bank V, while *Brent* appears to be the least volatile return series. In addition, the skewness statistic shows that the return series for *Brent*, *Bank II* and *Bank III* are negatively skewed while it is positively skewed for Bank I, Bank IV, Bank V and Bank VI.

Moreover, Kurtosis coefficients are important in size and highly significant, indicating that outliers may occur with a probability higher than that of a normal distribution. The kurtosis statistic which compares the peakedness and tailedness of the probability distribution with that of a normally distributed series shows that all the return series were found to have a leptokurtic behavior (i.e., their distributions have fatter tails than corresponding normal distributions). This suggests that each of the mean equations should be tested for the existence of conditional heteroskedasticity. Meanwhile, the Jarque–Bera statistic, which measures normality of the distribution using both the skewness and kurtosis statistics shows that we can reject the null hypothesis for normality for all the return series at all conventional significance levels.

We further carried out stochastic test for autocorrelation and conditional heteroskedasticity to verify stylized facts on financial time series variables. ARCH–LM test by Engle (1982) was adopted for testing the significance of time-varying conditional variance (ARCH effects) while Ljung–Box *Q*-statistic test was employed for testing the significance of autocorrelation. The results for these tests are also presented in Table 1 and show that we can reject the null hypothesis of no ARCH effects for all the return series at 1% level of significance. In addition, *Q*-statistic results show that there is statistically significant autocorrelation in the return series for all the stock returns. While, return series for Brent are found to exhibit insignificant autocorrelations. We also computed the unconditional correlations between *Banking* Sector stock returns and oil returns. These correlations are weak on average and positive for Bank II, Bank III, Bank IV and Bank V, while negative for *Bank I* and *Bank VI*, suggesting that oil price increases over the period were seen as indicative of higher expected corporate earnings for Bank II, *Bank III*, *Bank IV* and *Bank V*, and negative earnings for *Bank I* and *Bank VI*. *Bank III* has the highest positive correlation with oil (0.032), while the lowest positive correlation is observed between *Bank V* and oil market (0.013). *Bank I* and *Bank VI* had respectively negative correlations of -0.014 and -0.003 with the oil market.

Table 1: Descriptive statistics and statistical properties of return series for the Banking Sector and Brent

	RBR	RBI	RBII	RBIII	RBIV	RBV	RBVI
Mean	0.0123	0.0340	-0.0436	0.0405	-0.0401	-0.0376	-0.0166
Median	0.0365	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Maximum	18.1297	68.9808	368.888	228.278	199.243	167.428	90.016
Minimum	-19.891	-31.916	-368.888	-228.278	-193.152	-155.256	-85.866
Std. Dev.	2.269	3.122	11.525	6.168	5.787	6.476	3.736
Skew.	-0.252	2.628	-0.448	-0.200	0.738	5.111	0.222
Kurt.	9.020	75.422	822.280	1035.75	734.032	356.825	173.617
J-B	5525.305	798131.7	1.02E+08	1.61E+08	80896252	18966752	4406558.
Probability	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ARCH	32.66	4.14	64.20	532.99	786.32	279.98	870.15

	RBR	RBI	RBII	RBIII	RBIV	RBV	RBVI
LB(Q)	2.59	55.27	426.21	493.15	276.68	258.74	22.48
Corr. with oil	1.000	-0.014	0.022	0.032	0.017	0.013	-0.003
Observations	3633	3633	3633	3633	3633	3633	3633

Notes: The table reports statistics of return series, including mean (Mean), standard deviation (Std. Dev.), skewness (Skew.), kurtosis (Kurt.), ARCH refers to the empirical statistics of the statistical test for conditional heteroskedasticity, LB (Q) is the empirical statistics of the Ljung-Box tests for autocorrelations applied to the series. J-B is the empirical statistics of the Jarque-Berra test for normality based on skewness and excess kurtosis. Corr. Denotes correlation coefficients. RBR, RBI, RBII, RBIII, RBIV, RBV, and RBVI stand for prices of Brent crude and the stocks of BANK I, BANK II, BANK III, BANK IV, BANK V and BANK VI respectively.

4.2 Empirical Results

This model estimated using maximum likelihood method under the assumption of bivariate normal distributed error terms. The log likelihood function is maximized using Marquardt's numerical iterative algorithm to search for optimal parameters.

The empirical findings from our VAR (1)-GARCH (1, 1) estimation results are reported in Table 2 for a pair of oil price and six banking stock prices. One-period lagged values of stock price returns appears to have a significant explanatory power in explaining their current values in all the series considered in the *Banking* sector. With respect to the interdependence of returns in the mean equations, the findings showed that lagged oil price volatility significantly influenced stock prices in all the cases considered, except for *Bank II* and *Bank IV*. This could be as a result of the concentration of about one-thirds of total banking sector credit to the oil sector in Nigeria. . Thus, similar to results obtained for Nigeria by Fowowe (2013); Kuwait by Mohanty et al. (2011); Kuwait, Saudi Arabia, U.A.E. by Arouri et al. (2011); UK by Jammazi(2012); and Bahrain, Kuwait, Oman, Saudi Arabia, and UAE by Hammoudeh and Choi (2006). The effect of oil on stock prices is positive for five out of six companies in the *Banking* sector with *Bank VI* being negatively impacted.

Turning to the conditional variance equations, the estimates of ARCH and GARCH coefficients are statistically significant based on generally accepted levels in most cases. We can observe in the stock market that the sensitivity to past own conditional volatility (h_{t-1}^{SPR}) appears to be significant for *Bank II, Bank IV, Bank V* and *Bank VI,* while it is insignificant for *Bank I* and *Bank III* at the 1% level. From the results, it can also be seen that the present value of conditional volatility of stock returns in the *Banking* sector also rely on past unexpected shocks$\left(\xi_{t-1}^{SPR}\right)^2$ affecting returns dynamics since the associated coefficients are highly significant in all cases except for *Bank III*. However, the relatively large size of ARCH coefficients suggests that conditional volatility changes very rapidly under the influence of returns innovations, and it tends to fluctuate gradually over time as evident from the large magnitude of GARCH coefficients. Furthermore, the past unexpected shocks of stock market $\left(\xi_{t-1}^{SPR}\right)^2$ is not significant to the oil market for all the models. The past conditional volatility is negative for *Bank II, Bank I, Bank III, Bank IV and Bank VI;* and positive for *Bank V.* The stock market past conditional volatility (h_{t-1}^{SPR}) for *Bank II, Bank I, Bank IV* and *Bank VI* are significant for oil market while *Bank III* and *Bank VI* are insignificant. In addition, the past conditional volatility of oil market h_{t-1}^{o} is significant in *Bank II, Bank I, Bank IV and Bank VI* and insignificant in *Bank III* and *Bank V.* The cross-market unexpected past shocks $\left(\xi_{t-1}^{OPR}\right)^2$ from oil to stock is significant in all the cases except in *Bank I.*

Next, we consider the volatility spillover effect between oil and stock markets in Nigeria. We first observed that there is direct transmission of volatility h_{t-1}^{OPR} from oil market to stock market in *Bank II, Bank I, Bank IV, and Bank VI,* but not in *Bank III* and *Bank V.* The cross-volatility coefficients are mostly significant at conventional levels. More

specifically, past oil shocks $\left(\xi_{t-1}^{OPR}\right)^2$ have significant effects on stock market returns for *Bank II, Bank III, Bank IV, Bank V* and *Bank VI* except in *Bank I*. Past oil returns strongly affects stock returns in *Bank II, Bank I, Bank IV, Bank VI,* but not in *Bank III* and *Bank V.* Therefore, our results suggest an intensification of spillovers from oil to the *Banking sector* stocks.

Summing the *Banking* sector as a whole, the observed spillover effects from oil market to the stock market are significant at the 1% level. This relationship is not unexpected because oil price increases tend to have a serious effect on consumer and investor confidence and demand for financial products, while rising financial stock prices are often indicative of oil consumption due to increasing productive activity.

The estimates for the constant conditional correlation (*CCC*) between oil and individual bank (*Banking* sector) stock price are found to be positive for all but *Bank I* stock returns. This is not surprising, as there existed a negative cross-volatility between oil market and *Bank I* stock returns. Moreover, on a general note the *CCC* are somewhat low and weak. The positive outcome for *CCC* is in favour of plausible gains from investing in both stock and oil markets. It is seen that past conditional volatility of stock (*Banking* sector) returns significantly affected the current value of the oil market volatility and vice versa, in all the firms. Oil market unexpected past shocks in all the firms except one (i.e. *Bank I*) exerted significant influences on stock market returns, while oil prices are unaffected by past stock market shocks. It is equally imperative to note that the *Banking* sector may be subject to indirect impacts of oil price changes. For instance, increases in oil price are likely to exert influence on this sector through their effects on monetary policy, interest rates, employment and consumer confidence. Consequently, therefore, to better forecast stock market volatility and make appropriate investments decisions, investors need to closely watch events in the oil markets.

Table 2: Estimate of Bivariate VAR (1)-GARCH (1, 1) Model for Six Banking Sector Firms and Brent

Variables	BankI		BankII		BankIII		BankIV		Bank V		BankVI	
	Stock	**Oil**	**Stock**	**Oil**	**Stock**	**Oil**	**Stock**	**Oil**	**Stock**	**Oil**	**Stock**	**Oil**
Mean Equation												
Constant	-1.9111*** (0.0021)	0.0399*** (0.0116)	-0.0422 (0.0411)	0.0387 (0.0264)	-0.0497* (0.0272)	0.0330*** (0.0008)	-0.4289*** (0.0397)	0.0516** (0.0250)	-0.0278*** (0.0011)	0.0360* (0.0196)	-0.0187*** (0.0026)	-0.0012 (0.0232)
Stock(1)	-0.5262*** (0.0019)	0.0034** (0.0006)	0.1013*** (0.0169)	0.0123 (0.0098)	0.1464*** (0.0001)	-0.0002*** (0.0000)	-0.1768*** (0.0166)	0.0107*** (0.0006)	0.2687*** (0.0041)	-0.0022 (0.0018)	0.1992*** (0.0179)	0.0010 (0.0049)
Oil(1)	0.7466*** (0.0012)	0.0033*** (0.0072)	0.0749*** (0.0217)	0.0417*** (0.0100)	0.0529*** (0.0014)	0.0209** (0.0104)	0.1131*** (0.0210)	0.0036 (0.0155)	0.0213*** (0.0014)	0.0160*** (0.0001)	-0.0277*** (0.0009)	0.0863*** (0.0125)
Variance Equation												
Constant	1.2215*** (0.0674)	0.0050 (0.0020)	2.5369*** (0.0148)	-0.0164*** (0.0015)	22.6227*** (0.0195)	0.0135*** (0.0025)	1.5316*** (0.1491)	-0.0016 (0.0049)	0.7191*** (0.0021)	0.0173*** (0.0026)	0.0011 (0.0008)	0.0595*** (0.0100)
$\left(\xi_{t-1}^{SPR}\right)^2$	5.4212*** (0.0069)	-0.0079*** (0.0006)	0.2738*** (0.0095)	-0.0230*** (0.0023)	0.0992*** (0.0070)	-0.0014 (0.0025)	0.4189*** (0.0144)	-0.0063*** (0.0002)	0.2692*** (0.0009)	0.0103*** (0.0029)	0.3054*** (0.0029)	-0.0129*** (0.0037)
$\left(\xi_{t-1}^{OPR}\right)^2$	-1.5661*** (0.0179)	0.0492*** (0.0007)	0.0099 (0.0275)	0.0507*** (0.0003)	0.3459*** (0.0059)	0.0511*** (0.0009)	-0.3173*** (0.0165)	0.0472*** (0.0043)	0.3668*** (0.0001)	0.0533*** (0.0009)	-0.1109*** (0.0045)	0.0754*** (0.0033)
h_{t-1}^{SPR}	0.1146*** (0.0007)	0.8429*** (0.0555)	-0.0451*** (0.0019)	-1.4107*** (0.0158)	-0.0170*** (0.0000)	0.0072 (0.3411)	0.7538*** (0.0075)	0.2889** (0.0382)	0.8228*** (0.0001)	-0.0498 (0.0835)	0.7641*** (0.0019)	-0.5972*** (0.2037)
h_{t-1}^{OPR}	236.3689*** (2.4683)	0.9464*** (0.0006)	-48.3745*** (0.1317)	0.9233*** (0.0003)	-0.0273 (0.2689)	0.9483*** (0.0008)	-4.8130** (1.9275)	0.9420*** (0.0038)	-0.0992 (0.0656)	0.9455*** (0.0009)	5.1848*** (0.0554)	0.9202*** (0.0020)
CCC between oil and stocks		0.0017*** (0.0000)		-0.0164*** (0.0000)		-0.0002 (0.0018)		0.0228*** (0.0025)		0.0030*** (0.0002)		0.0058*** (0.0003)
Log-likelihood		-20096.9089		-16793.6567		-18590.6015		-17870.7924		-17909.3707		-15477.8730

Notes: The bivariate VAR (1)-GARCH (1, 1) model is estimated for each firm over the period January 2, 2001 to December 31, 2015. The optimal lag order for the VAR model is selected using the AIC and SBC information criteria. Standard errors are given in

AIC	11.076	9.257	10.246	9.850	9.871	8.532
SBC	11.105	9.286	10.275	9.879	9.900	8.561
No. of Observations	3632	3632	3632	3632	3632	3632

parenthesis. Oil, Stock and CCC are oil price , firm stock prices and constant conditional correlation respectively. *, **, and *** indicate significance at the 10%, 5% and 1% respectively.

5. Conclusion and Policy Implications

This study examined the empirical relationship between oil price volatility and the stock prices of selected firms on the Nigerian banking sector for the period January 2, 2001 to December31, 2015. The study employed a bivariate VAR-GARCH model to achieve this objective. Empirical results of the conditional mean equations showed that there is evidence of short-run predictability on banks' stock prices and also revealed that crude oil prices had a significant impact on the *Banking* sector movements only in two banks (*Bank II and Bank IV*). Additionally, the study also investigated volatility transmission between the two markets (*Brent* and *Banking* sector).

Based on the conditional variance equations, our empirical findings indicated that the conditional volatility of the prices on the individual firms in the *Banking* sector are affected not only by own volatility, but also by innovations in the oil market. Our results also showed the existence of significant volatility transmission between oil and *Banking* stocks in Nigeria, with the spillover effects being more apparent from oil to the *Banking* stocks. Following the findings of this study, a number of policy implications can be contemplated. Due to the volatility of international oil prices, which affects stock market and the empirical evidence of its short-term predictability on banks stock returns, banks in Nigeria are encouraged to hedge their investments and diversify their investment activities to non-oil sectors. In addition, the volatility transmission results showed that innovations in the oil market affected banking stocks in Nigeria. Therefore, due to the exposure of the balance sheet of banks to such oil price risk, bank lending to the oil and gas sector may require the exercise of caution in terms of credit expansion. This way the proliferation of non-performing loans especially during weak global oil price regimes can be avoided. Finally, oversight structures such as the regulatory role of the Securities and Exchange Commission (SEC) should be given additional attention.

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