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Interaction between stock market and exchange rate in Nigeria

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Abstract
The dynamics of exchange rate exhibits many challenges in international trade. These challenges make investments more difficult due to the danger that may emanate from increases in the exchange rate. However, this interaction has the tendency of increasing the business risk and the uncertainty of external transactions, which in most cases disposes a country to a related shock from exchange rate fluctuations. Incessant increase or hikes in crude oil prices causes a rise in inflation. The magnitude of this inflation partly depends on the degree of the labour market flexibility and the producer's capacity to transfer the increases in cost to the consumers. the impact of rising or decreasing oil prices on economic activities and inflation depends also on policy responses and supply side effects (IMF, 2020). Evidence has shown that the Nigerian government spending before 2010 was below N0.5 trillion, but surge to N1.02 trillion and N1.5 trillion in 2016 and 2018 respectively while the figures for 2017 and 2019 stood at N4.04 and N6.45 trillion respectively. Similarly, the total imports by the oil sub-sector, accounts for an average of 22.4% between 2012 and 2014 in the Nigeria's total visible trade. The continues decline in Nigerian Crude oil has caused a fall in foreign exchange earnings of the country especially in the case of mono product economy and consequently resulting to a fall in the capacity of the Central Bank of Nigeria (CBN) to fund foreign exchange market. The low level of foreign exchange reserve has induced free movement of exchange rate and as a result, it has implications on the demand side. Consequently, the increased foreign exchange demand in the face of unstable supply caused exchange rate volatility while the higher oscillation in oil price the more volatile the output in oil which in a way impacts the economy. Inversely, the current fall in oil price in Nigeria has affected the index and continuous depreciation of the local currency. In the light of the above, this research paper examined the effect of stock exchange and its interaction with exchange rate in Nigeria. This was done by considering 10 years horizon and the results show that in the short run 3.9% of the innovation in the stock market is due to its own past values and 91.18% is due to shocks to the oil price.

Keywords: Economy, exchange rate, stock market, volatility

Introduction

For a country like Nigeria having some of its population living in abject poverty conditions, whose infrastructures are in a state of decay, whose health, education and other growth-promoting and welfare - enhancing institutions are in near state of near collapse, whose roads (most of them) have become death traps due to their deplorable conditions, and whose power sector is in a state of moribund, one would have expected that being an oil exporting nation, Nigeria's four existing government- owned refineries should be operating at full capacity and thus export refined products in addition to crude oil. In addition, crude oil and gas affluence in Nigeria have been associated with the growing instability in its exchange rate, as well as its lingering propensity to exchange rate over-valuation an stock market.

A Stock is an investment. Masih, Peters and Demello (2016) defined Stock as the goods or merchandise kept on the premises of a shop or warehouse and available for sale or distribution. It is also the capital raised by a company or corporation through the issue and subscription of shares. Stock is seen as the type of investment that represents an ownership share in a company referring to Maghyereh (2014) [14].

Stock Market is the collection of markets and exchanges where regular activities of buying, selling, and issuance of shares of publicly held companies take place. It is also a place where shares of public listed companies are traded (Maghyereh, 2014) [14]. The primary market is where companies float shares to the general public in an initial public offering (IPO) to raise capital. According to Neary (2018) [17], stock exchange is a market in which securities are bought and sold. The stock exchange rate facilitates stockbrokers to trade company stocks and other securities (Neary, 2018) [17]. A stock may be bought or sold only if it is listed on an exchange. Thus, it is the meeting place of the stock buyers and sellers. India's premier stock exchanges are the Bombay Stock Exchange and the National Stock Exchange. According to Cologni *et al*. (2018) [7], dynamic exchange rate exhibits many challenges in international trade. These challenges make investments more difficult due to the danger that may emanate from increases in the exchange rate. However, this interaction has the tendency of increasing the business risk and the uncertainty of external transactions, which in most cases disposes a country to a related shock from exchange rate fluctuations (Jbir, 2019) [9].

Incessant increase or hikes in crude oil prices causes a rise in inflation. Be that as it may, the magnitude of this inflation partly depends on the degree of the labour market flexibility and the producer's capacity to transfer the increases in cost to the consumers. Over time, the impact of rising or decreasing oil prices on economic activities and inflation depends also on policy responses and supply side effects (IMF, 2020). it is no more news that the periods of increase in price of crude oil results to huge inflow of oil revenues in Nigeria which has resulted to the expansion in the level of government expenditure while the periods of decrease in oil price depletes the oil revenues with its consequence on budget deficits. However, Nigeria relies heavily on the revenue from the crude export with special interest in massive importation of refined petroleum and other related products (Aliyu, 2018) [2]. Evidence has shown from CBN (2020) [5] reports that the government spending before 2010 was below N0.5 trillion, but surge to N1.02 trillion and N1.5 trillion in 2016 and 2018 respectively while the figures for 2017 and 2019 stood at N4.04 and N6.45 trillion respectively (CBN, 2020) [5]. Furthermore, total imports by the oil sub-sector, accounts for an average of 22.4% between 2012 and 2014 in the Nigeria's total visible trade. Precisely, the sub sector accounts for 17.5% in 2013 and rose to 28.5% in 2016 which stood at 27.3% and 21.2% in 2017 and 2018 respectively (Aliyu, 2018) [2].

Nonetheless, the Nigeria crude oil output has been severely affected by increasing theft, persistent insurgent attack such as the Niger-Delta, worsened by a continuous decline in crude oil price in the world market. This continues decline has cause a fall in foreign exchange earnings of the country especially in the case of mono product economy and consequently resulting to a fall in the capacity of the Central Bank of Nigeria (CBN) to fund foreign exchange market. The low level of foreign exchange reserve has induced free movement of exchange rate and as a result, it has implications on the demand side.

"The demand for foreign exchange has been on increase in present time due to high demand for imported finish products, dependence of the industrial sector on imported raw materials and other input, capital flow reversals by portfolio investments and high speculative demand has caused uncertainty in the foreign exchange market" (CBN, 2020) [5]. Consequently, the increased foreign exchange demand in the face of unstable supply caused exchange rate volatility. Be that as it may, the oscillation in oil price can benefit or hurt an economy (Odeyemi *et al*, 2013) [18]. The higher the oscillation, the more volatile the output of oil rich countries and government revenue becomes. Inversely, the current fall in oil price in Nigeria has affected the index and continuous depreciation of the local currency (Olomola *et al*, 2016) [19]. To this point, many analysts tag the current macroeconomic instability in Nigeria to the recent fall in crude oil revenue owing to the fall in oil prices and the volatile nature of real exchange rate (REXR) experienced during the first quarter. Also, Nigeria's reliance on oil production for income generation has serious implications in managing her economic policies. Consequently, the short fall on oil revenue occasioned by oscillation in international oil prices had often led to deficit in the country's budget. These deficits normally have been managed by external or internal borrowings and most likely, through downward adjustment in budgetary allocation. However, this short fall in oil receipt owing to oscillation in international oil price has negative effect on economy performance best explained by Dutch disease. This syndrome explains the possibility of decline in the productivity of manufacturing sector regardless of any increase in the exploitation of natural resources. This affects the development of many emerging economies due to over dependent in oil revenue. Thus, making fiscal planning uneasy and in that case the quality of public spending will be lessen, which in most cases causes financial disaster. In the light of the above, this research paper seeks to examine the effect of stock exchange and its interaction with exchange rate in Nigeria.

Literature Review

The oil prices and macroeconomic variables dissect, theoretically is through some channels as cited by Lescaroux and Mignon (2018) [13], Lardic and Mignon (2016) [12], Jones *et al* (2014) [11], and Brown and Yucel (2012). These main channels include: the supply side effect; income transfer effect; real balance effect; monetary policy; consumption, investment and stock price effect and the production structure and employment effect. The supply side effect is premised on the belief that rising oil prices consequently leads to a reduction in potential output. The rise in price according to this premise, signals the scarcity of a basic input to production subsequently raising production cost and lowering output. The decline of productivity diminishes real wage growth and escalates unemployment and inflation rate. According to this theory, consumers save less or increase borrowing to smooth out their consumption, if the rise in price is believed to be temporary and transitory or where the short term effect on output outweighs the expected long term effects thereby boosting the equilibrium real interest rate. Consequently, this will lessen the demand for real cash balance but raise inflation owing to reducing output growth and rise in real interest rate (Brown and Yucel, 2012, Lardic and Mignon, 2016) [4, 12].

Secondly, another path through which oil price shocks can influence economic activity is the Income transfer and aggregate demand effect. According to this theory, wealth is transferred from oil importing countries to oil exporting countries as rising oil prices worsen the terms of trade for oil importing countries which leads to a transfer in purchasing power. While on a global scale, there is a reduction in world consumer demand for goods produced in the oil importing nations and this has led to a rise in world supply of savings. The improved availability of which leads to a declining pressure on real interest rate which can compensate the rising pressure being experienced in the oil importing nations. Investment on another part is stimulated by the sliding pressure on world interest rates which make up for the decrease in consumption leaving aggregate demand unchanged in oil importing countries. They emphasized that there will be a further decrease in GDP growth if prices are not downward flexible as a result of the decline in amount of money spent on consumption of goods produced in oil importing countries. The fall in consumption spending leads to a fall in the price level to yield equilibrium. If price fails to decline, consumption spending will decline by more than the increase in consumption. As a result, aggregate demand will fall leading to a slowdown in world economic growth.

In another development, oil prices could impact on macroeconomic variables through the real balance effect. According to this theory, a rise in interest rate will hold back economic growth owing to rising oil prices, if the monetary authorities are unable to match the increased demand for money. Economic growth according to (Lescaroux and Mignon, 2015) is regarded as interest rate is boosted by the inability of the monetary authority to match increased demand for money with supply (Brown and Yucel, 2012, Lescaroux and Mignon, 2018) [4, 13]. Similarly, the relationship may result from the monetary policy effect. Monetary policy as observed by Brown and Yucel (2012) [4] does shape the experience of an oil price shock. The research revealed that inflation will rise at the equal proportion at which growth of real GDP slows if monetary authorities attempt to keep the nominal GDP growth constant. The rise in oil price generates inflation representing an inflationary shock which can be accompanied by second round indirect effects triggering price wage loops (Brown and Yucel, 2012, Lescaroux and Mignon, 2018) [4, 13].

According to the consumption, investment, and stock price effects, rising oil prices may impact negatively on consumption, investment and stock prices. For Lescaroux and Mignon (2018) [13], stock market prices may be influenced by oil price fluctuations by reducing profits of non-oil exporting firms subsequently leading to a drop in the firms' fundamental value. Given that the fundamental value of an asset is equal to the discounted sum of expected future dividends, the fall in the firm's fundamental value thus have implication for stock prices.

Most emerging market currencies, including the Nigerian naira, witnessed significant pressure, due, largely to the slump in commodity prices and trade, in the review period. The South African rand depreciated by 11.9 per cent, while the Russian rouble depreciated by 7.9 per cent, and the Chinese RMB depreciated marginally by 0.04 per cent, against the dollar, in the review period. This was attributed, largely, to the effect of the COVID-19 pandemic, which affected commodity prices, particularly crude oil.

Nominal Effective Exchange Rate (NEER) and Real Effective Exchange Rate (REER) Indices reflects the incipient weakness in Nigeria's external competitiveness. Provisional figure for the average 13-currency Nominal Effective Exchange Rate (NEER) index in the review period was 178.92, indicating a 1.1 per cent increase, but a 0.8 per cent decrease, relative to the levels in the second and first half of 2019, respectively. The increase relative to the preceding half year indicated a nominal appreciation of the naira relative to the currencies of its trading partners during the review period. The average Real Effective Exchange Rate (REER) index, which measures external competitiveness of a country was 76.22, representing a decline of 3.8 and 9.7 per cent, compared with the levels in the preceding six months and the corresponding period of 2019, respectively. This development indicated a depreciation of the naira in real terms, relative to its trading partners.

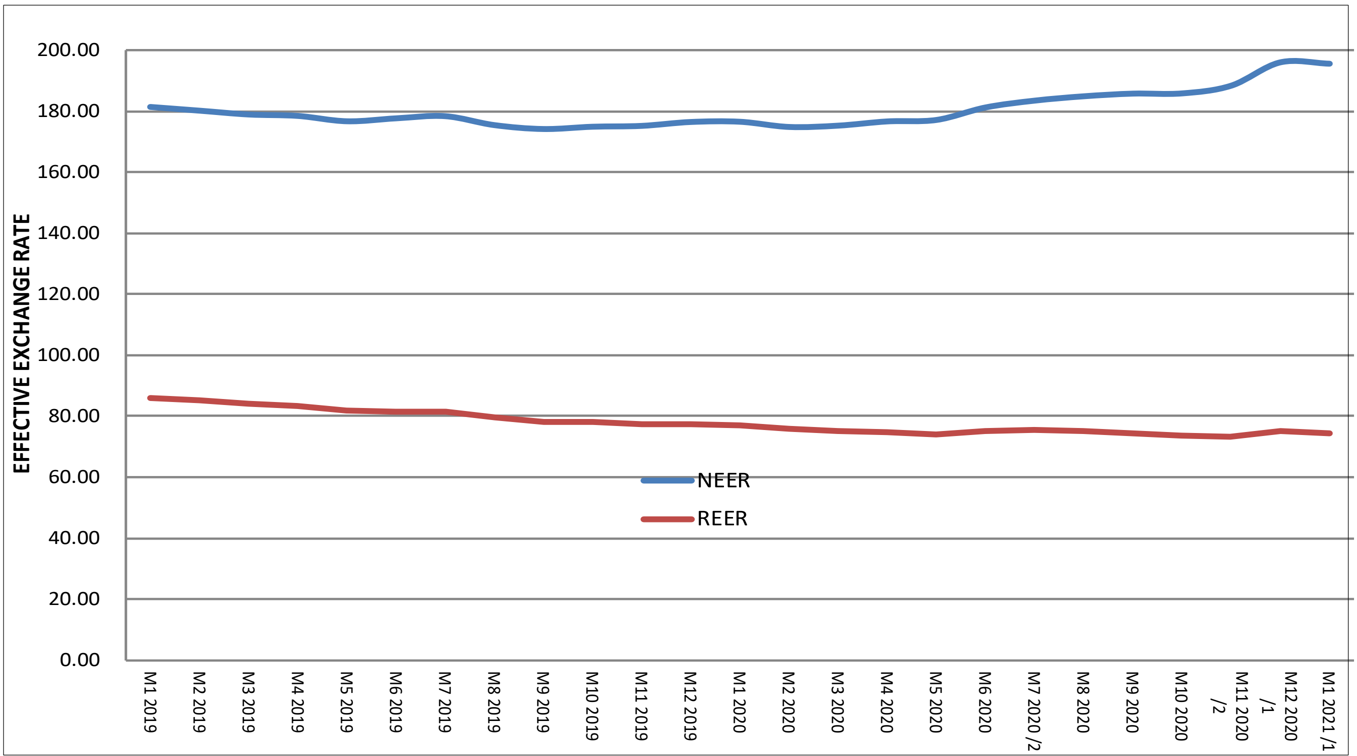

Fig 1: Neer and Reer BY Monthly Average Exchange Rate

Developments In The Capital And Stock Market

The negative impact of the COVID-19 pandemic, which included the crash in global crude oil prices and disruptions in the global supply chain, posed a major threat to the retention of portfolio investments during the review period. These challenges were somewhat mitigated by the gradual upturn in global crude oil prices and bargain hunting activities by investors who sought to take advantage of undervalued stocks. Furthermore, there was the new listing of 100 million units of 12.5 per cent, Fixed Rate Series 1 Senior Unsecured Bonds, in the debt segment of the market during the review period. Thus, the market closed on a mixed note, as the NSE All Share Index fell, while the aggregate market capitalisation rose at the end of the first half of 2020. The aggregate volume and value of traded securities rose by 7.6 per cent and 7.0 per cent to 55.42 billion shares and N576.50 billion, respectively, in 673,517 deals at end-June 2020, compared with 51.50 billion shares, valued at N538.67 billion, traded in 462,809 deals in the corresponding period of 2019. The equities subsector maintained its dominance in the market, with shares of 89.0 per cent and 98.3 per cent of the aggregate volume and value of transactions, respectively, while the debt and Exchange Traded Fund (ETF) segments accounted for the balance. Sectoral analysis of the market indicated that the financial services sector (measured by volume of transactions), remained the most active, accounting for 32.59 billion shares (77.7 per cent), valued at N302.13 billion (60.0 per cent), in 339,396 deals with 34.98 billion shares (78.5 per cent), valued at N260.20 billion (51.4 per cent) in 270,789 deals in the first half of 2019. This was followed by the consumer goods and conglomerates sectors. Analysis of investors' activities in the market showed a decline in participation by foreign investors, relative to the first half of 2019. The levels of domestic and foreign investors' participation were 60.5 per cent and 39.5 per cent, as against 54.2 per cent and 45.8 per cent, respectively, in the corresponding half of 2019.

Following renewed selling pressure in some stocks and widespread profit-taking across all the sectors in the first half of 2020. The NSE All Share Index at 24,479.22, nosedived by 8.8 per cent and 18.3 per cent decline, relative to 26,842.07 and 29,966.87 at end-December 2019 and end-June 2019.

Market capitalisation inched higher, due to bargain hunting, following the release of financial results by some blue-chip companies, as well as dividends declared by some companies in the review period. Consequently, aggregate market capitalisation of the 307 listed securities closed at N27.48 trillion, indicating an increase of 6.1 per cent and 6.8 per cent above the levels at end-December 2019 and the corresponding period of 2019, respectively. Listed equities had a share of 46.5 per cent of the aggregate market capitalisation, while the debt and ETF components accounted for the balance of 53.5 per cent. The top twenty most capitalised companies on the Exchange accounted for 90.7 per cent (N11.59 trillion) of the total equity capitalisation and 42.2 per cent of the aggregate market capitalisation. The number of banks that made the list of the top twenty most capitalised companies remained eight, as in the corresponding half of 2019. However, they accounted for N2.37 trillion or 18.5 per cent of the total equity market capitalisation, compared with 23.3 per cent in the corresponding period of 2019. As a percentage of nominal GDP, aggregate market capitalisation stood at 39.4 per cent at end-June 2020, compared with 38.2 per cent in the corresponding period of 2019.

The Nigerian Stock Exchange (NSE) started operating in 1960 with the creation of the Lagos stock exchange, which later in 1977 transformed into the Nigerian stock exchange (Osinubi, 2014) [21]. The Nigerian All Share Index and the market capitalisation of listed equities echoes the performance of the Nigerian stock exchange (Ajakaiye and Fakiyesi, 2011) [1]. According to Olowe (2009), trading on the equity market between 1971 and 1987 was extremely limited, as government and industrial loan stocks dominated There were no restrictions on foreign investor participation in the market prior to 1972. The indigenization decree promulgated in 1972 and later amended in 1977 as the Nigerian Investment Promotion Decree restricted capital inflows in to 40 per cent of equity holding as a maximum, yet in contrast, during the privatisation era of 1989 the decree was further amended to encourage foreign participation. Total deregulation of the capital market was achieved through the Nigerian Investment Promotion Commission Act of 1995, the Foreign Exchange Act of 1995 and the Investment and Securities Act of 1999. Since then foreigners have participated in the market as operators and investors with no percentage limit on foreign holdings in any company

As of January 2011, monthly trading statistics show that market capitalisation stood at N10.6 trillion and equity market capitalisation at N8.6 trillion (NSE, 2011). The index grew from 111.3 in January of 1985 to 343.0 in January 1990; to 2,285 in January of 1995, 5,752.2 in January of 2000 and finally to 23,078.3 in January of 2005. From that point on the Nigerian capital market was exceptionally bullish and share prices soared (Sere-Ejembi, 2012) [22] with the index peaking at 65005.48 in March of 2008, only to close at 31,450 by December of the same year. The index further dropped to 19851.89 by March of 2009, the lowest it had been since November of 2003/in six years (CBN Annual report, 2010).

Table 1: Market Capitalization and Value of Transaction with Share Index for 2020

Year- Month	All Share Index (1984 = 100)	Market Capitalization (₦' Billion)	VALUE OF TRANSACTION (N'Million)
2020			
Mar-20	21,300.47	11,110.80	121,607.09
Jun-20	24,479.22	12,769.81	64,712.92
Sep-20	26,831.76	14,024.53	67,593.11
Dec-20	40,270.72	21,056.76	135,674.24

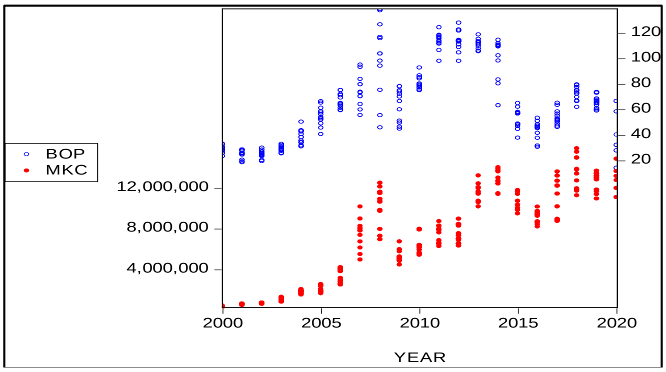

Fig 1: Scatter Plots of Oil Price and Market Capitalization

Figure 1 shows the relationship between oil price and market capitalization through the scatter plot. The plot reveals that both the international energy market and the Nigerian stock market strongly move in the same direction. The implication of this is that changes in the international scene have a direct and strong influence on the activities of the stock market. The stationarity of the data was established. We conducted a test for a long run relationship among the variables using the Bound Autoregressive Distributed Lag (ARDL) co-integration. The null hypothesis used was that, there is no cointegration among the variables.

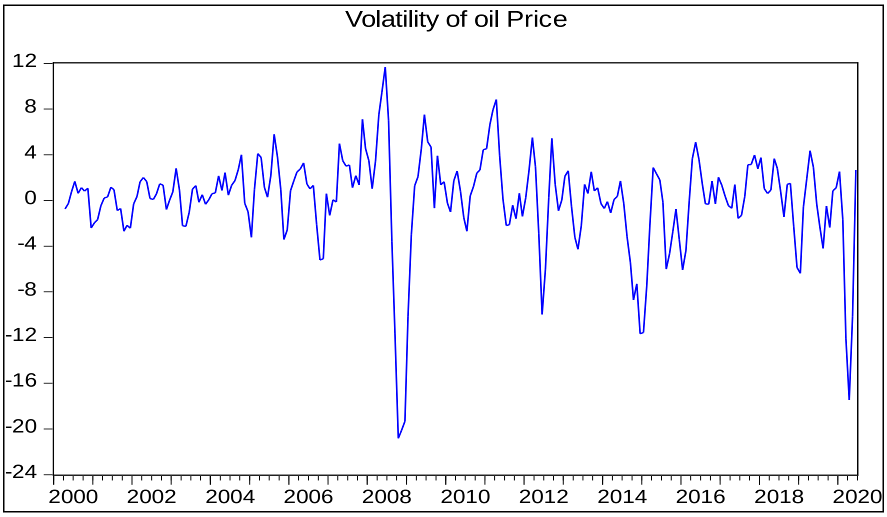

Fig 2: Graphical illustration of oil price volatility using the oil price return square and the crude oil price volatility metric.

Following the result of the stationarity test, we employed the bounds co-integration test which allows for a mixed order of integration unlike the Johanson Co-integration and other residual based single equation co-integration test. Table 2 below presents the result of the test. Findings show that the f-statistics of 4.562558 is higher than the upper critical value bound at 1% level. This indicate the presence of co-integration in the model. We therefore conclude that there is a long run co-integrating relationship in the model.

Table 2: Results of Co-integration test

F-statistic	Conclusion	Critical Value Bounds		
		K=6	Lower Bound	Upper Bound
4.562558	**Cointegration**	1%	3.15	4.43
		2.5%	2.75	3.99
		5%	2.45	3.61
		10%	2.12	3.23

Source: Author computation from the output of EViews 10

Table 3: Variance Decomposition of Market Capitalization

Period	S.E.	D(LMKC)	D(LBOP)	RPVOL
1	0.109992	3.960884	91.18147	0.000000
2	0.115324	6.002850	87.03699	1.214272
3	0.124648	5.159298	75.66151	10.50187
4	0.125645	5.166719	75.30418	10.39825
5	0.129575	5.617561	70.89746	14.34370
6	0.130587	5.819030	70.76745	14.40541
7	0.130899	5.852301	70.53445	14.56843
8	0.135234	6.165821	67.56003	16.92836
9	0.138834	6.694396	66.00511	17.84214
10	0.139275	6.653642	65.65025	18.13182

Source: Author computation from the output of EViews 10

Table 3 presents the variance decomposition for the stock market using the market capitalization. Reported within the 10 years horizon, results show that in the short run 3.9% of the innovation in the stock market is due to its own past values and 91.18% is due to shocks to the oil price. Overtime, however, 6.65% of innovation is due to its own shock while 65.65% is due to the shocks to oil price and 18% oil price volatility.

Summary and Conclusion

The global pandemic and recession experienced has called for attention as its effect has negatively affected the dynamics of stock market and its interactions with exchange rate of Nigeria. The rapid growth and huge rate of volatility and shocks emanating from sky rocking oil price during this recession period has eventually attracted improvised countries into great economic recession. This is buttressed by the works of Benjamin, Jimoh, Otonne, Benjamin, & Oyolola (2020) [3] that revealed that globally countries suffered significant loss in resources and income as well as severe social dislocations, increasing health spending emanating from the pandemic spread of the CORONA virus. This pandemic resulted to economic globalisation; trade liberalization policies employed on country basis. The main stay of countries during this period turned to dependency on other countries supplies.

of goods and services. For instance, Euro Zone registered the highest estimated GDP loss of 8.4%, followed closely by Oil Exporting Countries, and the Middle East (-7.7%), Other Asia (-6.3%) and the rest of the world (-5.9%). Despite the far-reaching consequences of the pandemic on trade, the Oil Producing Countries are expected to witness a 5.5% decline in GDP. The global, regional, and individual country growth rate in 2020 is expected to decline due to the global health crisis (Benjamin, *et al.*, 2020) [3]. Moreover, coronavirus disrupted the global supply of goods and crashed major markets including the oil, foreign exchange etc. In the mild stage of pandemic, the oil price, which stood at $67.12 per barrel on 2 January 2020 went down to $12.22 on 22 April, and stood at $40.91 as at 22 October 2020 (OPEC, 2020). The crash of the stock market is March 2020 is also caused by the COVID-19 pandemic (Benjamin, *et al.*, 2020) [3]. Mazur *et al.* (2020) showed that the Dow Jones Industrial Average (DJIA) dived by about 26% within four trading days because of the lockdown policy which forced businesses to shut-down production. Similarly, the Asian markets (most notably the China's Shanghai Composite, Hong Kong's Hang Seng and South Korea's KOSPI), Germany's DAX, the UK's FTSE 100 and the Euro Stock 50 performance were also down in March due to the fear associated with the uncoordinated governmental responses. Additionally, the lack of foreign earnings in many emerging African and European countries resulted to the devaluation of the currency (Benjamin, *et al*., 2020) [3]. The Nigerian monetary authority devalued the naira by about 5.5% during the pandemic, citing the need to unify the exchange rate around the NAFEX rate buttressing the stands of Oluronbi and Onu (2020). In conclusion, the oil price and stock market has an interaction with the exchange rate in Nigeria and the economy in general.

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