Review Article

The Effects of Macroeconomic Factors on Firm Value: Empirical Evidence from Nigeria

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Abstract - The study examines the effects of macroeconomic factors on listed Nigerian companies' firm value using panel data analysis from 2008 to 2017. The population of the study consists of 300 firm-year observations. Using the EV/EBITDA ratio as a proxy for firm value, the study found that GDP growth and Inflation have a significant negative and positive effect on firm value, respectively. However, the exchange rate has a significant and positive effect on firm value. Further, the study uses three control variables: board size, firm size, and firm growth. While board size and firm size have no significant effect on firm value, firm growth negatively affects firm value. Thus, the study concludes that macroeconomic factors influence the firm value of listed firms in Nigeria. Generally, the findings are in line with the previous literature, suggesting that macroeconomic factors such as GDP growth rate, inflation rate, and exchange rate are beyond the control of an organization, hence, the need for companies to predict the diverse effects of these macroeconomic factors on future business performance.

Keywords - Macroeconomic Factors, Firm Value, Nigeria

I. INTRODUCTION

Macroeconomic factors influence firms' value, and the businesses need to be conscious of these factors to minimize their shock on future cash flows and profitability (Issah & Antwi, 2017). Macroeconomic factors such as GDP growth rate, inflation rate, and exchange rates are beyond the control of an organization, hence, the need for companies to forecast the diverse effect of these macroeconomic factors on future business performances (Broadstock Shum, & Xu, 2011). Macroeconomic factors exist outside the company and not under management control; they include social, environmental, political conditions, suppliers, competitors, government regulations, and policies (Adidu & Olanye, 2006).

Previous studies have also found that macroeconomic variables affect the stock market's performance, mostly stock returns, through their influence on future cash flows and the speed at which they are discounted (Tripathi & Seth, 2014). However, many studies concentrated on the relationship between firm performance and macroeconomic variables (e.g., Broadstock, Shu, & Xu, 2011; Ibrahim & Aziz, 2003; Egbunike & Okerekeoti, 2018; Issah & Antwi, 2017; Owolabi, 2017; Otambo, 2016). However, most of these studies failed to examine the effect of macroeconomic factors on specific industries (Issah & Antwi, 2017). The majority of them employed stock returns and absolute accounting performance measures, especially Return on Asset (ROA), Return on Equity (ROE), and Earnings per Share (EPS), to measure performance. These measures are considered inadequate because they capture only the firm's short-term performance, i.e., profitability. Therefore, the study's major contribution is using a unique enterprise value ratio (EV/EBITDA). This is because it serves as an economic measure of a company's real market value as a complete corporate entity (Bhullar & Bhatnagar 2013).

The paper is organized as follows. Section two of the paper presents the overview of the research context, i.e., Nigeria. The next section, i.e., section three, discusses the theoretical perspective and empirical evidence. Section four presents hypotheses development. Moreover, section five provides the methodology and empirical models, while section six presents a discussion of the findings. Lastly, section seven concludes the paper.

II. OVERVIEW OF RESEARCH CONTEXT NIGERIA

In Nigeria, colonialism had been a significant feature of Nigerian economic history. Initially, Britain gained total control and management of Nigerian resources. The Nigerian economy after independence became more promising. However, before the oil boom era, agriculture has been the major source of Nigeria's revenue. Nigeria has been the major exporter of agricultural products like groundnuts, cotton, cocoa, and millet, contributing to about 63 percent to

the nation's Gross Domestic Product (GDP) in 1960 to 3.1 percent GDP growth annually. Moreover, for the period of the oil boom era 1970 to 1978, the nation's economy witnessed tremendous growth when the GDP grew positively by 6.2 percent annually. Nevertheless, the country experienced a series of unfortunate economic and political events that affect its economic growth. Ekpo & Umoh (2010) maintained that the contribution of agriculture to the Nigerian GDP was unsatisfactory. It dropped down from 63 percent in 1960 to 34 percent in 1988 due to carelessness and the agricultural sector's disregard. Consequently, Nigeria became the major importer of basic food items in 1975. In addition, the period of structural adjustments and economic freedom from 1988 to 1997 was a remarkable one because the GDP positively responded to the economic adjustment policies. The GDP grew at an annual growth rate of 4 percent.

The National Bureau of Statistics (2013) reported that a series of unfortunate economic and political events hinder Nigeria's economic growth. Nevertheless, the nation still plays a pivotal economic role globally, especially as a producer and exporter of crude oil. The economy faced many challenges that affected the overall economic activity in 2012 (National Bureau of Statistics, 2013). The report further stresses that the downturn in economic activities has affected the major sectors of the economy. Until the current downturn, Nigeria experienced robust growth from the year 2000. Real GDP grew at an average rate of almost 8 percent per year from 2000 to 2014, and almost 10 percent per year in the non-oil sector, before slowing sharply in 2015 and experiencing an outright contraction in 2016 (IMF Country Report, 2017).

Moreover, Nigeria's Gross Domestic Product (GDP) grew by 2.28 percent (year-on-year), in real terms, in the third quarter of 2019. Compared to the third quarter of 2018, which recorded a growth of 1.81 percent, the real GDP growth rate observed in the third quarter of 2019 indicates an increase of 0.47 percent (National Bureau of Statistics, 2019). On a quarter on quarter basis, however, real GDP grew by 9.23 percent. The growth rate in Q3 2019 represents the second-highest quarterly rate recorded since 2016. However, Figure 1 presents Nigeria`s real GDP year on year growth.
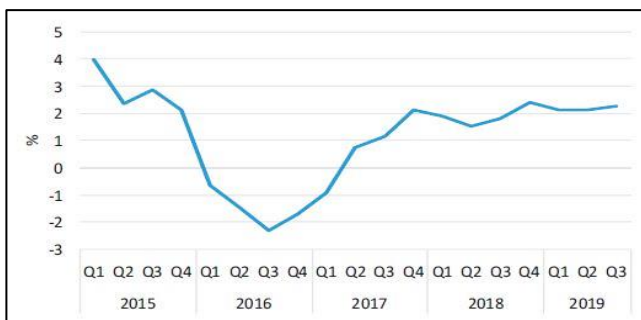
Furthermore, the high rate of Inflation deteriorates the financial sector's effectiveness in the course of financial market frictions and slows down the economy's performance (Alimi, 2014). Thus, the high rate of Inflation happens to be not merely a concern in the developed and developing economies but to the entire economy of nations. However, in Nigeria, as of January 2012, the Nigerian inflation rate skyrocketed to 12.6 percent and declined 11.9 percent in February. The inflation rate reaches its highest in April and June by recording 12.9 percent, respectively. It later drops down to 11.7 percent for August and October (Central Bank of Nigeria, 2017).

However, the year 2013 has been a favorable economic period for Nigeria because, in January, the inflation rate declines to 9 percent compared to December 2012 (12 percent). The rate drops to its lowest in October by recording 7.8 percent (year-on-year). The rate continues to fluctuate between 7 percent and 8 percent, while the year ends at 8 percent in December, and the average inflation rate for the year is 8.5 percent. In 2014, the inflation rate in January was 8 percent and dropped down to its minimum in February to 7.7 percent. Like 2013, the rate fluctuates between 7 percent and 8 percent throughout the year, while December has 8 percent and the average for the year is 8.05 percent. (Central Bank of Nigeria, 2017).

On the other hand, 2015 starts at 8.2 percent and ends at its highest at 9.55 percent, while the overall inflation rate average for the year is 9.01 percent. In January 2016, the rate was 9.62 percent and significantly increased to 11.38 percent in February, showing an increase of 1.76 percent (month-on-month). However, the highest inflation rate in the year 2016 is in December, with 18.55 percent. There was also a persistent increase from December 2016 to January 2017, where the inflation rate stood at 18.74 percent, and later on, moves at a decreasing rate to 16.05 percent in July 2017 due to various agricultural outputs by the nation's populace (Central Bank of Nigeria, 2017).

The Central Bank of Nigeria (CBN) Quarterly Economic Report (2019) revealed that headline inflation stood at 11.98 percent at the end-December 2019, compared with 11.24 percent and 11.44 percent at the end of the preceding quarter and the corresponding period of 2018, respectively. The 12-Month Moving Average (12MMA) inflation, for the fourth quarter of 2019, was 11.40 percent, compared with 11.27 percent and 12.10 percent in the preceding quarter and the corresponding period of 2018, respectively (See Table 1).

Fig.1   Real GDP growth in Nigeria
Source: National Bureau of Statistics, 2019

Table 1. Headline Inflation Rate (%)

	4-17	1-18	2-18	3-18	4-18	1-19	2-19	3-19	4-19
12-Month Moving Average	6.50	5.60	4.37	3.20	2.10	1.40	1.30	1.27	1.40
Year-on-Year	5.37	3.34	1.23	1.28	1.44	1.25	1.22	1.24	1.98

Source: CBN Quarterly Economic Report (Fourth Quarter, 2019).

Additionally, starting in mid-2014, the slump in oil prices sharply curtailed Foreign Exchange (FX) availability in the economy. Foreign exchange inflows to the Central Bank of Nigeria (mostly oil tax revenue) declined from $12 billion in 2013Q3 to $4.5 billion in 2016Q2. In contrast, other FX inflows to the economy, including non-oil exports, capital inflows, and over-the-counter purchases by oil companies, declined from $27 billion in 2013Q3 to $9.5 billion in 2016Q2 (IMF Country Report, 2017). During this period, three major devaluations occurred, with the exchange rate in the parallel market segment depreciating following the introduction of FX restrictions, including on CBN sales to Bureau de Change operators in January 2016 (IMF Country Report, 2017).

On a quarter-on-quarter basis, foreign exchange inflow, through the CBN, rose by 6.1 percent, while outflow through Bank fell by 3.9 percent, relative to their levels in the third quarter of 2019. Total non-oil export proceeds received by banks fell by 37.8 percent, compared with the level at end-September 2019 (CBN Quarterly Economic Report, 2019). The average exchange rate at the 'Investors' and 'Exporters' window, the BDC, and the Inter-bank segments of the market were N362.83/US$, N359.42/US$, and N306.95/US$, respectively, in the review quarter. At US$38.18 billion, the gross external reserves fell by 6.4 percent, compared with the level at end-September 2019. However, Aggregate foreign exchange inflow into the CBN amounted to US$13.29 billion, showing an increase of 6.1 percent over the level in the third quarter of 2019, but decreased by 15.9 percent below the level in the corresponding period of 2018. The development, relative to the preceding quarter, reflected, mainly, the rise in non-oil receipts.

Further, the aggregate outflow from the CBN was US$15.57 billion, indicating a decrease of 3.9 percent and 2.7 percent below the levels in the preceding quarter of 2019 and the corresponding period of 2018, respectively. The decline in outflow, relative to the preceding quarter, reflected, mainly, the decline in third-party MDAs transfers and interbank utilization. Overall, foreign exchange flows, through the Bank in the review period, resulted in a net

outflow of US$2.27 billion, compared with a net outflow of US$3.67 billion and US$0.19 billion in the preceding quarter and the corresponding period of 2018, respectively. Moreover, of the total, foreign exchange sales to BDCs, Interbank, Swaps, Secondary Market Intervention Sales (SMIS) Intervention and Wholesale Forward Intervention fell by 11.2 percent, 10.1 percent, 8.0 percent, 3.5 percent, and 2.3 percent to US$0.40 billion, US$1.65 billion, US$1.24 billion, US$0.31 and US$3.34 billion, respectively. In contrast, sales to the I&E window and SME intervention rose above their levels in the preceding quarter by 17.7 percent and 1.0 percent to US$2.62 billion and US$0.43 billion, respectively. Foreign exchange forwards disbursed at maturity recorded no transaction during the period under review (see Figure 2).
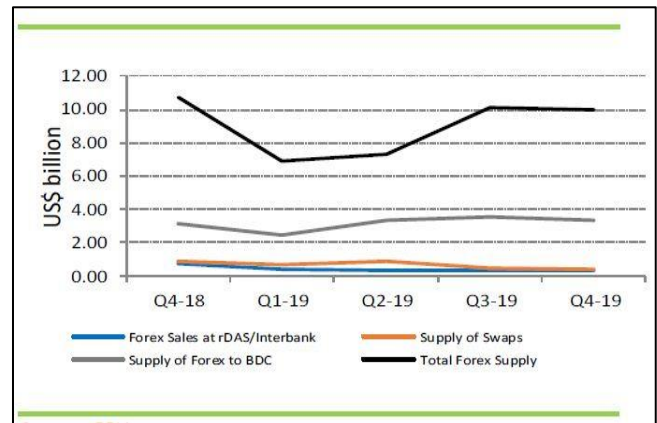

Fig. 2 Supply of Foreign Exchange
Source: CBN Quarterly Economic Report, 2019

III. LITERATURE REVIEW

A. Theoretical perspective

Arbitrage Pricing Theory (ATP) was developed by Ross (1977), as a result of much disparagement occasioned by the built-in problems, shortcomings, or weaknesses entrenched in the Capital Asset Pricing Model (CAPM) on both theoretical and empirical grounds as confirmed by its unrealistic assumptions, the complexity of its empirical testing. Further, a security's anticipated rate of Return is a function of only one factor (the general stock market), while other several factors such as macroeconomic factors relative sensitivity to Inflation, Gross National Product (GNP), interest rates, oil prices, exchange rates, a diversified stock index, tax rate, etc. may perhaps influence the security's returns relative to those of other securities.

The Arbitrage Pricing Theory (APT) is one more method of connecting macroeconomic variables to the stock market return. It is an extension of the Capital Asset Pricing Model (CAPM) based on the mean-variance framework by assuming generating security. In other words, CAPM is based on one factor means that there is only one independent variable, which is the risk premium of the market. There are

related assumptions between CAPM and APT, namely: the assumption of homogeneous expectations, perfectly competitive markets, and frictionless capital markets.

However, Ross (1977) proposes a multifactor approach to explaining asset pricing through the arbitrage pricing theory (APT). According to him, the major power on stock returns are some economic forces such as unanticipated shifts in risk premiums, changes in the expected level of industrial production, unexpected Inflation, and unanticipated movements in the shape of the term structure of interest rate. However, these factors are indicated with factor-specific coefficients that measure the assets' sensitivity to each factor. APT is a different approach to determining asset prices, and it obtains its basis from the law of one price.

According to Chen, Roll, and Ross (1986), individual stock depends on predictable and unexpected factors. They deem that the majority of investors' return grasp is due to unforeseen events, and these factors are connected to the overall economic conditions. Though asset returns can also be affected by the power that is not systematic to the economy, large portfolios' returns are mainly influenced by systematic risk. Idiosyncratic returns on individual assets are canceled out through diversification. This theory is linked to this study's variables based on macroeconomic factors, namely, GDP growth, Inflation, and exchange rate.

B. Empirical evidence
a) GDP Growth and Firm Value

Numerous indicators can symbolize a country's economic growth, but the GDP growth is an indicator of economic activities (Khanna, Srivastava & Medury, 2015). Economic growth refers to an increase in the total production output of an economy. Economic growth occurs once an economy either discovered new resources or uncovered procedures of producing extra applying existing resources. The divergence in growth rates between advanced and developing economies has motivated a large part of the present literature on the link between economic growth and equity returns over the past decades.

Moreover, at the corporation level, economic growth is believed to be correlated with its growth and is a proxy for its investment opportunity set and financing needs (Beck. & Maksimovic, 2002; Smith & Watts, 1992). As the economy grows, a decline is seen in expected bankruptcy cost and an increase in the collateral values of assets, stock prices, and free cash flow (Lemma & Negash, 2013), affecting the firm's growth its financing needs. Firm growth is expected to impact positively on firm value (Hutchinson & Gul, 2004). Khrawish and Al-Sa'di (2011) considered the factors that might influence the Jordanian commercial banks' performance from 2000 to 2010. Considering both internal and external factors, they established a significant and inverse correlation between Return on Assets (ROE) and GDP growth rates.

In a Nigerian study, Egbunike and Okerekeoti (2018) examined the interrelationship between macroeconomic factors, firm characteristics, and quoted manufacturing firms' financial performance in Nigeria. Specifically, the study investigates the effect of interest rate, inflation rate, exchange rate, and the GDP growth rate on firm performance (measured by ROA). The study finds no significant effect for interest rate and exchange rate, but a significant effect for inflation rate and GDP growth rate on ROA. Similarly, Djalilov and Piesse (2016) found a negative relationship between GDP growth with early transition countries' profitability and a positive relationship in late transition countries.

Issah and Antwi (2017) investigated the role of macroeconomic variables on firm performance in the United Kindom. Multiple regression was used to analyze the data. They studied a number of macroeconomic variables, subjected to principal component analysis for variable reduction. The full sample model showed an adjusted R2 value of 0.91, and the following variables were significant: lagged ROA; adjusted unemployment rate; benchmarked unit labor costs; real GDP and exchange rate. And five out of the six studied industries had significant F-values. Simiyu and Ngile (2015) examined the effects of three major macroeconomic variables: GDP growth, exchange rates, and interest rates on the profitability of the listed commercial banks in the Nairobi Securities Exchange (NSE) over a period 2001 to 2012. The study's findings revealed that the real GDP growth rate had a positive but insignificant effect on commercial banks' profitability as measured by Return on Assets (ROA).

b) Inflation and Firm Value

Another important economic factor that influences the value of a firm is the inflation rate of a nation. With the rise in the price level of different commodities, the overall costs of firms' raw materials and other facilities like fuel and energy, transportation, etc., also rise, and so does the firms' capital requirement (Khanna, Srivastava & Medury, 2015). Inflation is measured as the rate of increase in the general price level. Thus, the relative price changes affect supply-demand relationships for both factor and product markets. Changes in these relationships influence the level and distribution of income, asset values, cash flows, debt, net worth, and firm's structural characteristics (Lins & Duncan, 1980). Lins and Duncan (1980) added that Inflation has differing long-run and short-run impacts on financial performance. In the short run, Inflation may contribute to reduced firm income, increased capital gains, reduced liquidity, and greater income instability. In the long run, financial outcomes may not be substantially altered. Still, firms in the industry may adjust toward those who can best deal with income instability and capture growth opportunities. Inflation adversely affects the overall growth, the financial sector development, and the vulnerable poor segment of the population. Inflation decreases the real income and also induces uncertainty (Qayyum, 2006).

However, many studies have reported an inverse relationship between Inflation and the firm's market value (Meric & Meric, 1997). Inflation increases the required rate of Return and lowers common stock prices. It can also affect the firm's market value by raising its tax burden through understated historical depreciation and inventory costs. Ifeanyi and Chukwuma (2016) examined the relationship between Inflation and the value of firms in Nigeria's manufacturing sector. Their findings revealed a negative correlation between Inflation and firm value and an insignificant negative association between Inflation and ROA. Additionally, the relationship between ROA and economic value added is insignificant. Aggarwal and Padhan (2017) reported that the effect of Inflation on firm value is mixed in their Indian study.

On the other hand, Jubaedah et al. (2016) examined how financial performance, capital structure, and macroeconomic factors influence a firm value in the Indonesian textile industry. Using panel data regression, the results indicated that Inflation has a positive influence on the firm value. This is consistent with empirical studies conducted by Vejzagic and Zarafat (2014). They stated that to maintain profitability, the anticipation of Inflation should be done to protect revenues and reduce costs. Also, Athanasoglou et al. (2005) found a similar result.

c) Exchange Rate and Firm Value

The literature widely believed that rise and fall in the exchange rate could influence firm value. The conventional understanding is that currency swings directly influence companies that engage in an international operation. Chan, Seow, and Tam (2002) posit that variation in foreign currency exchange rates can influence firm value because they directly influence a firm's current and future cash flows. However, theoretical studies have supported this, such as Hodder (1982) and Shapiro (1975). For instance, Shapiro (1975) analyses an oligopolistic firm's profit-maximizing strategy in a two-country setting. He maintained that the key determinants of an international firm's foreign exchange risk are the percentage of overseas sales, domestic competition's strength, and the degree of substitutability it encountered between local and foreign production factors.

However, several empirical research types have been conducted on the association between foreign exchange exposure and firm value, and they reported mixed findings. Many of these researches proposed the negative influence of uncertainty on the growth of the exchange rate on cash flow and profitability of companies, and consequently their market values (e.g., Fraser & Pantzalis, 2004; Muller & Verschoor, 2006). Moreover, other researches demonstrate that overseas incomes are positively interrelated with the exchange rate exposure, and in a short period, currency drop negatively influences the market value of listed firms (He & Ng, 1998). Similarly, some researches revealed no statistically significant link between the firm value and exchange rates (e.g., Stavarek, 2005).

Parlapiano, Alexeev, and Dungey (2015) examined the influence of exchange rate instability on European firms for 1999–2011. Applying the Doukas, Hall, and Lang (2003) orthogonalized model approach, they considered firm-level data from all sectors of the economy, including financial and non-financial firms. They argued that company exposure to exchange rate risk is influenced by the level of international involvement, industry, firm size, and country of origin. European firms with large domestic operations reveal the most significant vulnerability to unexpected exchange rate movements. They further suggest that those companies should improve their risk management practices. In addition, Šimakova (2017) argued that many empirical studies suggest the negative impact of uncertainty about the development of the exchange rate on companies' cash flow and profitability and their market values. However, he investigates the effect of exchange rates on companies' value listed on stock exchanges in the Visegrad countries. Using Jorion's model and panel data regression for the sample period 2002 – 2016. The study's findings revealed a negative relationship between the exchange rate and the value of stock companies.

In contrast, Simiyu and Ngile (2015) evaluate the effect of macroeconomic variables on the financial profitability of listed commercial banks in the Nairobi Securities Exchange (NSE) for the years 2001 to 2012. Their result shows that the exchange rate positively affected listed commercial banks' profitability on Nairobi Securities Exchange. Sikarwar (2018) examines the presence of exchange rate exposure and its relationship with currency derivatives usage in the dynamic environment of the global financial crisis of 2008. Using a sample of 624 Indian firms over the period of April 2001 to March 2016, he suggests that the firms are more exposed to the exchange rate changes since the onset of the financial crisis. However, there is a lack of evidence that the usage of currency derivatives is more effective in reducing exposure during the crisis/post-crisis period as opposed to the pre-crisis period.

IV. HYPOTHESES DEVELOPMENT

Empirical evidence regarding the linkage of GDP growth and firm value provides mixed and contradictory results, and little research has been conducted on emerging or transition economies like Nigeria (Owolabi, 2017). Furthermore, while most empirical evidence conducted in emerging countries posit a positive relationship between GDP growth and firm value, other studies have found a negative relationship between the two. Specifically, the findings of Djalilov and Piesse (2016), Ghareli and Mohammadi (2016), and Tan and Floros (2012) reported that GDP growth negatively affects firm performance. In contrast, Otambo (2016) and Egbunike & Okerekeoti (2018) found a positive association between GDP growth and firm performance. Therefore, the following hypothesis is formed:

H1: GDP growth has a significant positive effect on the firm value of listed firms in Nigeria

Another important economic factor that influences the value of a firm is the inflation rate of a nation. Evidence from prior researches such as Khanna, Srivastava, and Medury (2015), Lins and Duncan (1980), Meric and Meric (1997) had revealed that Inflation exerts various long-run and short-run effects on the value of a firm. In the short run, Inflation reduces the firm's income, raises its capital, diminishes its liquidity, and, consequently, a high level of instability in income. Inflation negatively affects the country's overall growth, the development in the financial sector, and the susceptible poor division of the population. Thus, Inflation raises the real income as well as stimulate uncertainty (Qayyum, 2006).

Meanwhile, prior studies reported mixed results on the effect of Inflation on firm value. Jubaedah et al. (2016) examined how financial performance, capital structure, and macroeconomic factors may influence a firm's value in the Indonesian textile industry. Using panel data regression, the results show that Inflation has a positive influence on the firm value. Also, Athanasoglou et al. (2005) found a similar result.

On the other hand, Ifeanyi and Chukwuma (2016) considered the nature of the association between Inflation and firms' value in the manufacturing sector in Nigeria. Their findings revealed a negative correlation between Inflation and firm value and an insignificant negative association between Inflation and ROA. Additionally, the relationship between ROA and economic value added is insignificant. Inflation, even at a low level, harshly devalues the actual value of the firm. Aggarwal and Padhan (2017) reported that the effect of Inflation on firm value is mixed in their Indian study. Thus, the following hypothesis is formed:

H2: Inflation has a significant negative effect on the firm value of listed firms in Nigeria

It is a widely held belief in the literature that fluctuations in the exchange rate could affect firm value. The conventional wisdom is that currency swings directly impact firms with some international operations. Chan, Seow, and Tam (2002) posits that changes in foreign currency exchange rates can affect firm value since they directly affect a firm's current and future cash flows. However, most other prior and extant research such as Fraser and Pantzalis (2004), Muller and Verschoor (2006) emphasized the depressing impact of improbability concerning the influence of the firm's exchange rate profitability and cash flow, and consequently their market values. They argued that, since these types of multinationals companies engage in selling and buying abroad, their exposure to foreign exchange risk is always high. The income they generate and expenses, and unattained gains and losses may be subjected to various denominated currencies, consequently exposing these multinationals to unsure earnings when changing into their home currency. Flota (2009) discovered an inverse association between currency exposure and level of international sales.

In contrast, Issah and Antwi (2017) found that exchange rate changes that measure the financial condition is significant and positively related to firm performance. In addition, similar research was conducted on Islamic banking in Indonesia by Hidayati (2014) to measure the effectiveness of the exchange rate, Inflation, and Bank Indonesia rate (BI rate) on profitability. The result revealed that the exchange rate had a positive and significant effect on Return on the asset. Thus, the below hypothesis is formed:

H3: Exchange rate has a significant positive effect on firm value of listed firms in Nigeria

V. METHODOLOGY

A. Data
This research sample is 300 non-financial firms listed on the Nigerian stock market over the ten years from 2008 to 2017. Therefore, the data for this study were sourced from the World Development Indicators (WDI) database.

B. The variables
a) Measure of firm value
Previous research (e.g., Abor, 2007; Yazdanfar & Öhman, 2015) has applied various variables like EPS, ROE, and ROA to proxy profitability that measure short-term performance firm value captures the long-term performance of a firm (Samiloghu & Demirgunes, 2008). Based on Bhullar & Bhatnagar (2013), the EV/EBITDA ratio was considered a proxy for firm value in this paper and represented as the enterprise value divided by earnings before interest, taxes, depreciation, and amortization (EV/EBITDA).

b) Measure of Macroeconomic factors
This research uses the increase and decrease of the GDP from one year to the next to represent GDP growth. This solaces the works of Khrawish (2011) and Chen et al. (2009). Inflation is measured by the consumer price index (annual percentage). This is related to Ifeanyi and Chukwuma's (2016) studies and Lins and Duncan's (1980). The use of standard deviation of the moving average of the logarithm of the exchange rate to proxy exchange rate fluctuation is in line with the works of Parlapiano, Alexeev, and Dungey (2015) and Flota (2009).

c) Measure of control variables
This study uses many control variables, including board size, firm size, and firm growth. A company board is responsible for providing recommendations to the chief executive officer and access to significant information and resources to enhance its value. Prior studies like Jensen (1993) and Mak and Yuanto (2003) used the total number of executive and non-executive members serving the board of a company to proxy board size. However, this study measures board size in line with the above studies.

Table 1. Descriptive Statistics of Variables

Variables	Mean	SD	Min.	Max.
FV	0.1435	0.2060	0.0100	2.0171
GDP growth	1.2254	.0333	1.6170	7.8397
Inflation	27.867	56.197	0.7884	214.23
EXrate	0.0332	0.0073	0.0254	0.0522
BSIZE	10.083	2.9140	4.0000	23.000
FSIZE	16.787	1.9126	12.329	21.215
FGROWTH	0.1886	0.3413	0.9990	1.3481

Previous studies used many proxies to measure firm sizes, such as sales, assets, and employees (e.g., Sheikh and Wang, 2011). However, in this paper, firm size is measured as the natural logarithm of the firm's book value of sales. This is in line with the work of Yazdanfar and Ohman (2015). Moreover, Prior studies have considered growth opportunities as an important determinant of firm value. Firm growth is measured in this study as the percentage increases in sales, i.e., increased firms' sales (S) between periods. Current sales –previous sales / previous sales. This is in line with the work of Abor (2005), Samiloghu & Demirgunes (2008), and Zeitun & Tian (2007).

C. The Empirical Models

To test the effect of macroeconomic factors, firm characteristics on firm value, this research used the following model:

$$\gamma_{it} = \beta_1 + \beta X_{it} + \varepsilon_{it}$$

Where ε_{it} represents idiosyncratic shocks, while i stands for the firm (i= 1….30) and t stands for the period of time (t = 2008-2017). We employed a panel data model to analyze the effect of macroeconomic factors on firm value. This study, therefore, makes use of the following linear regression model.

$$FV_{it} = \beta_o + \beta_1 GDPGROWTH_{it} + \beta_2 INF_{it} + \beta_3 EXRATE_{it} + \beta_4 BSIZE_{it} + \beta_5 FIRMSIZE_{it} + \beta_6 FGROWTH_{it} + \varepsilon_{it}$$

FV represents firm value, GDP GROWTH represents GDP growth rate, INF represents Inflation, and EXRATE stands for the exchange rate. In addition, BSIZE represents board size, and FIRM SIZE represents the firm size, GROWTH represents firm growth, which may affect firm value in Nigeria.

VI. FINDINGS

A. Descriptive statistics of data

Table 1 summarizes the descriptive statistics of the dependent and independent variables for the sample of firms. The number of observations for all the variables is 300.

B. Diagnostic Tests

This study applies panel data analysis, which requires certain estimations to account for time-series and the data's cross-sectional dimension. The study carried out diagnostic tests that include Variance Inflation Factor (VIF) to check the absence of multicollinearity in the model, Breusch-Pagan / Cook-Weisberg test heteroskedasticity, and the Wooldridge test to check serial correlation.

a) Multicollinearity Test

In this study, the values of the variance inflation factor (VIF) of the variables are presented in Table 2. The outcome shows that multicollinearity does not exist because it is apparent that the coefficient of VIF for the model is less than the threshold of 10 and the mean is less than 5 (Hair et al., 2014; Pallant, 2005).

Table 2 Result of Variance Inflation Factor

Variables	VIF	1/VIF
GDP GROWTH	1.79	0.6381
INFLATION	1.86	0.5369
EXRATE	1.14	0.8760
BSIZE		
FSIZE	1.25	0.8014
FGROWTH	1.57	0.6381

Mean VIF   1.47

b) Heteroscedasticity Test

Table 3 indicates that the model has a reported p-value that is significant at the 0.05 level. Thus, the model rejected the null hypotheses as there is an issue of heteroscedasticity.

Table 3. Breusch-Pagan/Cook-Weisberg test for heteroskedasticity

Chi2(1)	Prob>chi2	Null (H0)
354.6	0.0000	Rejected

Note: Ho (null): homoscedasticity

c) Serial Correlation (Autocorrelation) Test

Based on the result displayed in Table 4 below, the regression model suffered from the serial correlation problem because the p-value for the model is significant (p<0.05). Consequently, the null (Ho) hypothesis states that: 'No first-order autocorrelation' was rejected.

Table 4. Wooldridge test for autocorrelation

F(1,29)	Prob > F	Null (H0)
4.843	0.0359	Rejected

Notes: H0: No first-order correlation

However, with regard to autocorrelation and heteroscedasticity problems, we used Driscoll-Kraay standard errors (the xtscc program) suggested by Driscoll and Kraay (1998) to address the two problems.

d) Model Specification Test

Table 5 indicates that the null hypothesis was accepted; this indicates that the fixed effects model is not appropriate and that the random effect model to be preferred.

Table 5. Hausman Model Specification Test

chi2(13)	Prob > chi2	Null (H0)
0.77	0.9929	Accepted

e) Summary of the random effect model

Table 6 shows the random effect model results, which indicate that macroeconomic factors, i.e., GDP growth, inflation exchange rate, are the major determinants of firm value for listed companies in Nigeria.

Table 6. Summary of the random effect model

Variables	Coef.	t.stat	p>t
GDP growth	-0.0395	(-2.84)	0.022
Inflation	0.0008	(2.81)	0.023
EXrate	0.0681	(3.97)	0.004
BSIZE	-0.0150	(-0.81)	0.443
FSIZE	-0.0444	(-1.46)	0.181
FGROWTH	0.0667	(3.99)	0.004
Constant	1.1073	(2.29)	0.051

The result of the random effect in Table 6 shows that three of the predictor variables GDP (β= -0.0395, P<0.05), Inflation (β= 0.0008, P<0.05), and EXrate (β= 0.0681, P<0.001), were found to be significantly related with firm value of listed firms in Nigeria. GDP growth shows a negative relationship with the firm value. When the GDP in real terms decreased by 5 percent, holding other variables constant, firm value decreased by 3.9 percent, vice-varsa. On the other hand, the results reveal that Inflation and exchange rate have a positive but significant effect on firm value. These imply that if there is an increase in Inflation and exchange rates, it will increase firm value. Moreover, board size (BSIZE) (β=-0.0150, >0.05) and firm size (FSIZE) (β= -0.0444, P>0.05) have no significant effect on firm value. Contrarily, firm growth (FGROWTH) (β=0.0667, P<0.001) has a significant and positive effect on firm value. This indicates that with the firm's 1% growth, the firm value increased by 66.7 percent, vice-versa.

VII. CONCLUSION

The study examines the effect of macro-economic factors on the firm value of listed Nigerian firms. As shown in Table 6, GDP growth has a negative effect on the firm value of listed firms in Nigeria. This is contrary to the hypothesis (H1) that assumed a significant positive effect of GDP growth on firm value. The plausible reason for the negative relationship implies that as economic activity decreases, a firm's future earnings will decrease and its value. However, the Nigerian economy has shown volatility in GDP growth. These have hindered the performance of manufacturing firms over time in the country. The firm performance also depends on the interaction of such factors with firm characteristics (Egbunike & Okerekeoti, 2018). Moreover, GDP growth is believed to be correlated with its growth at the corporation level and is a proxy for its investment opportunity set and financing needs (Beck. & Maksimovic, 2002; Smith & Watts, 1992).

Moreover, in this study, Inflation is predicted to have a negative effect on firm value. These results indicate that the sub hypothesis (H2), which states that Inflation negatively influences the firm value, is rejected. This indicates that an increase in the inflation rate essentially increases the value of companies. The increase in the price of goods and services generally occur almost simultaneously with various triggers. One factor price increase means the demand for such goods or services, including products or investment instruments such as stocks. The increase in Inflation under control will positively impact a firm's value (Jubaedah et al., 2016). This study's result is consistent with empirical studies conducted by Athanasoglou et al. (2005), which suggests Inflation and other macroeconomic factors affect firm value. The study also found a significant positive effect of exchange rate on firm value as hypothesized in hypothesis (H3). This implies that the lower the exchange rate, the lower the firm value. This is consistent with Issah and Antwi's (2017) findings, who found that exchange rates were significant and positively related to firm performance. This is also in line with the findings of Hidayati (2014) in an Indonesian study.

For this study, three control variables were used: firm size, the board size, and firm growth. From the regression result, firm size has a negative and significant effect on firm value. This result has contradicted the finding of Kakanda, Bello, and Abba (2016), who documents that firm size has a negative but insignificant effect on the performance of listed consumer goods companies in Nigeria. Board size, which is the second control variable, show an insignificant negative effect. In addition, firm growth has no significant effect on firm value revealed by the regression results.

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