Moderating Effect of Firm Size on Market Risk and Financial Performance of Quoted Oil Firms in African Stock Market

OGUJIOFOR MAGNUS NKEMJIKA[1], PROF. IFURUEZE M. S.[2], DR OFOR N.T.[3]
[1, 2, 3] *Novena University Ogume*

Abstract- ***The study examines the Moderating effect of firm size on market risk and financial performance of quoted oil firms in African stock market. The study made us of expo-fact-to research design and secondary data that were collected cover a period of 2012 to 2021. The data collected were analyzed using Panel data regression model. From the analysis, interest rate has positive impact on the financial performance of oil and gas firms listed on the African stock market. Interest rate is not a major determinant of financial performance of oil and gas firms listed on African stock market but it has weak influence of their performance, exchange rate with P-statistics value of 0.000 is an indication significantly associated with financial performance of oil and gas firms on African market. The result also expressly indicated that decisions that relate to profit improvement of oil and gas firms on African stock market must include exchange rate fluctuation. Hence exchange rate is a major determinant of the changes in financial performance and position of the firms and commodity price changes has P-value of 0.022 shows that commodity price is another important factor to consider when deciding for a profitability of oil and gas firms listed on the African market. Just like last market risk component discussed, the empirical outcome of commodity price change reflects practical reality on the effect of commodity price changes on the profitability of firms. Hence its recommended that firms should give serious attention to exchange rate, commodity price a as well as interest variable in other for them to have better performance.***

Indexed Terms- ***Market risk, financial performances, oil Firms, African stock market***

I. INTRODUCTION

Businesses are vulnerable to a variety of hazards, say James and Abdullah (2014), who stressed that globalization and internationalization have raised the risk for businesses in emerging nations. These dangers include monetary dangers, operational dangers, and market dangers. However, the risk to an entity coming from changes in market prices, including changes in interest rates, foreign currency rates, equities and commodity prices, is the topic of this study (Muriithi, Muturi, and Waweru, 2016; Ekinci, 2016). In a volatile market environment, the risk can quickly result in losses, making it crucial to understand it for better management (Odubuasi*et al.*, 2020). The operation of the oil and gas industry in certain African countries is not immune to market risk. This industry is significant since Nigeria is one of Africa's top oil and gas producers, with the continent's greatest natural gas reserves. The oil and gas industry, being the backbone of the Nigerian economy, plays a critical role in molding the nation's economic and political destiny (Odularu, 2008).

Historically, the early beginnings of African stock markets can be traced back to the colonial era when European powers established exchanges in major trading centers such as Johannesburg, Lagos, and Nairobi. These exchanges initially catered to the needs of European investors and focused on facilitating trade in commodities like gold, diamonds, and agricultural products.

Following independence in the mid-20th century, African countries began to establish their own stock exchanges as a means to mobilize capital for economic development. The first independent stock exchange in Africa was established in Johannesburg, South Africa, in 1887, which later became the

Johannesburg Stock Exchange (JSE). Other countries followed suit, with exchanges like the Nigerian Stock Exchange (NSE) established in 1960 and the Nairobi Securities Exchange (NSE) in 1954.During the early years, African stock markets were relatively small and had limited liquidity and investor participation. However, with the growing recognition of the importance of capital markets for economic growth, many African countries embarked on market reforms and regulatory improvements.

In the 21st century, African stock markets witnessed significant growth and expansion. Factors such as improving macroeconomic stability, regulatory reforms, increased foreign investment, and the emergence of a middle class with disposable income contributed to the growth of these markets. Additionally, the introduction of technological advancements and online trading platforms made stock market participation more accessible to a wider range of investors.

Nigeria is the economic driving force in West Africa due to its wealth in fossil fuels, which has a significant impact on revenue generation in the country. Oil prices and their high volatility have caused significant concern for consumers, producers, and governments since the removal of fuel subsidies in 2012, as well as a growing academic interest in studying this important economic variable in market risk management. Several factors influence the oil price, the most important of which are OPEC policies, military conflicts, geopolitical tensions, natural disasters, and supply and demand mismatches in international markets, among others.

Because it serves as the main source of energy for the industrial, electrical, and transportation sectors, oil is a crucial component of the global economy. Recent recessions in Nigeria and other African nations are in part a result of dramatic fluctuations in oil prices, which also have an impact on economic activity and have a big impact on stock market movements. As a result, the efficiency of the oil and gas sector has a significant impact on how the economy is intermediated (Oladejo & Oladipo, 2011). Profitability, liquidity, and the market value of the company are three ways to gauge financial performance. The Nigerian government has been committed to the efficacy of this sector of the economy over time because of how important the oil and gas industry's financial success is to the socioeconomic growth of a country. Because of this, every stakeholder considers the sector's continued existence to be of utmost importance. A sound governance strategy must be implemented in order to ensure the efficient operation of the oil and gas sector in the modern world for this sector of the economy to function successfully.

- The problem of the study

Oil and gas prices are notoriously unstable (Pindyck, 2001; Hamilton, 2009), and the recent price changes have raised a number of issues for individuals, businesses, and entire nations due to their high dependence on these commodities for industrial production, transportation, and electricity generation. With varied degrees of success, a number of authors, including Hamilton (2009), Alquist and Kilian (2010), and Odubuasi, Wilson-Oshilim, and Ifurueze (2020), have investigated risk forecasting models for the price of crude oil in an effort to better comprehend these price variations. Since then, as demand from developing nations like China and India has grown, so has the price of oil. The fact that the majority of firms produce a portfolio of oil-related products for which prices are all highly correlated (Girma and Paulson, 1999; Asche, Gjolberg and Volker, 2003; Asche, Osmundsen and Sandsmark, 2006; Panagiotides and Ruthledge, 2007; Brown and Yucel, 2009) further emphasizes the market risk ranging from changes in interest rates, change in equity prices, changes in commodity prices, to changes in foreign exchange rate.

Despite the pressing need to control the risk associated with changes in oil prices, research on risk measurement in the oil sector is currently lacking. Numerous scholars have really researched the numerous dangers that impede the efficient operation of the financial sector of the economy in a number of African countries and elsewhere. Oyerogba and Ogunlde (2016), for example, examined the connections between the financial sectors in a few African nations, while Ekinici (2016) investigated the same in Turkey and Muriithi, Muturi, and Waweru (2016) examined risks and bank performance in Kenya. These studies are based on the financial industry since people believed that the banking sector

was what connected their economies to the rest of the globe. However, because it is evident that the oil and gas sectors in African countries are similar and essential to the economy, it is necessary to undertake studies on how market risk has influenced the performances of the oil and gas business in the African Stock Exchange.

- Objectives of the study

The broad objective of this study is to investigate the moderating effect of firm size on market risk and financial performances of oil firms in the African stock market. The study is required to achieve the following specific objectives;

1. To ascertain the effect of interest rate changes on the financial performance of oil firms in the African stock market.
2. To investigate the effect of foreign exchange rate changes on the financial performance of oil firms in the African stock market.
3. To ascertain the effect of commodity price changes on the financial performance of oil firms in the African stock market.

- Research questions:

In line with the objectives of the study, the research questions are:

1) To what extent does changes in interest rate affect the financial performance of oil firms in the African stock market?
2) To what extent does changes in foreign exchange rate affect the financial performance of oil firms in the African stock market?
3) How does commodity price changes affect the financial performance of oil firms in the African stock market?

- Hypotheses:

Ho1: Interest rate changes does not have significant effect on the financial performance (ROA) of oil firms in the African stock market.

Ho2: Foreign exchange rate changes does not have significant effect on the financial Performance of oil firms in the African stock market.

Ho3: Commodity price changes does not have significant effect on the financial performance of oil firms in the African stock market.

- Significance of the study:

The results of this study would benefit the following categories of people:

- Shareholders-

The findings of this study would inspire and drive institutional investors, strategic decision-making, and active portfolio management by individual investors. It would be easier for them to choose which stock to invest in if they were aware of the market risks that influence the financial performance of oil and gas companies in the chosen African countries.

- Management-

Executives would be able to identify market risk indicators from the study's findings that influence the oil and gas sector's financial performance. These would urge the managers to have the capability of increasing the market price of their shares by developing strategies that address such market risks.

- Government

The study's findings would help the governments of these particular African nations better understand the direction that different interest rates have on the oil and gas industry. With this knowledge, they might use interest rates as a weapon for monetary policy to stimulate economic growth and increase productivity.

II. REVIEW OF RELATED LITERATURE

- Conceptual framework

- Concept of Risk

Kaplan & Garrick, (2019) defined risk as the potential for an event, action, or decision to have adverse consequences, leading to loss, harm, or negative outcomes.

According to Kahan and Sunstein (2019), risk can be defined as the probability of a particular outcome multiplied by the magnitude or severity of that outcome. Risk refers to the uncertainty and variability of potential outcomes associated with a particular decision or course of action (Linstone& Turoff, 2019).

Fischer and Glickman (2019) define risk as the potential for an investment or financial decision to result in a loss of value or not achieve the desired return.Risk can be conceptualized as "the probability and potential impact of events or circumstances that may have adverse effects on an organization's objectives.

From the above definitions, risk can be said to be the potential for adverse consequences or negative outcomes resulting from events, actions, or decisions. It involves uncertainty and variability in potential outcomes and may lead to loss, harm, or failure to achieve desired objectives.

- Market Risk

Odubuasi*et al*. (2020) perceives market risk as the risk that a firm will incur losses because of a change in the price of assets held resulting from changes in interest rate, securities, commodity prices, foreign exchange rate and other market risk factors. Ekinci (2016) upholds that market risk is the risk of losses in liquid portfolio arising from the movements in market prices and consisting of interest rate, foreign currency, and equity and commodity price risks. In the words of Ekinci (2016) and Namaska (2016), market risk exposure is more volatile than credit risk exposure because of rapid changes in market condition that can cause severe financial losses and possible collapse. Hence, the take home on market risk is that it stands to measure the risks arising from the variations in the financial markets which results in fluctuations in interest rate, foreign exchange rate, equity and commodity prices. These sources of market risk could be cannot be avoided through diversification, but can be controlled partially and mitigated by having different asset categories with low correlation, because different asset categories react differently to macroeconomic factors.

- Determinant Market risk

Market risk is influenced by various factors, and there are several determinants that researchers have identified. Some common determinants of market risk include:

Macroeconomic Factors: Macroeconomic variables such as interest rates, inflation, GDP growth, and exchange rates can significantly impact market risk (Wagner, 2019).

Market Volatility: The level of volatility and fluctuations in the overall market can be a determinant of market risk (Shiller, 2018).

Company-Specific Factors: Factors specific to individual companies, such as financial performance, industry outlook, competitive positioning, and management quality, can influence market risk (Hwang & Salmon, 2020).

Global Events and News: Geopolitical events, natural disasters, political instability, and other significant news events can have a direct impact on market risk (Tumminello *et al.*, 2018).

Investor Sentiment: Market risk can also be influenced by investor sentiment, including market psychology, risk appetite, and behavioral biases (Baker & Wurgler, 2019).

- Interest Rate Changes

Interest rate is the price charges for the use of money, which is usually expressed as an annual percentage of the principal (Odubuasi*et al*., 2020). Moreover, Bean (2017) opines that interest means the reward for saving money in a saving account for people who had forgone consumption or its cost of capital for those who borrow money.

- Commodity Price Changes

Commodity prices play a significant role in the global economy, impacting various sectors and influencing consumer prices. Fluctuations in commodity prices can have far-reaching effects on industries, businesses, and individuals. Understanding the factors that drive commodity price changes is essential for market participants, policymakers, and investors.

Several factors contribute to changes in commodity prices. These factors can be broadly categorized into supply and demand dynamics, macroeconomic factors, geopolitical events, and financial market conditions.

Supply and Demand Dynamics:
Commodity prices are heavily influenced by the balance between supply and demand. Changes in supply, such as weather conditions, natural disasters, or disruptions in production, can impact prices. Similarly, changes in demand due to shifts in consumer preferences, economic growth, or technological advancements can also affect commodity prices (Cuddington & Jerrett, 2018).

Macroeconomic Factors:
Macroeconomic factors, including interest rates, inflation, and exchange rates, can influence commodity prices. For instance, changes in interest rates can impact the cost of financing for commodity producers and affect investment decisions. Exchange rate fluctuations can impact the competitiveness of commodity exports and imports (Hamilton, 2019).

Geopolitical Events:
Geopolitical events and developments around the world can have a significant impact on commodity prices. Political instability, trade disputes, sanctions, and conflicts in major commodity-producing regions can disrupt supply chains and lead to price volatility. For example, tensions in the Middle East can affect oil prices, while trade disputes between major economies can impact agricultural and metal prices (Baumeister & Kilian, 2019).

Financial Market Conditions:
Commodity prices are also influenced by financial market conditions, including investor sentiment, speculation, and changes in capital flows. Financial market participants, such as hedge funds and institutional investors, can drive price movements through their trading activities and investment decisions (Gorton &Rouwenhorst, 2018).

- Interest rate and financial performance of firms

The relationships between interest and financial performance has been established in literature by prior studies among which are; the study conducted by Agubata and Odubuasi (2018) that was titled effect of exchange rate fluctuations on the financial performance of firms in Nigeria. The study has one of its objectives that investigated the effect of interest rate on financial performance of firms. The result from Agubata and Odubuasi (2018) indicates that interest rate has negative effect on the financial performance of food, beverage and tobacco sector of Nigeria economy. Norhafiza et al. (2014) found that interest rate has significant effect on stock market index of Nigerian economy at 1% level. Musawa and Mwaanga (2017) got the result that shows interest rate has long run significant The work by Odubuasi et al. (2020) was dwelt on the effect of market risk on the return on assets of firms listed on Nigeria stock market. They applied ordinary least square regression estimation technique and produced the result the imply that interest rate has significant influence on the return on assets and return on equity of the firms selected from Nigeria exchange market (Odubuasi et al., 2020). Meanwhile Egbunike and Okerekeoti (2018) found that interest rate has no significant effect on the financial performance of firms in Nigeria.

- Foreign exchange rate and financial performance of firms

Exchange rate fluctuation was found to be positive and statistical significant on return on investment (Haney, 2018). Is was implied that the rising rate of interest rate would cause a significant increase on the return on investment of listed firms on Nigeria stock exchange (Haney, 2018). Similar result came from Ihsan et al. (2018), where they reported that exchange rate has significant effect on the value of firms that are listed on the Pakistan stock market. They applied generalised least square estimation technique as the method of analysis on their empirical investigation of the relationship between exchange rate exposure and value of firms listed on the Pakistan exchange market (Ihsan et al., 2018). Another result more again shows that exchange rate have positive effect on the financial performance of food, beverage and tobacco sector as listed on the Nigeria exchange rate (Agubata&Odubuasi, 2018). However, a study from Zambia shows that exchange rate has both long run and short run effect on the firms listed on the Zambia stock market (Musawa & Mwaanga, 2017). The study that was conducted in Turkey reported that foreign exchange rate has significant effect on the performance of banks in Turkey as they applied generalised autoregressive conditional heteroscedasticity technique of analysis (Ekinci, 2016). Nonetheless, Muriithi et al. (2016) found that exchange rate is a strong determinant of profitability

of banks in Kenya. They came out with the result that rising rate in exchange rate would lead to low performance in their operational measurement financially, therefore they conclude that exchange rate has significant and negative effect on the financial performance of commercial banks listed on the Nairobi stock exchange (Muriithi et al., 2016). Similarly, Odubuasi et al. (2020) conducted investigation on the effect of market risk and performance of firms listed on the Nigeria stock market from which they found that foreign exchange rate changes impacts significantly on the return on assets and return on equity of oil and gas firms listed on the Nigeria stock market. The postulation is that increases in exchange rate inhibits the expected financial performance of the firms in Nigeria.

- Commodity price change and financial performance of firms

The study by Risman et la. (2017) found that commodity price has direct and indirect effect on the value of firms in South Africa through the mediation of business risks. They proxy commodity price with crude oil, coal, crude palm oil, gold nickel and tin. The study in Nigeria by Alao and Oloni (2010) made an empirical finding that commodity price has positive and significant effect o the value of Nigerian firms. The study emanated from their investigation of impact of commodity price changes on the financial performance of drink service industry as listed on Nigerian exchange market. Northafiza et al. (2014) investigated the effect of commodity prices, interest rate and exchange rate on the stock market performance of firms listed on the Malaysian stock market. They made an empirical submission that commodity price has positive significant effect on the stock market index of the economy. Abramov andKholodili (2019) found that market risk has significant effect on the volatility of Russian commodity price. Meanwhile, Odubuasi et al. (2020) in their research that investigated the effect of market risk on the performance of firms listed on the Nigeria exchange market made an empirical discovery that, commodity price changes has no significant effect on the performance of those firms as sampled. Darko and Kruger (2017) has their result that insisted that oil price has positive significant effect on the financial performance of firms as was measured with return on assets, return on equity and earnings per share of USA firms. The result from the empirical investigation that was conducted by Bagirov et al. (2017) show that Crude oil price has significant positive impact on the performance of listed oil and gas firm in Western Europe. However, their study was majorly a theoretical review based undertaken and the study did specifically review the extant literature on firms listed on Belgium stock exchange (Bagirov et al., 2017). From Nigeria was discovered the empirical result that posit that exchange rate highly submissive to the movement in oil prices in Nigeria economic disposition as was found from the implementation of Johansen estimation technique, co-integration rank model and vector error correction model methodology, on the data generated from 1970 to 2011 fiscal years (Ogundipe*et al.*, 2014).

- Empirical Review

Oke and Tiamiyu (2022) assessed credit risk, market risk and financial performance of selected deposit money banks in Nigeria which span from 2008 to 2017. The study used return on equity (ROE) as proxy for bank financial performance; non-performing loans ratio and loan loss provisions ratio as proxies for credit risk; and net interest income ratio and foreign currency ratio as proxies for market risk. The study took sample of twelve deposit money banks listed on the Nigeria exchange market and extracted secondary data from the annual reports of the banks as well as the statistical bulletin of Central Bank of Nigeria. Random effect model of the panel regression analysis was engaged in data analysis whereas the results imply that non-performing loan ratio (credit risk) has negative statistically significant effect on return on equity of the banks sampled. Their work and the current work are related in that both studies look at performance of stock market. However, both studies differ in their method of analysis. Why their study made use of panel regression, this current study made use of both regression analysis and descriptive percentage

Ogunmuyiwa and Ekpo (2021) analyzed the impact of market risk on exchange rate volatility in Nigeria using a generalized autoregressive conditional heteroscedasticity (GARCH) model. The study found that market risk had a significant impact on exchange rate volatility, with the impact being asymmetric, with negative shocks having a greater effect than

positive shocks. The study and the present study are related in that both study focus on market risk. On the other hand, both study differ from one another in terms of their method of analysis. The current study made use of descriptive analysis while their made use of autoregressive conditional heteroscedasticity (GARCH) model

Lara-Rodríguez and Moreno-García (2020) studied the impact of market risk on Mexican corporate bond yields using panel regression analysis. The study found that market risk had a significant impact on bond yields, with the impact varying across different sectors and credit ratings. Both studies are related in terms of their objective in that both of the study look at market risk. However, both studies differs from one another in their method of data analysis.The current study made use of descriptive analysis but theirs made use of regression analysis.

Arbunde*et al.* (2020) investigated impact of interest rate on the financial performance of listed manufacturing firms in Nigeria from 2009 to 2018. The study proxy dependent variable, financial performance by return on assets (ROA) and return on equity (ROE), while the independent variable was interest rate. They sourced for secondary data of financial performance from the annual reports of 28 manufacturing companies sampled for the period. However, data for interest rate was extracted from the Central Bank of Nigeria (CBN) statistical bulletin. The nature of the study made the researchers to employ correlation research design. The further adopted panel multiple regression technique to analyses the data and the result imply that Interest rates has a significant impact on ROA. Moreover, the interest rate has no significant impact on ROE of listed manufacturing firms in Nigeria. Both studies are related in their variable as both of them use ROA and ROE variable. On the other hand, both study differ in their method of analysis. The present study made use of descriptive analysis while theirs used penal regression analysis.

Odubuasi*et al.* (2020) investigated the effect of market risk on the financial performance of firms listed on the Nigeria stock exchange that spans from 2014 to 2018 financial years. The market risks components investigated included interest rate, foreign exchange rate, commodity price changes and equity price changes whole firm performance was proxy with return on equity and return on assets. The study employed causal research design that enabled collection of secondary data from the annual reports of the firms and CBN statistical bulletin. The study was anchored on the twelve listed oil and gas firms on Nigeria stock exchange and the data collected were analyzed with the help of descriptive statistics, correlation and regression technique of estimation. The result show that exchange rate impacts significantly on ROA and ROE of oil and gas firms in Nigeria. Interest rate has significant impact on ROE but Insignificant impact on ROA, commodity price change and equity price change both have no significant impact on ROE and ROA of oil and gas firms on Nigeria stock market. The both studies are related in terms of method of data analysis as both studies used descriptive analysis. However, both studies differ in their year of study.

Setiawanta et al. (2020) investigated the association among financial performance, exchange rate, and firm value on the public companies listed on Indonesian stock exchange as at 31st December 2017. The study measured independent variable with capital structure and return on equity, while they proxy dependent variable with Tobin's Q, Economic market value and Economic book value, finally they moderated the relationship between the two variables with exchange rate. However, fifty non-financial companies were sampled over four years leading to total observation of 200. The data collected were analysed with descriptive statistics, correlation and panel regression estimation. The result therefrom indicate that a significant influence of capital structure and profitability is on firm value.

Karugu et al. (2020) analysed the effect of market risk and firm size on financial performance of microfinance institutions in Kenya that span from 2014 to 2018. The study engaged explanatory non-experimental research design and the study population is the thirteen registered deposit taking microfinance institutions. Secondary data was collected from the annual reports of the firms and was analysed with multiple regression estimation technique. The empirical outcome therefrom show that market risk has positive statistical significant

effect on the performance of firms as represented by ROE. Meanwhile firm size has negative insignificant effect on return on equity of the microfinance institutions sampled.

Kassi *et al*. (2019) investigated the effect of market risk on financial performance of non-financial companies listed on the Moroccan stock exchange from 2000 to 2016. The study proxy independent variables with financial leverage, book-to-market ratio and gearing ratio while the dependent variable was measured with return on assets, return on equity and profit margin. Secondary data were collected for the study and was analysed with panel OLS with its fixed and random effect models, the difference GMM and system-GMM models which produced the results that indicate that the different measures of market risks have significant negative effect on the financial performance of the firms studied.

Osho and Efuntade (2019) determined the effect of exchange rate fluctuation on the financial performance of multinational organizations in Nigeria ranging from 2001 to 2018. Ex post facto research design was adopted which allowed collection of secondary (ROA; dependent variable) data from the annual reports of the selected firms. The data for the independent variables (exchange rate, inflation rate and interest rate) were collected from the CBN bulletin. The data collected were analysed with linear regression estimation and the empirical findings show that none of the independent variables has significant effect on the performance of multinational firms.

Abramov and Kholodilin (2019) examined the impact of market risk on commodity price volatility in Russia using a vector error correction model. The study found that market risk had a significant impact on commodity price volatility, with the impact varying across different sectors of the economy.

da Silva *et al.,* (2019) investigated the Impact of Market Risk on Brazilian Stock Returns Country of Research: Co-integration Analysis was used The study found that market risk had a significant impact on the returns of Brazilian stocks, and that the impact was stronger in the short-term than in the long-term .

Zainol and Rahman, (2019) examined market Risk and Stock Returns in Malaysia Country of Research, GARCH was used. The study found that market risk had a significant impact on the returns of Malaysian stocks, and that the impact was stronger during periods of market turmoil

Zainol and Rahman (2019) investigated the impact of market risk on Malaysian stock returns using a GARCH model. The study found that market risk had a significant impact on stock returns, with the impact being stronger during periods of market turmoil.

Meng *et al.* (2018) examined the effect of market risk on Australian real estate investment trust (REIT) returns using panel regression analysis. The study found that market risk had a significant impact on REIT returns, with the impact varying across different property sectors.

Olofsson and Ögren (2018) analyzed the impact of market risk on bank stock returns in Sweden using factor analysis. The study found that market risk had a significant impact on bank stock returns, with the impact being stronger for larger banks than for smaller ones.

Olofsson and Ögren, (2018) examined the impact of Market Risk on Bank Stock Returns in Sweden Country,Factor Analysis was used. The study found that market risk had a significant impact on the returns of Swedish bank stocks, and that the impact was stronger for larger banks than for smaller ones

Riza *et al*., (2018) examined market Risk and Stock Returns in South Africa Country of Research: Time-Varying Parameter Regression was used. The study found that market risk had a significant impact on the returns of South African stocks, and that the impact varied over time and across different sectors of the economy

Nys *et al.,* (2018) examined Market Risk and Bank Profitability in France Country of Research. Panel Regression Analysis was used. The study found that market risk had a significant impact on the profitability of French banks, and that this effect was stronger during times of economic stress.

Meng *et al*., (2018) examined effect of Market Risk on Real Estate Investment Trust Returns in Australia Country. Panel Regression Analysis was used: The study found that market risk had a significant impact on the returns of Australian real estate investment trusts (REITs), and that the impact varied across different property sectors

Cruz-Rodriguez and Urrutia, (2018) investigated Market Risk and Stock Returns in Spain Country of Research: Markov Regime-Switching Model was used. The study found that market risk had a significant impact on the returns of Spanish stocks, and that the impact varied across different market regimes

Haney (2018) empirically examined the effect of exchange rate fluctuations on the performance of some firms listed on the Nigeria stock exchange market. The study used Ordinary Least Square (OLS) regression technique on the panel data generated from 2012 to 2016. They found that exchange rate fluctuation possess a significant positive impact on the returns on investment of the firms sampled.

Egbunike and Okerekeoti (2018) examined the influence of micro economic factors that rages from interest rate, inflation rate, exchange rate and the gross domestic product growth rate on the financial performance of firms quoted manufacturing firms on the Nigeria stock market. The study used firm characteristics proxy like firm size, leverage and liquidity. The dependent variable financial performance was proxy by return on assets (ROA). The study used the ex post facto research design and the population comprised all quoted manufacturing firms on the Nigerian Stock Exchange. The sampled firm used was from consumer goods sector, selected using non-probability sampling method. The study used multiple linear regression as the method of validating the hypotheses. The study found no significant effect for interest rate and exchange rate, but a significant effect for inflation rate and GDP growth rate on ROA. Second, the firm characteristics showed that firm size, leverage and liquidity were significant. The study recommended that managers should effectively consider interest rates in making borrowing decisions as it might affect the cost of debt.

Ihsan, Rshid and Naz (2018) made an assessment on the relationship between exchange rate exposure and firm value on domestic firms comparatively with multinational firms (all non-financial firm) listed on the Pakistan Stock Exchange (PSE). The sample of the unbalanced Panel data of the 232 selected nonfinancial firms were collected, from Pakistan Stock Exchange and the State Bank of Pakistan Statistical Bulletin, for fifteen years covering 2000 to 2014 from and generalized least square estimator was applied to overcome the problem of heteroskedasticity. Their results show that exchange rate variations have a significant effect on the firm value and firms are exposed significantly to one-period lagged variation in the exchange rate. More so, the findings disclose that multinational firms experience greater exchange exposure in comparison with domestic firms.

Williams (2018) he investigated the impact of exchange rate fluctuations on firm's performance in Nigeria. Having noted the impact of exchange rate fluctuation from the literatures, it became paramount to investigate the impact in the Nigeria context. In this study, seven research questions were formulated which led to the test of seven hypotheses. The major objective of the study was to empirically investigate the impact of exchange rate fluctuations on return of investment. The study makes use of descriptive and ordinary least square methodology. The scope of the study is 2012 to 2016 on a panel data. From the study, the exchange rate plays a significant impact on Return on Investment as most of the banks are involved in exchange rate transactions. The regression result shows that there is a positive relationship between Return on Investment and exchange rate.

Agubata and Odubuasi (2018) investigated the effect of exchange rate fluctuation on the financial performance of manufacturing firms in selected African Countries, sampling the eight firms within the food, beverage and tobacco sector of economy. Ex post facto research design was employed and time series and samples were collected from central Bank of Nigeria Statistical Bulletin and the financial statements of firms which spanned from 2015 to 2014. Ordinary Least Square (OLS) multiple regression estimator was used the results indicate that

exchange rate inflation rate have positive effect on the financial performance of the sector where as interest rate has negative effect on the food, beverage and tobacco sector.

Hasan *et al*. (2018) examined the impact of some selected macroeconomic variables on the performance of 32 non-life insurance companies of Bangladesh over the period of 7 years (2009–2015) giving rise to 224 panel observations. Two performance measures, like return on asset (ROA) and return on equity (ROE) were used as dependent variables. The explanatory variables were inflation rate, GDP growth rate, interest rate, and exchange rate. The research employed panel data regression methodology. The regression results suggested that inflation rate, GDP growth rate and exchange rate, except interest rate, had no statistically significant influence on the performance of non-life insurance companies. The study recommended that interest rate along with firm-specific factors(age, sizes, loss ratio, solvency margin, tangibility of assets) should be identified as determinants of the performance of the Bangladeshi non-life insurance companies.

Sathye &Bartleet, (2018) examine market Risk and Industry Performance in the UK Country of Research. Principal Component Analysis was used. The study found that market risk had a significant impact on the returns of UK firms, and that the impact varied across different industries

Basher *et al.,* (2017) examined the impact of Market Risk on German Stock Returns Country of Research. Vector Autoregression Model analysis was used. The study found that market risk had a significant impact on the stock returns of German firms, and that this effect was stronger during periods of market turbulence

Darko and Kruger (2017) found that crude oil prices have positive and significant impact on the accounting returns (ROA, ROE and EPS) of the reviewed firms. Their study was prompted by the fact that earlier investigations into the effect of crude oil fluctuations had been on country by country bases, and they demanded to ascertain how the result will be when the major oil companies of the world, which would cut across countries, feel the effect of changes in the crude oil prices on their profitability. Their study covered top 20 oil and gas companies from 2012 to 2016 as was reported by Forbes annual reports of 2016, but panel data was collected from the 8 of companies that reported their accounts on the IFRS formats. The data was analyzed using (OLS) panel regression model, random effect and fixed effect estimation of establish the cause effect relationships between the explained and explanatory variables.

Risman, Salim, Sumiati and Indrawati (2017) evaluated the effect of commodity prices (crude oil, coal, crude palm oil, gold nickel and tin), exchange rate and investment on the firms' value, either directly or indirectly through mediation of business risk. The study covers a sample of 25 mining and agricultural firms listed on the Indonesian Stock Exchange spanning through 2010 to 2014 that gives a panel balanced data of 5 years, which generated 125 observations. A plat Analysis was developed which concurred with regression model adopted for study. The result obtained by applying common effect approach for panel data on the path analysis model indicate that oil prices and exchange rate affect the firms value either directly or indirectly though business risk as mediation variable, but risk does not mediate the effect of the investment on the firms' value.

Bagirov and Mateus (2017) expanded the understanding of the relationship between oil prices, stock markets and firm performance on Europe stock. Their study was in three stages; firstly they investigated the effect of oil price and Stop Market in Europe. The study was also conducted on market level. Finally, they examined the impact of crude oil price changes on the financial performance measure of oil and gas firms, both listed and unlisted from the Western European region. Their results indicate the presence of one directional relationship between oil and most of the European markets. More so the results show spillovers volatility between returns in oil price and stock markets. Crude oil price has significant positive impact on the performance of listed oil and gas firm in Western Europe.

Musawa and Mwaanga (2017) employed descriptive statistics, Auto Regression Distribution lag bound

test, and Vector Auto Correction base co-integration model to analyses data generated, in assessing the effect of commodity prices, interest rate and exchange rate on the performance of Zambian stock exchange from 2004 to 2016. The results have it that exchange rate, interest rate, copper and oil price jointly have long run and short run effect on the Zambian stock market. But on the individual variables, interest rate and copper price have long run significant effect on the Lusaka Stock Market, thought in a short run, only copper price and exchange rate immediate effect on the Lusaka Stock Market.

III. METHODOLOGY

- Research design

Expo facto (after the event) research design was adopted considering the specific objectives and the panel statistical technique that is to be applied.

This design is considered to be appropriate for the study because of variables are related and the data exists and cannot be manipulated. The independent variable proxies of this study will be measured against the dependent variable.

- Area of study

This study covers active quoted oil and gas firms in the African stock market for a period of ten years starting from 2012 to 2021. This period provoked the study because of the economic depression witnessed generally in the world economy within the period.

- Sources of data collection

The data for the study was obtained from the audited annual corporative reports and economics of sampled quoted oil and gas firms in the African stock market within the chosen period of the study. Secondary data was used since studies have proven the validity and reliably of the empirical result using secondary data.

- Population of the study

The population of this study consist of 10 active quoted oil and gas firms in the African Stock market as at 31st December 2021.

The active quoted oil and gas firms as at 31st December 2021are as follows:

S/N	Oil and gas firms	country
1	African Clean Energy Solution	Mauritius
2	(ACES.mu)	
3	Conoil Nigeria plc (CONOIL.ng)	Nigeria
4	Eterna Nigeria plc (ETERNA.ng)	Nigeria
5	MRS oil Nigeria plc (MRS.ng)	Nigeria
6	Seplat Energy Marketing Nigeria plc	
7	(SEPLAT.ng)	Nigeria
8	Total Energy Marketing plc	
9	(TOTAL.ng)	Nigeria
10	Swala oil and gas (SWALA.tz)	
	Tol gases ltd (TOL.tz)	Nigeria
	Umeme ltd (UMEME.ug)	
	Puma Energy Zambia plc	Tanzania
	(PUMA.zm)	
		Tanzania
		Uganda
		Zambia

Source: African Stock Market, 2022

- Sample size of the study

The entire population of the study constitute the sample size. This imply that the entire population is our sample size.

- Method of data analysis

Panel data regression model was adopted in order to control for individual unobserved heterogeneity, obtain more accurate results because it provides more observations and information to work with, it allows a follow up on individual dynamics and before and after effect can be easily estimated (Temple, 1999; Woodridge, 2002; and Hsiao, 2003 as cited in Alajekwu, 2018). Cross-sectional and time series data are pooled in the regression to overcome the problem of insufficient degree of freedom.

Decision rule for regression analysis: It is interpreted as the proportion of the variance in the dependent variable that is predictable from the independent variable. Its decision rule is +1 or -1.

- The coefficient of determination ranges from 0 to 1.
- An R^2 of 0 means that the dependent variable cannot be predicted from the independent variable.
- An R^2 of 1 means the dependent variable can be predicted without error from the independent variable.

An R^2 between 0 and 1 indicates the extent to which the dependent variable is predictable. An R^2 of 0.10 means that 10 percent of the variance in *Y* is predictable from *X*; an R^2 of 0.20 means that 20 percent is predictable; and so on. For analyzing secondary data using regression analysis, it is interpreted as the proportion of the variance in the dependent variable that is predictable from the independent variable. Its decision rule is +1 or -1.

- Econometric Model

The static model assumption was utilized in the analysis using econometric model in order to capture the problem of time and firm variation of panel data set. The econometric model assumes that the dependent variable (financial performance) is a function of the independent variable (market risk).

- Panel Ordinary Least Square (PLS)

Panel Least Square method is applied when firm specific effects are variant over time and there are time specific effect. Omitted variable bias may lead to unobserved heterogeneity (Data limitation or ignorance, unobserved variables) in a panel data model. The observed heterogeneity may be ignored, proxy variables may be used to measure it but may include errors. Alternatively, this study assumed that the omitted variable is constant over time in panel data model and used fixed effects or random effects to control the unobserved heterogeneity(Shin, Ennisand Spurlin, 2015; Olowalaju and Ogunsan, 2016; Ellis and Jordi, 2016; Khalid, Arshad and Abdul, 2017; Alajekwu, 2018).

- Fixed Effects Model (FEM)

Fixed panel effect test are conducted when the same individual or entities are observed for each period and when there is heterogeneity or individual effect that may or may not be observed. Thus, may lead to firm specific unobserved characteristics that may be correlated with the explanatory variables in the model. Thus, the Fixed Effects model (FEM) can be used to control the unobserved characteristics.

- Random Effects Model (REM)

Random effects model (REM) assumes that firm specific characteristics are not constant and the time effects are absent.

- Model Selection

Panel regression analysis (PLS regression) and Panel data analysis (fixed and random effects model) were conducted to choose the appropriate analytical technique.

- Fixed Effects and Random Effects Test

The Hausman's specification test in Panel data model was conducted for fixed and random effects test of individual characteristics or time effect. The core difference between fixed and random effect models lies in the role of dummy variables.

- Decision Rule: At 0.05 level of significance, if the probability value of the chi-square is greater than 0.05, the estimation will be based on the Random effects model (REM) and if the probability value of the chi-square is less than 0.05, the estimation will be based on the fixed effects model. (FEM).

IV. MODEL SPECIFICATION

The study adopted two deferent models to achieve the set objectives of the study. The first model captures the direct relationship between interest rate (INTR), foreign exchange rate (XCHR), commodity price (COMP) Equity price, (EOUP) and Inflation rate (INFR), control by firm age (FAGE), the moderating (FSIZE) variable with return on Assets (ROA) without moderation.

This first model is adopted from the Odubuasi, Uduak &Ifurueze (2020), stated as:

ROA = F (INTR, XCHR, COMP, EQUP, WOCP)

Econometrically this model will be modified to state our first model without moderation as:

$ROA = a + B_1INTRit + B_2XCHRit + B_3COMPit + eit$ …….. Model

Where:
$B_1B_2B_3B_4B_5$ = Coefficient of Proxies of independent variable
B_6 = A Coefficient moderating variable .
B_7 = A Coefficient of control variable
ROA = an indicator representing return on asset (proxy for dependent variable.
BINTR = Interest rate
BXCHR = Exchange rate
BCOMP = Commodity price
Apriori expectations: B_1,B_2, B_3, B_4, B_5, > 0

The second model for the study with moderation will be specified to establish the indirect relationship of the independent variable market risk moderated by firm size. In the second model both direct and indirect relationships of interest rate (INTR), foreign exchange rate (XCCHR), commodity price (COMP), Equity price (EQOUP), Inflation rate (INFR) firm size (FSIZE) firm age (FAGE) as they affect return on assets(ROA), will be established.

Baron and Kenny (1986) opined that if the effect of the independent variable on the dependent variable varies linearly, the best analytical procedures for testing moderation effects for a continuous variable is to regress the dependent variable (Y) against the independent (X). Accordingly, the moderating effects will be indicated by the significant effect of XZ while X and Z are controlled. This second model is to be adopted from the works of Barbra (2016) and is to be modified thus:

ROA = F (INTR + XCHR + COMP+ EQUP + INFR + FSIZE*INTR + FSIZE* XCHR +FSIZE* COMP + FSIXE* EQUP + FSIZE* INFR + FAGE
Econometrically, the above function will be rewritten as :
$ROA_{it} = a + B_1INTR_{it} + B_2XCHR_{it} + B_3COMP_{it} + B_4EQUP_{it} + B_5INFR_{it} + B_6FSIZE_{it}*INTR_{it} + FSIZE_{it}* + B_7XCHR_{it} + FSIZE_{it}* B_8COMP_{it} + FSIXE_{it}* B_9EQUP_{it} + FSIZE_{it}* B_{10}INFR_{it} + B_{11}FAGE_{it} + eit$…….. model 2.
Where:
ROA = an indicator representing return on assets proxy for Dependent variable
BINTR = a predictor representing independent variable (Interest rate)
BXCHR = a predictor representing independent variable (exchange rate)
BCOMP = a predictor representing independent variable (commodity price)
BEQCUP = predictor representing independent variable (Equity price)
BINFR = predictor representing independent variable (Inflation Rate)
FSIZE = predictor representing moderating variable (Firm size)
FAGE = predictor representing control variable (Firm age)
eit = stochastic error term
i = firm
t = periods
F = Functionality
Aprori expectations: B_6,B_7,B_8,B_9,B_{10}> 0

V. RESULTS

Table 1: Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
ROA	79	.7078377	26.4026	-19.45	18.45
EXR	80	755.1716	1147.178	5.15	3727.1
INTR	77	7.423766	5.244648	-3.7	21.5
COMPR	80	63.87713	20.06161	39.68	97.98

Source: Stata 2014 output

The descriptive statistics of the data as presented in table 4.2 above observed that, return on assets (ROA) has a mean of 0.7078 with maximum and minimum values of 18.45 and -19.450 respectively. The values indicated that wide variation exists among the oil firms in their earning potentials across the nations as the standard deviation is higher than the mean value. Exchange rate (EXR), has mean value of 755, which

means that among the countries of the study, the average exchange rate to US dollar is 755. The minimum and maximum exchange rate is 5.15 and 3727.1 respectively.Interest rate (INTR) has average value of 7.42%, maximum value of 21.5% and minimum value of negative 3.7%, the standard deviation 5.24 also proves that the values cluster around the mean and are not widely dispersed. Finally, commodity price (COMPR) shows average value of 63.88 US dollar, with maximum value of $ 97.98 and minimum value of $39.68. The standard deviation of 20.06 that is lower than the mean value invariably shows that the values clustered around the mean, therefore are not dispersed.

- Discussion of results
- Interest rate changes

Result that was generated from the study has shown that interest rate has positive impact on the financial performance of oil and gas firms listed on the African stock market. Interest rate is not a major determinant of financial performance of oil and gas firms listed on African stock market but it has weak influence of their performance. Nonetheless, the result does agree with the finding made by Agubata and Odubuasi (2018), which found interest rate to be insignificant on the financial performance of food, beverage and tobacco sector of Nigerian economy. The finding of Agubata and Odubuasi (2018) and that of this present study point to the direction that interest rate is not a serious factor to look at, when making decision on how to increase the financial performance of oil firms. The result contradicts that of Musawa and Mwaanga (2017), which come out with the result that interest rate is a major determinant factor in valuing the stock market of Zambia. Be that as it may, interest rate may have to affect the loan obtained for the business operations of the enterprise. To this length, interest rate may affect highly levered companies because of services the existing fund borrowed. But a company that is lowly geared would not have much challenge with fluctuation in exchange rate, Hence, the reason for the insignificant of interest rate on the financial performance of oil and gas firms listed on African stock market. On the other hand, Odubuasi*et al*. (2020) in contradiction to the finding of this present study, came out with the result that posits that Interest rate is unequivocally important for companies listed on Nigerian oil and gas sector to make profit. The reason for the diversification on the two results may be for the fact that Odubuasi*et al.* (2020) used data from companies listed on oil and gas sector of Nigerian economy alone, while this present study centered on the wider companies across many African nations as were listed on the African stock market.

- Exchange rate

Result indicates that exchange rate with P-statistics value of 0.000 has expressed to be significantly associated with financial performance of oil and gas firms on African market. The result expressly indicated that decisions that relate to profit improvement of oil and gas firms on African stock market must include exchange rate fluctuation. Hence exchange rate is a major determinant of the changes in financial performance and position of the firms. This result is interestingly reflecting theory and real practice because the companies in question are trading on international markets. Therefore, it is expected that the fluctuation in exchange rate would have direct impact either on the amount of transactions of the company. Meanwhile, this result has concurred with some findings as obtained in extant literature. For instance; the result of this study agrees with the result of Haney (2018) that affirm that foreign exchange rate has statistical positive significant effect on the return on investment of firm listed on Nigeria stock exchange. The directional relationship attributable to foreign exchange rate implies that increase in the exchange rate would cause a corresponding increase on the values of merchandise and other assets of the enterprise, which would increase the financial performance in the same measure and vice versa. Similar and concurring result was also found in Pakistan where exchange rate was reported to empirically have significant effect on the value of firms listed on Pakistan exchange market (Ihsan et al., 2018). Additionally, (Ekinci, 2016) recorded an empirical result that posits in agreement to this present study that foreign exchange rate has statistical significant effect on the financial performance of Turkish banks listed on its stock exchange. The study on oil and gas sector on the Nigerian exchange market shows a corroborating result that exchange rate has significant influence on its associated firms. These results are concertedly pointing to a practical reality of what exchange rate

fluctuation does to business operations and profitability as the end result. Again, supposing that the business just bought its inventory of wares and suddenly realises that a fall in exchange rate occurred. This would generate large loss of fund to the business and these amounts to the positive significant association that is empirically reported in the findings. On this note foreign exchange rate becomes indispensable in the decision to improve financial performance of oil and gas firms listed on African stock market as this study sampled.

- Commodity price change

The result indicated that commodity price changes has P-value of 0.022 that has shown that commodity price is another important factor to consider when deciding for a profitability of oil and gas firms listed on the African market. Just like last market risk component discussed, the empirical outcome of commodity price change reflects practical reality on the effect of commodity price changes on the profitability of firms. Note that commodity prices are the prices of mostly raw material items like crude oil, palm oil, tin, cotton, wheat, iron, rubber, copper, gold, cool, fisheries and others. They are basically products engaged in manufacturing processes. The prices of these items would certainly affect the operations of business activities of the enterprise even to the point of determining the outcome that is the profit. Hence, the reason that commodity price changes is significantly affecting the financial performance of oil and gas firms listed on the African stock market. The study result however, concurs with the prior studies made by Risman et al. (2017) who reported that commodity price has direct and indirect impact, as was moderated by business risk, on the performance of firms listed on South African stock market. The study also agrees with the finding made by Alao and Oloni (2010), who submitted an empirical result that posit that commodity price has significant effect on the financial performance of drink service firms listed on Nigerian stock market. More corroborating evidence was provided by Northafiza et al. (2014), who submitted that commodity price has positive statistical significant effect on the firms listed on the Malaysian stock exchange. Other concurring result is Bagirov et al. (2017), which shows that Crude oil price has significant positive impact on the performance of listed oil and gas firm in Belgium stock exchange, Western Europe. Darko and Kruger (2017) has their result that insisted that oil price has positive significant effect on the financial performance of firms as was measured with return on assets, return on equity and earnings per share of USA firms. Among all these corroboratively supporting results, Odubuasi et al. (2020) has a contradictory result, which made an empirical submission that commodity price as was measured by crude oil price does not have significant effect on the financial performance of oil and gas firms listed on the Nigerian stock exchange. This disagreeing finding cold be because, crude oil is not the raw material of those companies besides, the government through exports the crude as its major source of revenue which would not have direct effect on the performance of the individual companies operating within the economy, rather would have on the nation's economic revenue and budget execution. Therefore, the result that commodity price change have significant influence on the financial performance of oil and gas firms listed on African stock market is an empirical result that reflects on the practical reality of the region.

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